2025

URBAN WATER MANAGEMENT PLAN

Crescenta Valley Water District, CA

WEST&ASSOCIATES
ENGINEERING, INC.

2025

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Crescenta Valley Water District, CA

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Table of Contents

Section 1: Introduction 15

1.1. PURPOSE AND SUMMARY 15
1.2. COORDINATION 18
1.3. DWR UPDATES FOR THE 2025 UWMPS 20
1.4. UPDATES TO THE DISTRICT'S UWMP 21
1.5. FORMAT OF THE 2025 UWMP 22
1.6. LAY DESCRIPTION 24

Section 2: Service Area Description 25

2.1. DISTRICT AND WATER SYSTEM HISTORY 25
2.1.1. Early Stages 25
2.2. CURRENT WATER SERVICE AREA 26
2.3. LAND USE & ECONOMY 27
2.3.1. District Land Use 27
2.4. CLIMATE 29
2.4.1. Climate Change 30
2.5. POPULATION 31
2.5.1. Service Area Population 31
2.5.2. District Population Forecasts 32
2.5.3. Adjusted Population Forecasts 32
2.6. WATER SYSTEM 33
2.6.1. Water System Background 33
2.6.2. District Water System Overview 33
2.6.3. Groundwater and Imported Water 33

Section 3: Water Sources and Supplies 39

3.1. INTRODUCTION 39
3.2. IMPORTED WATER SOURCES 39
3.2.1. Colorado River Water Supply History 40
3.2.2. Early Canal Systems 42
3.2.3. Colorado River Water Rights 42

3.2.4. MWD'S Colorado River Rights 43
3.2.5. BAY-DELTA 44
3.2.6. Bay Delta Conveyance Project 44
3.2.7. State Water Project (Aqueduct) 45
3.3. IMPORTED WATER PURCHASES 48
3.4. GROUNDWATER SOURCES 49
3.4.1. Verdugo Groundwater Basin 49
3.5. GROUNDWATER PRODUCTION 52
3.6. ROSEMONT PRESERVE STORMWATER RECHARGE PROJECT 53
3.7. PROJECTED WATER SUPPLIES 54
3.7.1. Planned/Projected Supply Projects 55
3.8. ALTERNATE WATER SOURCES 55
3.8.1. Greywater 55
3.9. TRANSFERS OR EXCHANGES 56
3.10. ENERGY INTENSITY OF SUPPLY 56
3.11. RELIABILITY OF SUPPLIES 57

Section 4: Recycled Water Opportunities 59

4.1. OVERVIEW 59
4.2. WASTEWATER COLLECTION SYSTEM 60
4.2.1. Wastewater Treatment 60
4.3. RECYCLED WATER 60
4.3.1. Potential Recycled Water Use 61

Section 5: Water Quality 63

5.1. OVERVIEW 63
5.2. WATER QUALITY STANDARDS 63
5.2.1. Federal Regulations 63
5.2.2. State Regulations 64
5.2.3. State Drinking Water Standards 64
5.2.4. Hexavalent Chromium (Cr6) 65
5.2.5. District Standards 65
5.3. QUALITY OF WATER SOURCES 66

5.3.1. Imported Water Quality 66
5.3.2. Groundwater Quality 67
5.4. IMPACTS OF WATER QUALITY 68
5.4.1. Impacts of Abandoned Wells 68
5.4.2. Groundwater Contamination Response 72
5.4.3. Sanitary Surveys by DDW 72
5.4.4. Impacts on Management & Reliability 73

Section 6: Water Use 75

6.1. OVERVIEW 75
6.2. COVID PANDEMIC'S EFFECT ON THE WATER SYSTEM 75
6.3. CURRENT DISTRICT WATER NEEDS 76
6.4. CLIMATE IMPACTS ON WATER USE 76
6.4.1. California Water Plan Update 2023 78
6.5. WATER USE 78
6.5.1. Past Water Use 78
6.5.2. Recent Water Use 79
6.6. WATER USE BY SECTOR 79
6.6.1. Service Connections/Accounts 79
6.6.2. Distribution System Losses 82
6.6.3. 2028 Water Loss Standard 82
6.7. URBAN WATER USE OBJECTIVE 83
6.7.1. Key Highlights from the Report 83
6.7.2. Objectives Calculated with Future Standards 83
6.8. WATER CONSERVATION ACT 84
6.8.1. Act Background (SBx7-7) 84
6.8.2. Exempt Agencies 85
6.8.3. SBx7-7 Baseline & Target 88
6.8.4. SBx7-7 Target Compliance 91
6.9. PROJECTED WATER DEMAND 91
6.9.1. Passive Savings 91
6.9.2. Low-Income Water Demands 91
6.9.3. Projected Water Use by Sector 92

Section 7: Reliability Planning 95

7.1. OVERVIEW 95
7.2. HISTORIC DROUGHTS 96
7.3. RECENT DROUGHT (2020-2022) 96
7.4. STATE WATER SUPPLY RELIABILITY 98
7.4.1. State Water Project (SWP) Reliability 98
7.5. COLORADO RIVER RELIABILITY 103
7.5.1. Competition for Water Rights 103
7.6. DISTRICT SUPPLY RELIABILITY 104
7.6.1. Reliability of Alternative Sources 105
7.7. DROUGHT RISK ASSESSMENT 105
7.7.1. Basis for Projected Demands 105
7.7.2. Basis for Projected Supplies 106
7.7.3. Tabular Comparisons 107
7.8. ENSURING ADEQUATE SUPPLY 117
7.9. WSCP SUPPLY AUGMENTATION 117

Section 8: Contingency Planning 119

8.1. INTRODUCTION 119
8.2. NEED FOR CONTINGENCY PLANS 120
8.2.1. Recent California Water Code Amendments 120
8.3. LEGAL AUTHORITY 121
8.4. WATER SUPPLY RELIABILITY ANALYSIS 121
8.4.1. WSCP Re-Adoption 122
8.5. District Staff Response 122
8.6. ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES 124
8.6.1. DECISION-MAKING PROCESS 124
8.6.2. KEY DATA INPUTS AND ASSESSMENT METHODOLOGY 125
8.6.3. LOCALLY APPLICABLE EVALUATION CRITERIA 125
8.7. SHORTAGE STAGES AND SHORTAGE RESPONSE ACTIONS 126
8.7.1. MWD STAGES OF ACTION 126
8.7.2. MWD WATER SUPPLY ALLOCATION PLAN (FOR WSDM SHORTAGE STAGE 7) 128

8.7.3. BASE PERIOD CALCULATIONS (USED TO DETERMINE WSAP REDUCTIONS) 129
8.7.4. WSAP ALLOCATION YEAR CALCULATIONS 129
8.7.5. FMWD SHORTAGE STAGES OF ACTION 131
8.7.6. Supply Allocation Formula Elements 131
8.7.7. Conservation Plan Ordinance 132
8.7.8. CVWD STAGES OF ACTION 133
8.7.9. PROHIBITIONS 133
8.7.10. CONSUMPTION REDUCTION METHODS 137
8.8. CATASTROPHIC SUPPLY INTERRUPTION 137
8.8.1. MWD Response 137
8.8.2. CVWD Response 138
8.8.3. SEISMIC RISK ASSESSMENT AND MITIGATION PLAN INTRODUCTION 140
8.8.4. CVWD LHMP 140
8.8.5. LHMP Goals and Objectives 140
8.8.6. SEISMOLOGY OF WATER FACILITIES & VULNERABILITY 141
8.8.7. Hazard Mitigation Plan 142
8.8.8. CVWD SEISMIC EVALUATION 143
8.8.9. MITIGATION ACTIONS 143
8.9. COMMUNICATION PROTOCOLS 144
8.9.1. COORDINATION 144
8.9.2. COMMUNICATION GOALS 146
8.9.3. COMMUNICATION PROTOCOL FOR CURRENT OR PREDICTED SHORTAGE 146
8.9.4. COMMUNICATION PROTOCOL FOR SHORTAGE RESPONSE ACTIONS TRIGGERED OR ANTICIPATED TO BE TRIGGERED 146
8.9.5. OTHER RELEVANT COMMUNICATION PROTOCOLS 146
8.9.6. CRISIS COMMUNICATION PROTOCOL 147
8.10. COMPLIANCE AND ENFORCEMENT 148
8.10.1. PENALTIES OR CHARGES 148
8.10.2. APPEAL REGARDING VIOLATIONS 149
8.11. LEGAL AUTHORITIES 149
8.11.1. FINANCIAL CONSEQUENCES OF WSCP IMPLEMENTATION 149
8.12. MONITORING AND REPORTING 150
8.12.1. SPECIAL WATER FEATURE DISTINCTION 151

8.13. WSCP ADOPTION AND REFINEMENT PROCEDURES 151
8.13.1. WSCP REFINEMENT PROCEDURES 151

Section 9: Conservation Measures 153

9.1. OVERVIEW 153
9.2. DWR DMMs FOR 2025 UWMPs 154
9.3. CalWEP BMPs 154
9.3.1. 2025 Updates to CalWEP BMPs 155
9.4. DISTRICT CONSERVATION MEASURES 155
9.4.1. DMM No. 1: Water Waste Prevention 158
9.4.2. DMM No. 2: Metering 160
9.4.3. DMM No. 3: Conservation Pricing 161
9.4.4. DMM No. 4: Public Education & Outreach 163
9.4.5. DMM No. 5: Programs to Assess and Manage Distribution System Real Loss 165
9.4.6. DMM No. 6: Water Conservation Program Coordination and Staffing Support 165
9.4.7. DMM No. 7: Other Conservation Measures 166
9.4.8. DMM No. 7a: Residential Programs 166
9.4.9. DMM No. 7b: Programs for CII Properties 168
9.4.10. DMM No. 7c: Large Landscape Programs 169
9.5. CONTINUED IMPLEMENTATION 170

List of Tables

Table 1.1: Coordination and Public Involvement 19
Table 2.1 Current Land Use & Economic Statistics for Los Angeles County 28
Table 2.2 Historical Climate (1918-2011) 29
Table 2.3 Recent Climate (2025) 29
Table 2.4 Crescenta Valley Water District Overall Population 31
Table 2.5 Crescenta Valley Water Service Area Projected Population 33
Table 3.1 Imported Water Supply 49
Table 3.2: Overall Groundwater Production 53
Table 3.3 Energy Reporting - Total Utility Approach 57
Table 6.1 District Past Water Use 79
Table 6.2 District Recent Water Use 79
Table 6.3 Service Connections (2025) 80
Table 6.4 Recent Water Demand by Sector (AF) 81

Table 6.5 Objectives Calculated with Future Standards 84
Table 6.6 Crescenta Valley Water District Water Use (GPCPD) 90
Table 6.7 Crescenta Valley Water District SBx7-7 2020 Water Use Targets 90
Table 6.8 Projected Water Demand by Sector 93
Table 7.1 Crescenta Valley Water District Water Supply Availability & Demand Projections Normal Water Year (AF) 108
Table 7.2 Crescenta Valley Water District Water Supply Availability & Demand Projections Single Dry Year (AF) 109
Table 7.3 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2026-2030) (AF) 110
Table 7.4 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2031-2035) (AF) 111
Table 7.5 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2036-2040) (AF) 112
Table 7.6 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2041-2045) (AF) 113
Table 7.7 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2046-2050) (AF) 114
Table 8.1: Water Allocation Percentages 130
Table 8.2: Water Supply Shortage Stages and Conditions – Rationing Stages 134
Table 8.3: Mandatory Prohibitions 134
Table 8.4: Consumption Reduction Methods 137
Table 8.5: Preparation Actions for Catastrophe 139
Table 8.6: Penalties and Charges 148
Table 8.7: Proposed Measures to Overcome Revenue Impacts 150
Table 8.8: Proposed Measures to Overcome Expenditure Impacts 150
Table 8.9: Water Use Monitoring Mechanisms 151
Table 9.1: Conservation Measures 156
Table 9.2: Water Conservation Alert System Codes 159
Table 9.3 Current Water & Sewer Rates (as of 7/1/2024) 162
Table 9.4 Past Water & Sewer Rates in 2020 UWMP (as of 09/01/2019) 163
Table 9.5: CII Retrofit Devices & Rebate Amounts under SoCal Water$mart Program 169

List of Figures

Figure 1.1 UWMPs are Governed by State Law 16
Figure 1.2 UWMP Act Establishment and Amendment 17
Figure 2.1 Crescenta Valley Water District Organization Chart (March 2026) 34
Figure 2.2 Crescenta Valley Water District – Water Service Area Map 35
Figure 2.3 Crescenta Valley Water District Pressure Zones 36
Figure 2.4 Los Angeles Zoned Districts (January 2022) 37
Figure 3.1 Parker Dam at Colorado River 40

Figure 3.2 Colorado River Basin and Diversion Structure 41
Figure 3.3 Bay Delta 44
Figure 3.4 Sacramento-San Joaquin Bay Delta 46
Figure 3.5 Aqueduct Systems in California 47
Figure 3.6 State Water Project 48
Figure 3.7 Local Groundwater Basins within the Upper Los Angeles River Area 49
Figure 3.8 Verdugo Groundwater Basin 50
Figure 3.9 MWD Service Area Map 51
Figure 3.10 MWD Reservoir Levels (May 2026) 52
Figure 3.11 Rosemont Preserve Stormwater Recharge Project 54
Figure 3.12 Greywater System 56
Figure 4.1 Los Angeles-Glendale Plant 60
Figure 5.1 MWD's Weymouth Treatment Plant Provides a Safe Supply of Water 66
Figure 5.2 Native Rock adds to the Salinity of the Colorado River Water Supplies 67
Figure 5.3 Well 10 Water Quality Sampling Cabinet 70
Figure 5.4 Basic Overview of Water Quality Testing and Response for Municipal Wells 71
Figure 6.1 Two Strike Park located in La Crescenta-Montrose 80
Figure 6.2 Current Water Demand by Sector (in 2025) 81
Figure 6.3 California's 2020 Water Conservation Goals 85
Figure 6.4 California's 2020 Water Conservation Goals 86
Figure 6.5 South Coast Hydrologic Region 87
Figure 6.6 Procedure for Determining Baseline Per Capita Water Use 89
Figure 6.7 Procedure for Determining Target Per Capita Water Use 89
Figure 6.8 Projected Water Demand by Sector (in 2050) 93
Figure 7.1 Governor Newsom at Lake Mendocino in Ukiah on April 21, 2021 97
Figure 7.2 Lake Oroville During Drought of 2020-2022 (October 4, 2022) 100
Figure 7.3 Lake Oroville After Drought (June 12, 2023) 100
Figure 7.4 California State Reservoir Levels (May 2026) 101
Figure 7.5 SWP Table A Deliveries 102
Figure 7.6 Projected Normal Water Supply: Year 2030 115
Figure 7.7 Projected Normal Water Supply: Year 2050 116
Figure 8.1 Basic Overview of Water Quality Contamination Response for City Wells 123
Figure 8.2: Sample Annual Assessment Decision-Making Process Timeline 125
Figure 8.3 MWD WSDM Surplus & Drought Stages 127
Figure 8.4: MWD's Diamond Valley Lake (Potential Reserves for WSAP Allocations) 129
Figure 8.5: The Five Phases of Emergency Management 140
Figure 8.6: Seismic Hazards within CVWD Service Area (California Geological Survey) 142
Figure 8.7: Pipeline Repairs Required after a Magnitude 6.9 Event (2020 Seismic Evaluation) 145
Figure 8.8: Probability of Damage to Facilities from a Magnitude 6.9 Event (2020 Seismic Evaluation) 145
Figure 9.1 CUWCC became CalWEP in January 2018 154
Figure 9.2 Agricultural Fallowing Helps Conserve Water in the Palo Verde Valley 155
Figure 9.3 Conservation Measures for 2025 UWMPs: CalWEP and DWR Compared 157
Figure 9.4 Water Waste is Prohibited by District Ordinance 158

Figure 9.5 Water Meter with AMI Technology 161
Figure 9.6 Residential Water Survey 166
Figure 9.7 High-Efficient Washing Machines 168
Figure 9.8 CIMIS Stations Measure Rainfall and ETo 170

Appendices

Appendix A	District Board Resolution Adopting 2025 UWMP
Appendix B	District Board Resolution Adopting 2025 WSCP
Appendix C	UWMP Act
Appendix D	Dept. of Water Resources UWMP Checklist
Appendix E	Dept. of Water Resources UWMP Data Tables
Appendix F	Dept. of Water Resources SBx7-7 Tables
Appendix G	UWMP Notices: 60-Day Notice, 2-Week and 1 Week Notices
Appendix H	Final Transmittals to County and State Library
Appendix I	ULARA Judgment
Appendix J	Rockhaven Well Operation & Water Sale Agreement
Appendix K	Crescenta Valley Water District Staff Report (Rosemont Preserve)
Appendix L	2021 Crescenta Valley Water District Hazard Mitigation Plan
Appendix M	2025 Recycled Water Feasibility Study
Appendix N	Crescenta Valley Water District Water Conservation Program

ACRONYMS

AAC	All-American Canal
Act	Urban Water Management Planning Act
AF	Acre-Feet
AFY	Acre-Feet per Year
AMI	Automatic Metering Infrastructure
AP	Allocation Plan
Basin	Verdugo Groundwater Basin
BDCP	Bay-Delta Conservation Plan
BMP	Best Management Practice
Board	Metropolitan Water District of Southern California's Board of Directors
CDP	Census Designated Place
CDPH	California Department of Public Health
CFS	Cubic Feet per Second
CII	Commercial/Industrial/Institutional
CIMIS	California Irrigation Management Information System
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVWD	Crescenta Valley Water District
CWC	California Water Code
DBPs	Disinfection Byproducts
DDW	Division of Drinking Water
DMM	Demand Management Measure
DOE	Department of Energy
DWSAP	Drinking Water Source Assessment and Protection
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
Eto	Evapotranspiration
FMWD	Foothill Municipal Water District

GPCD	Gallons per Capita per Day
GPF	Gallons per Flush
GPM	Gallons per Minute
GW	Groundwater
GWP	Glendale Water and Power
HECW	High Efficiency Clothes Washer
HEN	High Efficiency Nozzle
HET	High Efficiency Toilet
HEW	High Efficiency Washer
HP	Horsepower
HR	Hydrologic Region
IID	Imperial Irrigation District
IPR	Indirect Potable Reuse
IRP	Integrated Resources Plan
IWA	International Water Association
JWPCP	Joint Water Pollution Control Plant
LACSD	Sanitation Districts of Los Angeles County
LADWP	Los Angeles Department of Water and Power
LAGWRP	Los Angeles/Glendale Water Reclamation Plant
LCID	La Cañada Irrigation District
LRWSP	Local, Reliable Water Supply Program
MAF	Million Acre-Feet
MBR	Membrane Bioreactor
MCL	Maximum Contaminant Level
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
µg/L	Micrograms per Liter
MOU	Memorandum of Understanding
MWD	Metropolitan Water District of Southern California
MWELO	Model Water Efficient Landscape Ordinance
MTBE	Methyl Tertiary Butyl Ether
NDMA	N-Nitrosodimethylamine
ng/L	Nanograms per Liter

NPDWR	National Primary Drinking Water Regulations
NTU	Nephelometric Turbidity Units
PCA	Possible Contaminating Activities
PCE	Tetrachloroethylene
PFAS	Per- and Polyfluoroalkyl Substances
PHETs	Premium High Efficiency Toilets
PHG	Public Health Goal
PPCPs	Pharmaceuticals and Personal Care Products
PVID	Palo Verde Irrigation District
QSA	Quantification Settlement Agreement
RHNA	Regional Housing Needs Assessment
SB	Senate Bill
SBx7-7	Senate Bill x7-7
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SDP	Seawater Desalination Program
SDWA	Safe Drinking Water Act
SMSS	Soil Moisture Sensor System
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
ULARA	Upper Los Angeles River Area
USFWS	U.S. Fish and Wildlife Service
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
WARN	Water Agency Response Network
WBIC	Weather-Based Irrigation Controller
WRP	Water Reclamation Plant
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM	Water Surplus and Drought Management Plan
WSS	Watershed Sanitary Survey
WWTP	Wastewater Treatment Plant

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Section 1: Introduction

In accordance with the Water Code, an Urban Water Management Plan is required to be updated every five years.

1.1. PURPOSE AND SUMMARY

This is the 2025 Urban Water Management Plan ("UWMP" or "Plan") for the Crescenta Valley Water District (hereinafter "District"). This Plan has been prepared in compliance with the Urban Water Management Planning Act (Act), which was established in 1983 and has been codified into the California Water Code (CWC) sections 10610 through 10657. A copy of the Act can be found in **Appendix C**.

As part of the Act, the legislature declared that waters of the state are a limited and renewable resource subject to ever increasing demands; that the conservation and efficient use of urban water supplies are of statewide concern; that successful implementation of plans is best accomplished at the local level; that conservation and efficient use of water shall be actively pursued to protect both the people of the state and their water resources; that conservation and efficient use of urban water supplies shall be a guiding criterion in public decisions; and that urban water suppliers shall be required to develop water management plans to achieve conservation and efficient use.

The Act requires "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt, in accordance with prescribed requirements, an Urban Water Management Plan."

These plans must be filed with the California Department of Water Resources (DWR) every five (5) years, describing and evaluating reasonable and practical efficient water uses, reclamation, and conservation activities. The CWC mandates that each water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one.

Figure 1.1 UWMPs are Governed by State Law

The Act has been amended multiple times since its initial passage in 1983. A summary of the amendments is provided in **Figure 1.2**. The intent of the amendments was to broaden the scope of the UWMPs, encourage public participation, and add financial incentives to the UWMPs. A significant amendment to the Act was a 2009 amendment (Senate Bill SBx7-7) signed by former Governor Arnold Schwarzenegger. The Senate Bill, also known as the "Water Conservation Act" required that per capita water use within an urban water supplier's service area decrease by 20 percent by the year 2020 in order to receive grants or loans administered by DWR or other state agencies. Each urban retail water supplier developed water use "targets" for 2015 and for 2020. The "target" date for 2020 passed on December 31, 2020. Urban water suppliers whose 2020 actual water use does not meet the target requirements established by this bill are not eligible for state water grants or loans This included, but was not limited to, the following funding sources:

Amendments to the Act have added financial incentives to UWMPs.

- **Drinking Water State Revolving Fund:** Primarily a source of funds to help correct deficiencies
- **Proposition 1:** Primarily a source of funds related to supplies & infrastructure
- **Proposition 4:** Primarily a source of funds related to climate-related programs
- **Proposition 50:** Primarily a source of funds related to security & treatment technology
- **Proposition 84:** Primarily a source of funds related to protection from pollution

Agencies that submit their UWMPs past the July 2026 deadline are still technically eligible for grants or loans, provided that the UWMP addresses the requirements of the

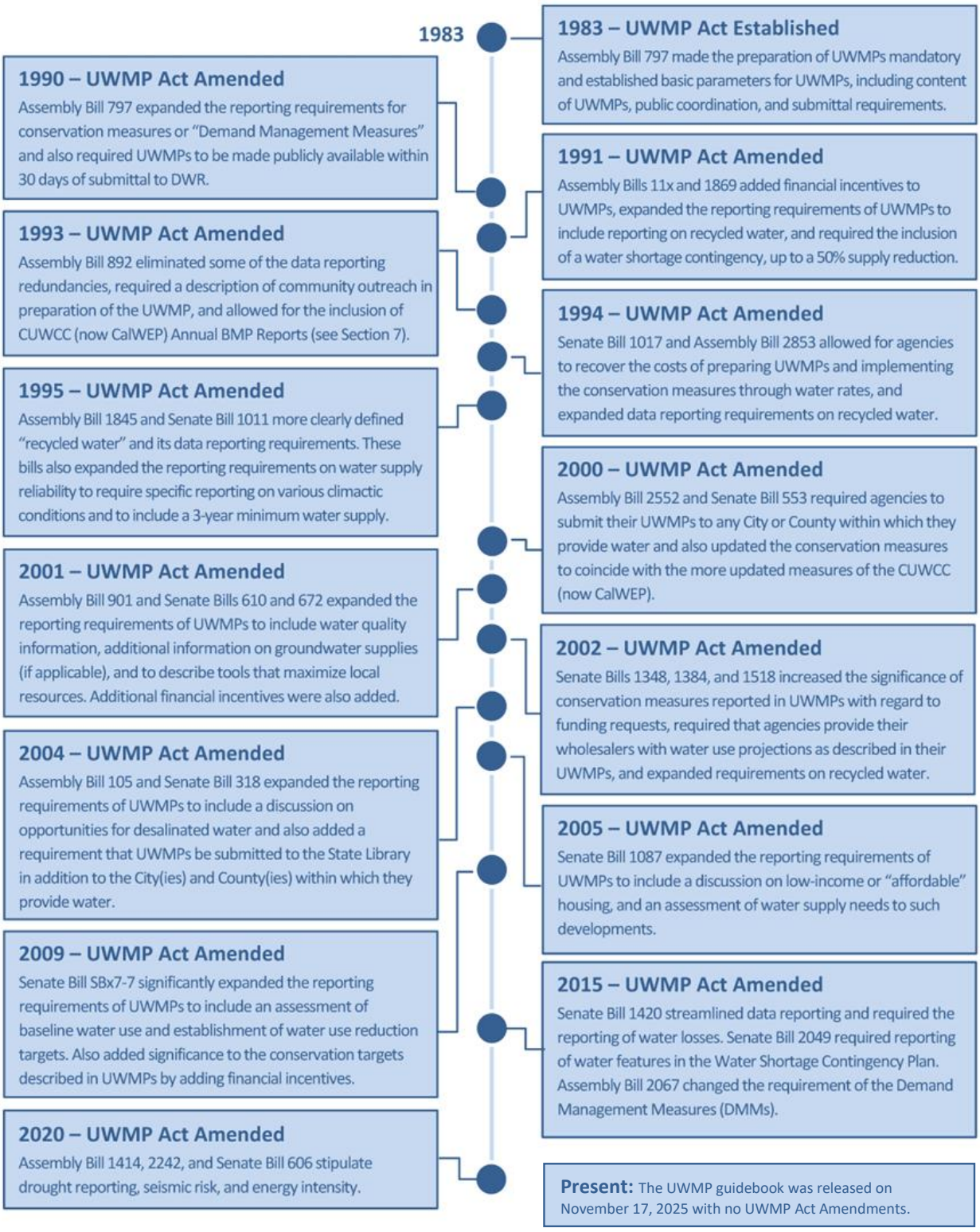

Figure 1.2 UWMP Act Establishment and Amendment

Act. However, applications for such funds are subject to legal challenges coming from competing agencies for the same funding, if the competing agencies become aware of the timeframe in which an UWMP was submitted.

UWMPs are considered to be a foundation document and a source of information for Water Supply Assessments (Senate Bill 610) and Written Verifications of Water Supply (SB 221). In addition, an UWMP may serve as a long-range planning document for water supply, a source of data for development of a regional water plan, and a source document for cities and counties as they prepare their General Plans. These planning documents are linked, and their accuracy and usefulness are interdependent.

One of the primary objectives of the Act is the assessment of demands and supplies over a 20-year or a 25-year planning horizon under normal rainfall conditions, as well as under various drought conditions. The Act also requires water shortage contingency planning and drought response actions to be included in the UWMP. In short, this Plan is a management tool that provides a general, long-term framework for action, rather than a detailed blueprint for supply and demand management. This Plan evaluates the District's supply and demand projections over a 25-year planning horizon, and what mix of programs should be explored for ensuring that such water will be available. As part of the District's past and current water conservation policies, the District is currently implementing many facets of this plan already to achieve its water conservation goals.

1.2. COORDINATION

The process of preparing and submitting an UWMP is a transparent process that requires opportunities for outside-agency and general public involvement. In preparing this 2025 UWMP, the District has encouraged broad community participation. The District notified the agencies that the District interacts with more than 60 days in advance of the District Board's adoption of the 2025 UWMP. The District also made the draft 2025 UWMP available at the District's Board Room and on the District's website, leading up to a public hearing on the 2025 UWMP. Notices of the public hearing were published in the local press and on the District's website for a two-week period. On May 26, 2026, the District held a noticed public hearing to review and accept comments on the 2025 UWMP. Following the public hearing, the District officially adopted the 2025 UWMP through board resolution, of which a copy is included in **Appendix A.**

The District's 2025 UWMP is a collaborative effort involving its own staff, outside agencies, and the general public.

Table 1.1: Coordination and Public Involvement

Agency	Participated in Plan Preparation	Contacted for Assistance	Commented on Draft	Notified of Public Hearing	Attended Public Hearing
District Staff	x	x	x	x	x
District Board	x	x	x	x	x
Foothill Municipal Water District				x	
City of Glendale				x	
Glendale Water and Power				x	
La Cañada Irrigation District				x	
Crescenta Valley Town Council				x	
Los Angeles County				x	
Upper Los Angeles River Area Watermaster				x	
Interested General Public				x	x

Notes:

1. "60-Day" notice letters were sent out to all agencies (except the Districts own) as required by CWC § 10621(b):
2. 2-week and 1-week notices were published in the local newspaper, Crescenta Valley Weekly.
3. **Appendix G** contains copies of the 60-day notice and the 2-week and 1-week notices.

As required by the Act, the 2025 UWMP is being prepared by the City and will be submitted to DWR, the California State Library, and any city or county within which it provides water to no later than 30 days after adoption. The 2025 UWMP has been made available to the public on the District's website and at District Offices during normal business hours within 30 days of submitting the 2025 UWMP to DWR.

1.3. DWR UPDATES FOR THE 2025 UWMPS

There have been minor changes to the CWC affecting the 2025 UWMPs. The changes include:

- **Clarified Reporting Requirements for SBx7-7:** Agencies must provide a description in the 2025 UWMP of how their water use goals of the 20x2020 were met. An urban retail water supplier's failure to meet those goals will be a violation of law and potentially result in a state administrative or judicial proceeding. If the agency did not achieve its targeted reduction in 2020, the agency must show in its 2025 UWMP whether it met their 2020 Target in 2025 to be eligible for state funds. Currently, the CWC does not set an end date for reporting on a supplier's progress in meeting the 2020 Target. (CWC § 10608.40)
- **Water Losses:** Retail Suppliers must indicate the quantity of water losses for five years by reporting data from their Validated Water Loss Audits, discuss their progress toward compliance with the 2028 Water Loss Standard, and show whether they met the Water Loss Performance Standard enacted by the State Water Resources Control Board (SWRCB). (CWC § 10631 (d) (3) (C), SB 1414, 2019). Suppliers can simply provide a link to their water loss reports submitted to DWR's Water Loss Audit Program.
- **Updates to Demand Management Measures (DMMs):** Retail Suppliers with an annual actual water use above their Urban Water Use-Objective (UWUO) must include a narrative describing additional DMMs the supplier plans to use to achieve its UWUO by January 1, 2027. (CWC § 10609.25, AB 1414, 2019)
- **UWUO and Water Use Reporting:** The standard for indoor residential water use from January 1, 2025 to January 1, 2030 was lowered from 52 to 47 Gallons per Capita per Day (gpcd). Until January 1, 2025, the standard was 55 gpcd. Beginning January 1, 2030 the standard was lowered from 50 to 42 gpcd. DWR, in coordination with SWRCB, will conduct an investigation to determine if the date for the 2030 indoor residential use standard will be changed. The District will not be subject to enforcement

pursuant to this chapter solely for failing to meet the indoor residential use standard. (CWC § 10609.4).

- **Irrigation of Nonfunctional Turf:** ”Functional turf” is ground cover surface of turf located in a recreational use area or community space. ”Nonfunctional turf” means any turf that is not functional turf, and includes turf located within street rights-of-way and parking lots. Turf enclosed by fencing or other barriers to permanently preclude human access for recreation or assembly is Nonfunctional turf. The use of potable water to irrigate nonfunctional turf is wasteful and incompatible with state policy relating to climate change, water conservation, and reduced reliance on the Sacramento-San Joaquin Delta ecosystem (CWC § 110). The use of potable water to irrigate Nonfunctional turf on all properties owned by the District are to be phased out by January 1, 2027. All other Commercial, Industrial, and Institutional (CII) properties are to be phased out by January 1, 2028. After which it will be prohibited with a few exceptions (CWC § 10618.14). The website saveourwater.com/ provides information and resources on converting nonfunctional turf to native vegetation.

The use of potable water to irrigate nonfunctional turf is incompatible with state policy relating to climate change.

- **Definitions:** New definitions were added or existing definitions were modified, which include Nonfunctional Turf, CII water use, Large landscape, Gross water use, Potable reuse, Urban water use objective, Affordable housing, and Disadvantaged community to name a few (CWC § 10608.12).

In addition, there are several optional or voluntary categorical and data reporting changes to the UWMP Act. These include an optional Planning Tool that suppliers can use to report and assess water use and supply in order to better conduct the Reliability Assessment and Drought Risk Assessment, a Potable and Non-Potable Planning Tool, Potable and Non-Potable Submittal Tables, as well as various optional data reporting.

1.4. UPDATES TO THE DISTRICT’S UWMP

In addition to the required updates described in the previous section, the District’s 2025 UWMP has undergone some changes from the 2020 UWMP. A summary of the key changes to the UWMP are:

- **New Format:** Format of the UWMP has been changed to include a new look and new arrangement of sections. The new arrangement helps the discussion of certain topics which precede other topics. See **Section 1.5** for the format of this 2025 UWMP.

- **DWR & Water Code:** A listing of DWR-required UWMP updates (see previous Section).
- **District Development Growth:** An updated review of development which took place in the District's service area since the 2020 UWMP.
- **Water Sources and Supplies:** A broader, more in-depth discussion of water sources and supplies.
- **Recycled Water:** An updated review of recycled water opportunities in the District.
- **Water Quality:** An update to new regulations and contaminants affecting water quality and treatment.
- **Water Use:** Updated information on recent water use quantities and a more in-depth discussion on water use parameters.
- **Supply v Demand:** Updated information on projected supplies vs demands, and a discussion on recent regional droughts affecting the District. There is also an expansion on the discussion of the District's source water reliability.
- **Contingency Planning:** Updated information on the District's contingency plans, including the District's Ordinances.
- **Conservation Measures:** Updated information on the District's conservation measures, which reflect the previous (2020) changes by DWR.

In addition to these changes, there are multiple minor changes. The changes reflect both those that are required by the CWC and those that are voluntarily included for the benefit of the District.

1.5. FORMAT OF THE 2025 UWMP

The information contained in this 2025 UWMP corresponds to the items in the UWMP Act and other amendments to the Water Code. The sections of the UWMP are:

Section 1 - Introduction

This section describes the UWMP Act, the UWMP preparation and adoption process, updates to the UWMP, and a lay description of this entire document.

Section 2 – Service Area Description

This section outlines the history and development of the District and the District's water supply system, a description of its existing service area, the local climate, population served, and basic statistics on the District's water distribution system.

Section 3 – Water Sources & Supplies

This section describes the existing potable water supplies available to the District, including groundwater from the Verdugo

Groundwater Basin (Basin) and imported water from Metropolitan Water District of Southern California (MWD) through the Foothill Municipal Water District (FMWD). In addition, this section evaluates potential future water supply sources.

Section 4 – Recycled Water Opportunities

This section discusses potential recycled water supplies, an assessment of potential customers, and methods to expand the use of recycled water.

Section 5 – Water Quality

This section discusses the quality of the District's potable water supply sources, including imported water and groundwater. This section also discusses drinking water standards and the effect that water quality has on management strategies and supply reliability.

Section 6 – Water Use

This section describes past, current, and projected water usage within the District's service area. Past and projected water use in this section is broken down by sector. This chapter also discusses the requirements of the 2009 Water Conservation Act (SBx7-7), including the 2020 Water Use Targets.

Section 7 – Reliability Planning

This section presents a drought risk assessment of the District's water system which compares projected future water demands with expected available water supplies under three different hydrologic conditions: normal year; a single dry year; and multiple dry years. This 2025 UWMP concludes that if projected imported and local supplies are developed as anticipated, no water shortages are anticipated in the District's service area during the planning period.

Section 8 – Contingency Planning

This section serves as the District's Water Shortage Contingency Plan (WSCP). A WSCP is a response plan to water shortages, as well as the efforts that will be utilized in the event of water supply interruptions, such as power outages, earthquakes, or droughts. This section also describes regional response efforts to water supply interruptions.

Section 9 – Conservation Measures

This section addresses the District's compliance with water conservation measures that correspond to the seven (7) Demand Management Measures (DMMs) described in the 2025 UWMP Guidebook, which were previously the 14 DMMs listed in the Act. The DMMs also correspond to the current Best Management Practices (BMPs) from the California Water Efficiency Partnership (CalWEP).

Appendices

The Appendices contain references and specific documents that contain reference

data used to prepare this 2025 UWMP.

1.6. LAY DESCRIPTION

To facilitate effective and efficient management of water supplies, and in compliance with the UWMP Act and the Water Conservation Act of 2009, the District has prepared this 2025 UWMP. This UWMP includes background information regarding the District's history, water system, and water supplies. This UWMP also analyzes recent water demands and projects future water supply capacity and water demands through 2050. The effects of water quality, drought, and emergencies on the District's water supply reliability are also analyzed.

As indicated by **Section 7**, the District does not expect to have a water supply shortage through 2050. Furthermore, this UWMP concludes that the District's water supplies, which are obtained from local groundwater basins and wholesale agencies, are resilient to droughts. A basic overview of the District's water system can be found in **Section 2**. Water quality concerns do have an occasional impact on the consistency of groundwater supplies, but the District's groundwater quality is not expected to be affected. These are described in **Section 5**.

This 2025 UWMP recommends that the District implement water operation management tools that maximize the use of local groundwater production and imported water to meet its water demands. This UWMP also recommends conservation tools that will enable the District's residents to conserve water and maximize water use efficiency. These are described in **Section 9**.

If the water consumption rates in the District decrease as this UWMP projects, the District can expect to have an adequate water supply in future years. This is in spite of projected population growth over the next 25 years. Finally, this UWMP recommends that severe droughts or sudden supply interruptions be addressed by following the criteria of the WSCP, as described in **Section 8**.

Since UWMPs are due for revision every five years, this UWMP is projected to be in effect until the year's end of 2030. At that time the District's 2030 UWMP will begin development and adoption.

2

Section 2: Service Area Description

Originally as Crescenta Valley County Water District, The term "County" was officially removed in 1996.

2.1. DISTRICT AND WATER SYSTEM HISTORY

The Crescenta Valley Water District was formed as the Crescenta Valley County Water District on December 14, 1950 by the vote of local residents. Organized under the provisions of Division 12 of the CWC, the District operates as a political subdivision of the state. The term "County" was officially deleted from District's name in 1996. The Crescenta Valley Water District operates under a District Board/District Manager form of government. The District Board consists of five Board Members elected to four-year terms. District has a 5-member Board of Directors who are elected at-large and participate in the management of the District. The current members of the Board of Directors are:

- **James D. Bodnar -President**
- **Jennifer T. Valdez – Vice President**
- **Jeffery W. Johnson – Board Director**
- **Kerry D. Erickson – Board Director**
- **Sharon S. Raghavachary – Board Director**

2.1.1. Early Stages

In the early 1950's, the newly-formed District purchased the assets and consolidated the infrastructure of several small private water companies then in existence. By 1953, with rapid growth in the Crescenta Valley and surrounding foothill communities, it became apparent that the local groundwater supply was not going to be sufficient to meet the increasing demand. Residents from La Crescenta to Altadena voted to form the FMWD to purchase and distribute imported water from the

Metropolitan Water District of Southern California (MWD). By 1955, the District was augmenting its local well water with MWD water from the Colorado River. In the 1960's, MWD increased its supply by also contracting for Northern California water with the completion of the State Water Project.

The Verdugo Basin is one of four groundwater subbasins within the Upper Los Angeles River Area (ULARA), with the San Fernando Basin being the largest. The ground water rights of the District are defined by the Judgement in Superior Court Case No. 650079, entitled "The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et. al., Defendants" and the final Judgment was signed on January 26, 1979. The judgement also established a court-appointed position of Watermaster, which oversees parties' extraction and parties' rights to native groundwater, imported return water, and stored waters in the ULARA groundwater basins.

The Judgement states that Glendale and the District have appropriative and prescriptive rights to extract 3,856 and 3,294 acre-feet of groundwater per year, respectively, from Verdugo Basin and there are no provisions in the Judgment to allow for stored water credits in the Verdugo Basin.

2.2. CURRENT WATER SERVICE AREA

The District is located in the Crescenta Valley area of Los Angeles County in the foothills of the San Gabriel Mountains, between the San Fernando and San Gabriel valleys. The District provides water distribution and sewage collection to the unincorporated communities of La Crescenta, Montrose, and Verdugo City, as well as a small portion of the City of Glendale and City of La Cañada-Flintridge. The District's water service area encompasses an area of approximately 4 square miles or 2,560 acres in a relatively steep terrain ranging from 1,200 feet to almost 3,000 feet above sea level. The District's limits are shown in **Figure 2.3**.

The District currently provides water to over 8,250 accounts representing a population of 28,200, and wastewater collection service to over 6,000 accounts. Customer growth is low as the Crescenta Valley area is nearly built-out. Residential growth is occurring through increased housing density in the multiple-unit zoned areas (primarily Montrose) as well as limited in-fill housing developments on random parcels in La Crescenta.

With no wholesale customers, the District is a retail-only water agency and maintains residential, commercial, institutional, and landscape irrigation customers. Most of the water service accounts are single-family residences. The District is responsible for providing water services to its certificated

water service area, which coincides with the District's jurisdictional boundaries. The District's Organization Chart is shown in **Figure 2.1**, and has a budget of $18.3 million. The key objectives of the District's Administration are as follows:

- Produce water and meter water for billing purposes
- Responding to all water quality complaints
- Flush mains
- Efficiently operate groundwater facilities
- Maintaining and making repairs to all components of the water distribution system
- Complying with California Water Resources Control Board Division of Drinking Water (DDW) regulations, including laboratory testing
- Promoting water certification and safety training

2.3. LAND USE & ECONOMY

The District is located in Los Angeles County. Los Angeles County encompasses an area of 4,060 square miles or 2.6 million acres, and is bordered on the west by Ventura County, on the north by Kern County, on the South by the Pacific Ocean, on the east by San Bernardino County, and on the southeast by Orange County.

Table 2.1 provides basic statistics on current land use and economy for Los Angeles County. **Figure 2.4** shows the Los Angeles County Zoned Districts, which includes the District within Service Area C (East).

2.3.1. District Land Use

Land use in the service area is primarily residential with two commercial/business corridors along Foothill Boulevard and Honolulu Avenue. Due to zoning changes, some areas, specifically south of Foothill Boulevard, continue to be converted into multi-family units. There are no industrial or agricultural water users within the District, and institutional users are limited to schools, churches, parks, and freeway landscaping.

Table 2.1 Current Land Use & Economic Statistics for Los Angeles County

Land: Total (sq. miles)	
Item	**Los Angeles County**
Land Area (sq. miles)	4,060 sq. miles
Land Area (acres)	2.6 million acres
Land: Developed (acres)	
Item	**LA County**
Developed Land	716,000 acres
Population	
Item	**LA County**
Population	10,014,009
Housing	
Item	**LA County**
Total Housing Units	3,709,264
Median Home Price	$808,000
Owner Occupancy Rate	45.6%
Economy	
Item	**LA County**
Employed (16yrs +)	61.5%
Median Household Income	$90,845
Percent in Poverty	13.3%
Economic: Production/Revenue	
Item	**LA County**
Manufacturing	N/A
Agriculture/Crops	N/A
Retail & Wholesale Sales	N/A

**N/A: Data not Available*

2.4. CLIMATE

The District has a Mediterranean climate, with a "foothill" characteristic. Summers are warm to hot and dry, while winters are cool and have an annual historical average precipitation of approximately 23.20 inches. Another feature of this Mediterranean climate is the frequency of high-velocity, low-humidity, northeasterly winds in the fall and early winter. Therefore, the District is highly prone to wildfire danger during these periods. Adequate storage of reservoir water supply is deemed critical by the local fire jurisdictions. **Table 2.2** lists the historical average rainfall for the District:

Table 2.2 Historical Climate (1918-2011)
La Crescenta FC251C, California (044628)
(www.wrcc.dri.edu)

Month	Average Rainfall (in)
Jan	4.55
Feb	5.15
Mar	3.73
Apr	1.95
May	0.63
Jun	0.16
Jul	0.03
Aug	0.14
Sep	0.52
Oct	0.84
Nov	2.21
Dec	3.28
Annual:	**23.20**

The sources of the District's imported water supplies, the State Water Project (SWP) and Colorado River Aqueduct (CRA), are influenced by weather conditions in Northern California and along the Colorado River Basin region. Both regions have recently been suffering from multi-year drought conditions and record low rainfalls, which directly impact demands and supplies to the District and Southern California.

Climate fluctuations not only can increase or decrease demand, but can also directly affect the District's ratio of groundwater to imported water, since reduced precipitation and snowfall means less groundwater replenishment. When groundwater supplies are reduced, the District purchases more imported water.

As the State of California and the Los Angeles County region has undergone a several-year drought, rainfall has been much lower in the District. Southern California is also expected to be Transitioning out of a weak La Nina into El Nino by the end of 2026. Recent ETo and rainfall for the District is listed in **Table 2.3**:

Table 2.3 Recent Climate (2025)
CIMIS Station 216 (Arleta - Los Angeles Basin)
(cimis.water.ca.gov**)**

Month	Rainfall (in)	ETo (in)
Jan (2025)	1.03	3.05
Feb (2025)	3.22	2.87
Mar (2025)	2.47	3.58
Apr (2025)	0.26	4.85
May (2025)	0.08	5.95
Jun (2025)	0	6.93

Month	Rainfall (in)	ETo (in)
Jul (2025)	0.00	2.68
Aug (2025)	0	N/A
Sep (2025)	0.2	N/A
Oct (2025)	2.48	N/A
Nov (2025)	5.83	N/A
Dec (2025)	6.41	N/A
Totals:	**22**	**29.91**

2.4.1. Climate Change

The DWR Guidebook requires water suppliers to include a discussion of climate change in their UWMPs, specifically with regard to Drought Risk Assessments (DRA). **Section 7** provides an overview of droughts.

The rise of anthropogenic activities producing carbon dioxide in the world has changed the earth's climate by emitting greenhouse gasses responsible for global warming. This has resulted in extreme weather events occurring more frequently. The severity and frequency of climate change impacts on temperature and precipitation patterns can be difficult to forecast due to dramatic shifts in weather patterns as a result of increased concentrations of carbon dioxide in the atmosphere. While the precise timing, severity, and regional impacts of these temperature and precipitation changes are uncertain, climate researchers have identified several important issues of concern for water planners in California.

The climate change impacts of concern include increases in temperature, precipitation pattern changes. and sea-level rise. More winter precipitation falling as rain than snow leads to reduced snowpack water storage, reduced long term soil humidity, reduced groundwater and downstream flows, and reduced imported water deliveries. Higher temperatures alter evapotranspiration rates and growing seasons become longer. Precipitation pattern changes leads to increase flooding from intense storms. Although the extent of these changes is uncertain, the District is already planning ahead to ensure long lasting reliability of its source for their customers.

The California Natural Resources Agency released a draft of the 2024 California Climate Adaptation Strategy (Strategy), which builds on the successes and lessons learned since the first iteration in 2009 and the California Adaptive Planning Guide issued in 2012. It also integrates and connects key elements of the latest specific State of California action plans, such as the Extreme Heat Action Plan, Water Supply Strategy, Climate Smart Lands Strategy, Wildfire and Forest Resilience Action Plan, and Climate Action Plan for Transportation Infrastructure. Key elements of the approach:

01.Set updated, strategic direction and identify outcome-based priorities:

The Strategy links the State's existing, planned, and resourced climate adaptation efforts, showing how they fit together to achieve broad climate resilience priorities. The Strategy also specifies needed actions, with timeframes and metrics, to drive progress and enable accountability.

02.Unify efforts across all sectors and regions:

The Strategy is organized around outcome-based priorities, rather than individual sectors, enabling a coordinated, integrated approach to building climate resilience. This approach recognizes how climate adaptation is implemented on the ground, and reflects our commitment to integrating climate resilience into the work of all state agencies. The priorities have been developed based on input from Californians across all regions of the state and in consultation with California Native American tribes.

03. Help all Californians understand and contribute to California's climate resilience:

The 2024 Strategy updates the interactive website that serves as a hub for state climate resilience action. This website will continue to be updated to enable easier navigation, to follow the state's progress and to find adaptation information and resources easily.

2.5. POPULATION

2.5.1. Service Area Population

According to the most recent population figures from the Water Loss Audit and Electronic Annual Report, the District's current 2025 population is 35,841; however, this value has been used for these reports since at least 2023 and SWRCB, the Division of Drinking Water (DDW) Records as of 5/21/2024. These values most likely included populations within or near the District's service area, but not serviced by the District's water system. Therefore, the District used internal reporting to more accurately represent the true service area population.

The population has experienced some growth from 2021 through 2025, which showed less growth from 2015 through 2020. **Table 2.4** lists the District's recent and current (2025) overall populations:

Table 2.4 Crescenta Valley Water District Overall Population

Year	Population
2021	27,182
2022	27,192
2023	28,031
2024	28,103
2025	28,162

Table 2.4 shows the District's population climbing over time to 28,162 in 2025.

2.5.2. District Population Forecasts

In its 2020 UWMP, the District references an annual population growth rate of eight percent (8%) in its forecasts to the year 2025. This resulted in a 2020 population of 32,462 and a 2025 population of 32,974, as shown in Table 2.1 on Page 2-4 of the Land Use Element of the District's 2020 UWMP. This would have required a growth of eight percent (8%) annually from 2020 to match the District's forecast for 2025. With a current 2025 population of approximately 36,149, it appears that this forecast was significantly lower than the actual population. This is a 3,175 difference, which could be due to a much higher growth factor than expected in 2020. Although these values most likely included populations within or near the District's service area, but not serviced by the District's water system, the growth rates can still be referenced.

2.5.3. Adjusted Population Forecasts

Future service area populations can be determined based on the projected number of service connections multiplied by the average persons per connection (3.29). The District determined an average growth factor of sixty-five (65) connections per year. Then the projected number of service connections is multiplied by the average persons per connection (3.29) to determine the projected population, as shown in **Table 2.5.**

There is no industry in the District's service area, and there are six-and-a-half percent (6.5) commercial or institutional accounts. The District does not anticipate any significant increases in employment for the area based on the land availability and the zoning. Densification will occur as single-family lots are converted to multi-family dwellings where it is allowed by zoning classification and the governing agency.

There are two major planned developments in La Crescenta that would impact water supplies, although it is uncertain if these will be pursued:

- 3037/3043 Foothill Blvd – 46 units
- 2413 Foothill Blvd – 80 units

Both projects are still in the process of securing permits from the County and there may be additional delays. In order to perform a more conservative analysis, this UWMP will assume these Developments will be in service in 2030 and will add the estimated population increase at that time. **Table 2.5** shows the projected population for the next 25 years.

Table 2.5 Crescenta Valley Water Service Area Projected Population

Year	Population
2030	28,649
2035	29,719
2040	30,788
2045	31,857
2050	32,926

As the District continues to grow both in size and significance, the District may likely experience periodic spikes in the number of daytime or short-term residents.

2.6. WATER SYSTEM

A basic overview of the District's water system is provided in the following sections. More information on the District's water sources, water treatment, and water demands can be found in **Sections 3 through 6**. As this report is a water-resource-management planning document, it does not provide technical or engineering detail on water system components.

2.6.1. Water System Background

Since its founding in 1950, the District has owned and operated a water and sewer system that has served the District's developed areas within its main core. Due to the rapid growth of the District, the water system would not be able to supply the increasing demand. FMWD was formed to purchase imported water from the MWD. The Districted augmented its local well water with MWD water coming from the Colorado River. In 2025, the District relied on approximately 56% local groundwater and 44% imported water.

2.6.2. District Water System Overview

The District's water system consists of the following components:

- Groundwater Wells
- Mountain Tunnel
- Wellhead Treatment
- Water Distribution Pipeline Network
- Emergency Transfer Interties
- Water Storage Facilities
- Booster Pump Stations
- Imported Water Connections

The District distributes water to approximately 8,250 service connections through over a 100.6-mile network of distribution mains. The water system is divided into 11 main pressure zones (**Figure 2.3**) served by 14 pumping stations and 17 storage reservoirs, totaling 17.5 million gallons.

2.6.3. Groundwater and Imported Water

The District's sources of potable water supply are groundwater pumped from the

Verdugo Basin and imported water from MWD. The Verdugo Basin is approximately 4,400 acres and is adjudicated within the Upper Los Angeles River Area (ULARA). The Verdugo Basin is currently limited to 3,865 AFY due to District's adjudicated rights of 3,294 AF and 500 AF from the City of Glendale during a normal year. The District owns and operates eleven (11) production wells located within the Verdugo Basin.

MWD has access to both the Colorado River and Sacramento-San Joaquin River Delta located in Northern California for imported water supply. The San Joaquin River provides a significant amount of water to Southern California annually but struggles to satisfy both the needs of water demand and the ecological habit which could lead to environmental damage. The State Water Project and Central Valley Project both took place in order to counteract and increase long-term supply reliability.

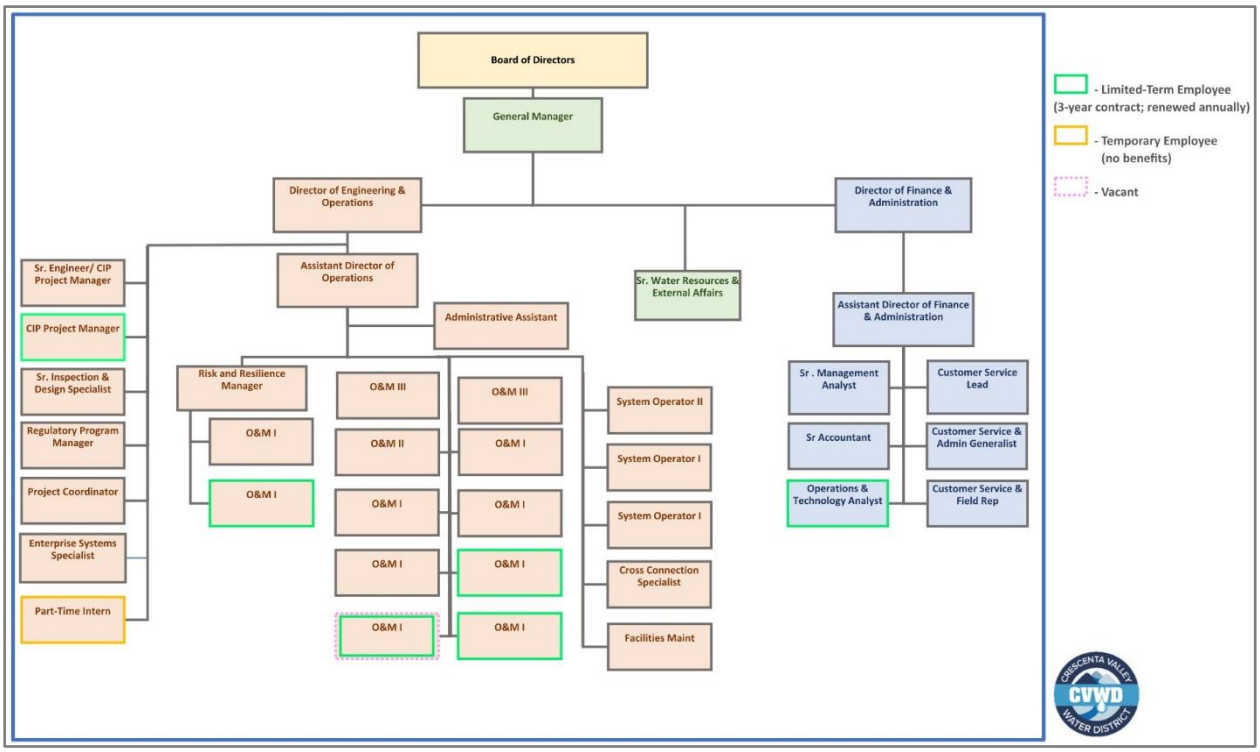

Figure 2.1 Crescenta Valley Water District Organization Chart (March 2026)

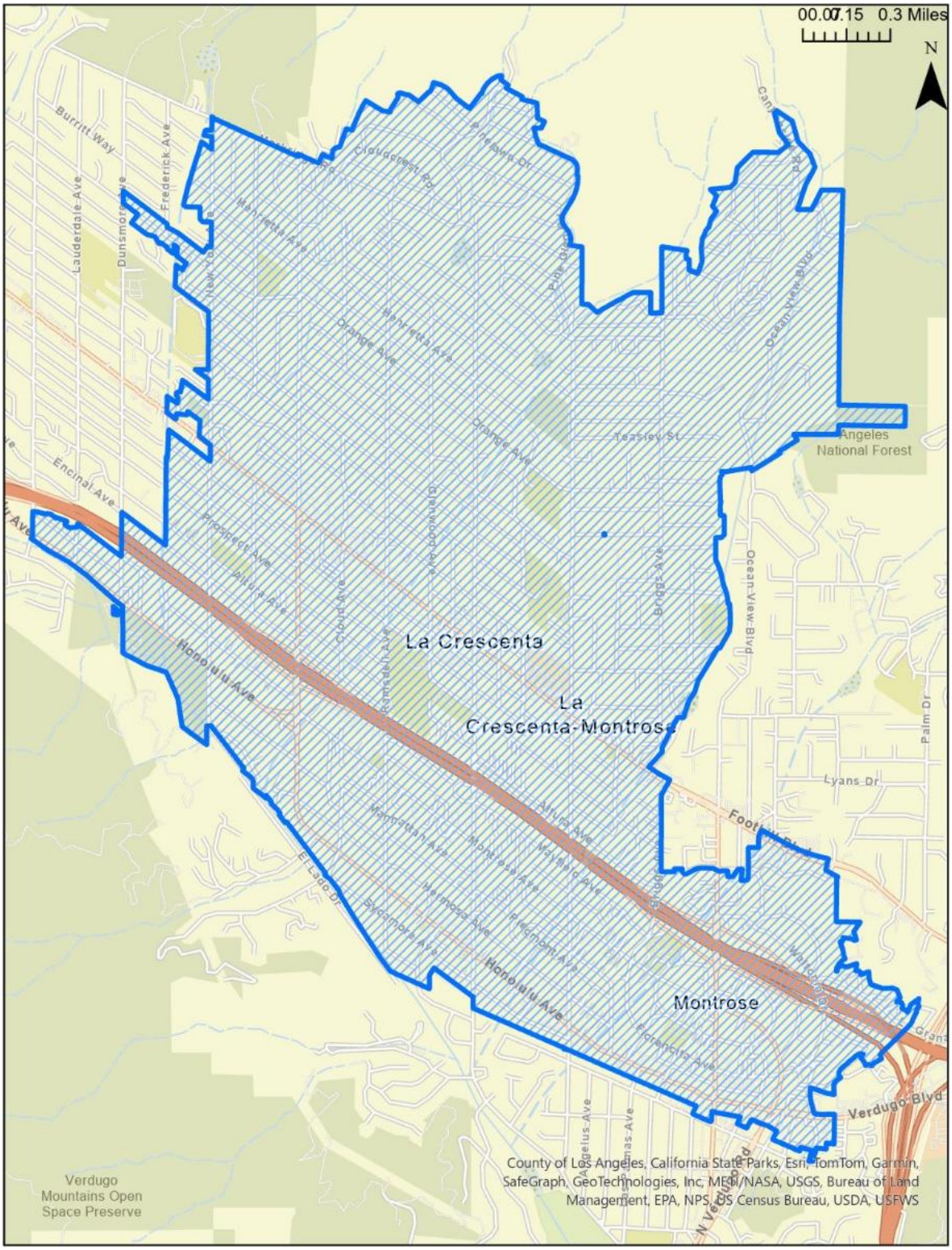

Figure 2.2 Crescenta Valley Water District – Water Service Area Map

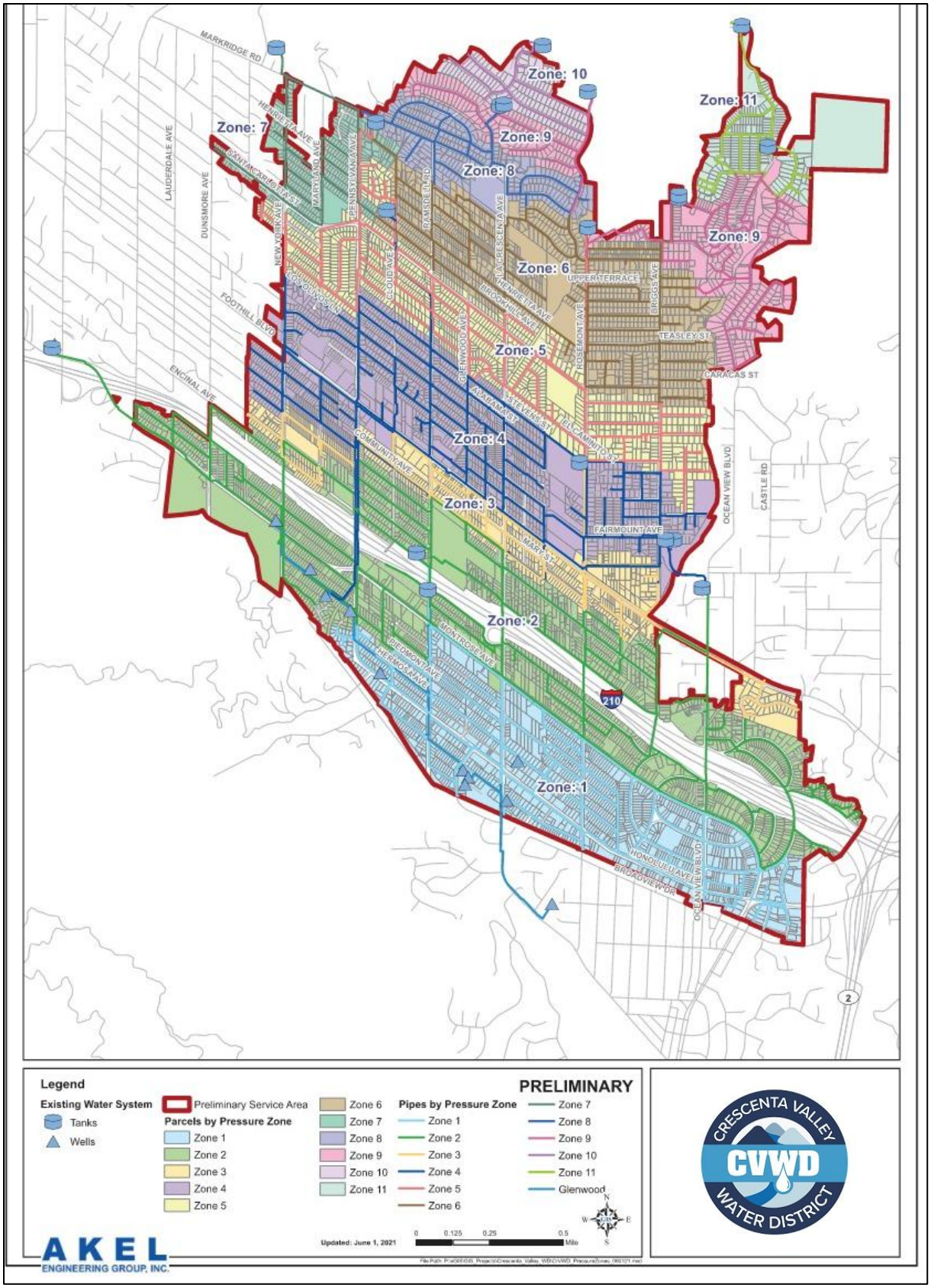

Figure 2.3 Crescenta Valley Water District Pressure Zones

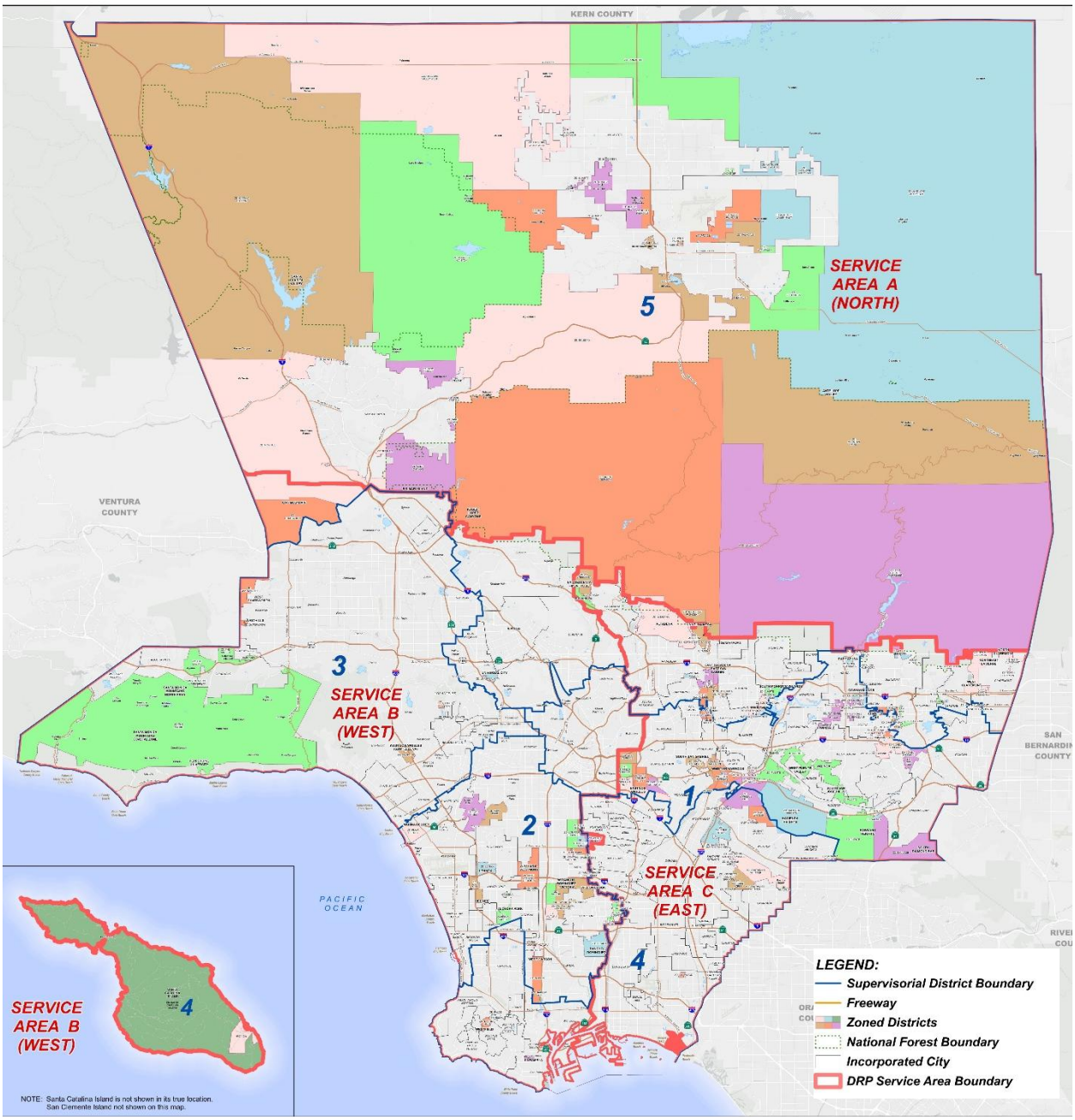

Figure 2.4 Los Angeles Zoned Districts (January 2022)

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Section 3: Water Sources and Supplies

Supplies consist of groundwater produced from the Verdugo Basin and imported water from FMWD.

3.1. INTRODUCTION

This Section describes the current and projected water resources available to the District over a 25-year period (from 2026 through 2050). This Section also provides background information on the overall water supplies available to the region. The District's water supplies consist of groundwater produced from the Verdugo Basin and imported water purchased from FMWD (MWD water). Approximately fifty-six percent (56%) of the District's water consists of groundwater, while the remaining forty-four percent (44%) consists of imported water. The majority of the District's groundwater wells are located along the Verdugo Wash, south of Honolulu Avenue. Local groundwater is disinfected with chlorine before blending with MWD's surface water. The sources of imported water supplies include the Colorado River Aqueduct (CRA) and the State Water Project (SWP). The most dominant feature of the District's water supply operations is the intensive pumping required for delivering water to the residents in the communities located in the foothills of the San Gabriel Mountains. In some cases, this water must be lifted over 1,000 feet to deliver it to the elevations of some water users in the service area. This section discusses water supply, quality, and water reliability under all foreseeable hydrologic conditions from 2026 through 2050.

3.2. IMPORTED WATER SOURCES

In order to provide Southern California with imported water, MWD utilizes two separate

aqueduct systems (one for each source of supply) to obtain its supplies. These two aqueduct systems convey water from each source into two separate reservoirs whereupon MWD pumps the water to one of its five treatment facilities. These aqueduct systems are known as the Colorado River Aqueduct (CRA) and the California Aqueduct, also known as the State Water Project (SWP).

3.2.1. Colorado River Water Supply History

The Colorado River begins as far north as Wyoming, with multiple tributaries from seven States feeding the Colorado River's branch system. The watershed of the Colorado River encompasses 246,000 square miles, which is the seventh largest in North America. Most of the river's water source is produced during winter seasons, with snow above 5,000 feet and rainfall at lower elevations in the Rocky, Uinta, and Wind River Mountains. The snowmelt and rainfall occurring in and nearby these mountains are the primary origination or source point of the Colorado River's water.

Prior to the construction of major dams and canals, the Colorado River dumped approximately 16.3 million acre-feet (MAF), or 5.3 trillion gallons, of water into the Gulf of California on an annual basis. The river is also historically known to be very volatile, with summer flows, known for their flood potential, far surpassing winter flows by margins of over 50 to 1. Historically, this volatility was the cause of flooding concerns for the areas lying within the floodplain of the river.

Figure 3.1 Parker Dam at Colorado River

Figure 3.2 Colorado River Basin and Diversion Structure

3.2.2. Early Canal Systems

As mentioned in **Section 2**, the Colorado River was tapped as a source of supply in the early 1900s. The early canals were built mostly by and for private land owners in the Palo Verde Valley and the Imperial Valley, mainly for agricultural purposes. This included the Alamo Canal (also known as the Imperial Canal), which was the earliest major canal built from the Colorado River. Built in 1900-1901, the Alamo Canal connected the Colorado River to the head of the Alamo River, and supplied water to the Imperial Valley area just south of the Palo Verde Valley. In response to silt deposits that restricted flow capacity of the Alamo Canal, modifications were made to the Canal in 1904 to increase flow capacity.

Flooding of the Colorado River in the succeeding years occurred, and the improperly constructed improvements led to the river's flows being diverted into the Canal, which then flowed into the Salton Sink and created the Salton Sea. The flooding was corrected and the Alamo Canal was modified in 1907 to prevent future incidents. Within a few years, the Imperial Valley farmers formed the Imperial Irrigation District to assume responsibility and control of the Alamo Canal, and plans for its replacement were soon underway.

3.2.3. Colorado River Water Rights

"Law of the River" (Water Rights)

The right to water from the Colorado River is governed by numerous compacts, state and federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River." These documents apportion the water and regulate the use and management of the Colorado River among the seven basin states and Mexico. A summary of the court decisions is as follows:

Colorado River Compact (1922):
An interstate agreement giving each basin perpetual rights to annual apportionments of 7.5 million acre-feet (MAF) of Colorado River water to the States of Arizona, California, and Nevada.

Boulder-Canyon Project Act (1928)
Further defined the lower basin's 7.5 MAF apportionment split, with an annual allocation of 2.8 MAF to Arizona, 4.4 MAF to California, and 0.3 MAF to Nevada.

CA Seven Party Agreement (1931)
Prioritized California water rights of 4.4 MAF, with agricultural entities using 3.85 MAF of that total. The remaining priorities are defined for years in which the Secretary declares that excess waters are available.

Arizona v. California (1964 & 1979)
The 1964 decision defined Arizona's rights to the Colorado River and paved the way for the Central Arizona Project. The 1979 decision addressed Present Perfected Rights (PPRs) previously mentioned in past agreements. These rights are entitlements essentially established under state law, and have priority over later contract entitlements.

CO River Basin Project Act (1968)
Authorized projects in both the upper and lower basins, including the Central Arizona Project (CAP) in 1968. The act made the priority of the CAP water supply subordinate to California's apportionment in times of shortage.

Quantification Settlement Agreement (2003)
The Quantification Settlement Agreement (QSA) settles disputes among the United States, the State of California, Imperial Irrigation District (IID), MWD, Coachella Valley Water District, and the San Diego County Water Authority (SDCWA). The agreements resolve, for a period of 35 to 75 years, issues regarding the reasonable and beneficial use of Colorado River water; the ability to conserve, transfer and acquire conserved Colorado River water; the quantification of Priorities 3 and 6 (*CA Seven Party Agreement*) within California for the use of Colorado River water; and the obligation to implement and fund related environmental impact mitigation.

In short, the "Law of the River" and the more recent QSA provide the methods and the means to allow water rights holders to interact with one another and to elevate their water use to efficient 21st Century standards.

3.2.4. MWD'S Colorado River Rights

Water supply from the CRA continues to be a critical issue for Southern California as MWD competes with several agricultural water agencies in California for unused water rights to the Colorado River. Although California's allocation has been established at 4.4 MAF annually, MWD's allotment stands at 550,000 AFY with additional amounts increasing MWD's allotment to 842,000 AFY if there is any unused water from the agricultural agencies.

MWD recognizes that competition from other states and other agencies within California has decreased the CRA's supply reliability. In 2003, the Quantification Settlement Agreement (QSA) facilitated the transfer of water from agricultural agencies to urban uses. This historic agreement provides California the means to implement transfers and supply programs, which will allow California to live within the State's 4.4 MAF basic annual apportionment of Colorado River water.

Section 7.5 provides further details regarding the Colorado Rivers reliability

since 2020, including recent water levels in Lakes Mead and Powell.

3.2.5. BAY-DELTA

The District has access to imported water from the Sacramento-San Joaquin River Delta in Northern California from MWD, through FMWD. The Bay Delta water system provides Southern California agencies with over 1 million acre-feet (MAF) of water annually.

Figure 3.3 Bay Delta

The Delta is often considered the nexus of California's statewide water system. Approximately half the total river flow in the State passes through this region, from which water is exported to the San Joaquin Valley, Southern California, and portions of the Bay Area to supply 1,130,000 acres of farmland and 23 million people in central and Southern California. The Delta provides an estimated 7 million acre-feet (MAF) of water per year, of which approximately 100,000 AF is exported to the San Francisco Bay Area, 1.7 MAF is used locally, and more than 5 MAF is exported to the San Joaquin Valley, coastal Central and Southern California via the State Water Project.

3.2.6. Bay Delta Conveyance Project

The Delta Conveyance Project is a modernization effort proposed by the State of California Department of Water Resources (DWR) to change how water is moved through the Sacramento–San Joaquin Delta for the State Water Project (SWP). The Delta Conveyance Project centers around constructing a new, single-tunnel conveyance facility that would divert a portion of Sacramento River flows through new intakes in the North Delta and deliver that water to the existing SWP pumping facilities in the South Delta. The goal is not to increase water exports, but to improve the system's ability to capture water during periods of high availability and maintain water reliability during future droughts.

The Delta Conveyance Project's received DWR's approval, certification of EIR, and permit from CEQA.

The Delta Conveyance Project is currently in the final stages of regulatory review and permitting, following the DWR's approval of the project and certification of the Final Environmental Impact Report (EIR) in late 2023. During 2024–2025, DWR secured several major environmental permits,

including the California Endangered Species Act Incidental Take Permit, and advanced federal permitting through the U.S. Army Corps of Engineers and NOAA Fisheries. The project continues to move forward but has not received final approval to begin construction.

3.2.7. State Water Project (Aqueduct)

The California State Water Project is a water storage and delivery system of reservoirs, aqueducts, power and pumping plants. Its main purpose is to store water and distribute it to twenty-nine (29) urban and agricultural water suppliers in Northern California, San Francisco Bay Area, San Joaquin Valley, Central Coast, and Southern California. Of the contracted water supply, seventy percent (70%) is delivered to urban users and thirty percent (30%) is delivered to agricultural users.

The State Water Project or "SWP" is a result of decades of planning and construction dating back to the 1940s.

In 1947, the California State Legislature funded a water resources investigation that led to the development of the SWP. This investigation resulted in the publication of the California Water Plan. The California Water Plan presented preliminary plans to meet the State's ultimate water needs, including those facility works required for transferring surplus water from Northern California to Southern California. Financing for the construction of SWP facilities was authorized in 1959, when the State Legislature enacted the California Water Resources Development Act (known as the Burns-Porter Act). The Burns-Porter Act, formally known as the California Water Resources Development Bond Act, was placed on the November 1960 ballot and approved by voters. Also known as Proposition One, the initial water projects included Oroville Dam and Lake Oroville, B.F. Sisk Dam (also known as San Luis Dam), San Luis Reservoir, South Bay Aqueduct, North Bay Aqueduct, and the California Aqueduct. Construction on the Oroville site began before the passage of the Burns-Porter Act. A $25 million emergency appropriation was passed in 1957 after a record late 1955 to early 1956 flood, which devastated Northern and Central California. Statewide, 64 deaths were recorded due to the flooding, mostly in Sutter County and Yuba City, and more than $200 million of property damage.

The State Water Project or "SWP" is a result of decades of planning and construction dating back to the 1940s.

Figure 3.4 Sacramento-San Joaquin Bay Delta

Figure 3.5 Aqueduct Systems in California

Figure 3.6 State Water Project

The first SWP water deliveries were made in 1962, two years after construction began The State of California Department of Water Resources (DWR) and MWD signed the first water supply contract in 1960. Today twenty-nine (29) agencies have long-term water supply contracts with DWR. The service areas of those long-term water supply contractors vary widely in size, location, climate, and population. The contractors' uses for SWP water also differ. In the San Joaquin Valley, SWP water is used primarily for agriculture. In Southern California, SWP water is used primarily for urban and industrial needs.

Today 29 agencies have long-term water supply contracts with DWR

Today, the SWP includes thirty-four (34) storage facilities, reservoirs, and lakes; twenty (20) pumping plants; four (4) pumping-generating plants; five (5) hydroelectric power plants; and approximately 701 miles of open canals and pipelines. The SWP is owned and managed by DWR.

3.3. IMPORTED WATER PURCHASES

Table 3.1 presents the District's recent imported water purchases from FMWD for years 2021 to 2025 and compares them to years 2015 to 2020.

Table 3.1 Imported Water Supply

Year	Purchases (AF)
2021	1,987
2022	1,636
2023	1,457
2024	1,446
2025	1,602
Average:	**1,626**
2015 – 2020 Avg. (2020 UWMP)	**1,992**

3.4. GROUNDWATER SOURCES

3.4.1. Verdugo Groundwater Basin

The District owns and operates eleven (11) production wells in the Verdugo Groundwater Basin (Basin). The Basin, shown in **Figure 3.8,** north and east of the Verdugo Mountains, consists of 4,400 acres and comprises approximately 3.6% of the total valley fill. It is bounded on the north by the San Gabriel Mountains; on the northwest by a groundwater divide, which separates it from the San Fernando Basin; on the east by a groundwater divide separating it from the Monk Hill Subarea of the Raymond Basin; on the southeast by the San Rafael Hills; and on the south and southwest by the Verdugo Mountains.

The Basin is an adjudicated basin within the Upper Los Angeles River Area (ULARA). The Basin has an adjudicated "safe yield" of 7,150 AFY. The District shares groundwater rights in this basin with the City of Glendale. As the only two water-rights holders in the Basin, the District has an annual entitlement of 3,294 AFY and the City of Glendale has an annual entitlement of 3,856 AFY. A copy of the Basin's adjudication is included in **Appendix I**.

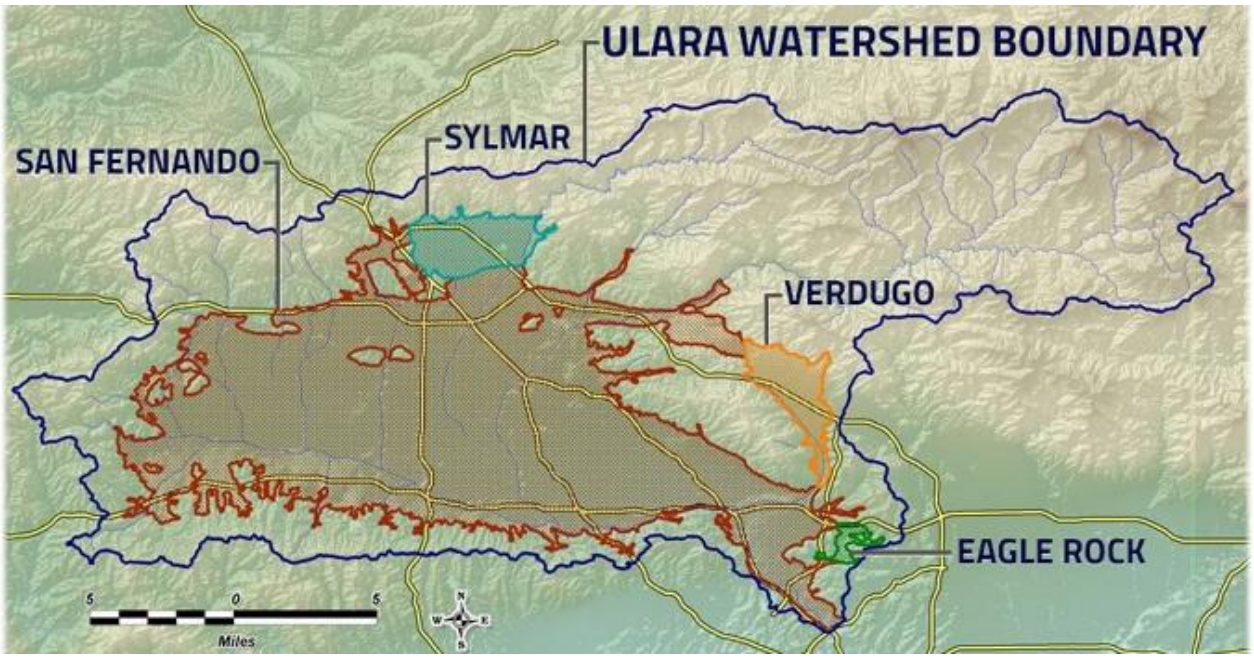

Figure 3.7 Local Groundwater Basins within the Upper Los Angeles River Area

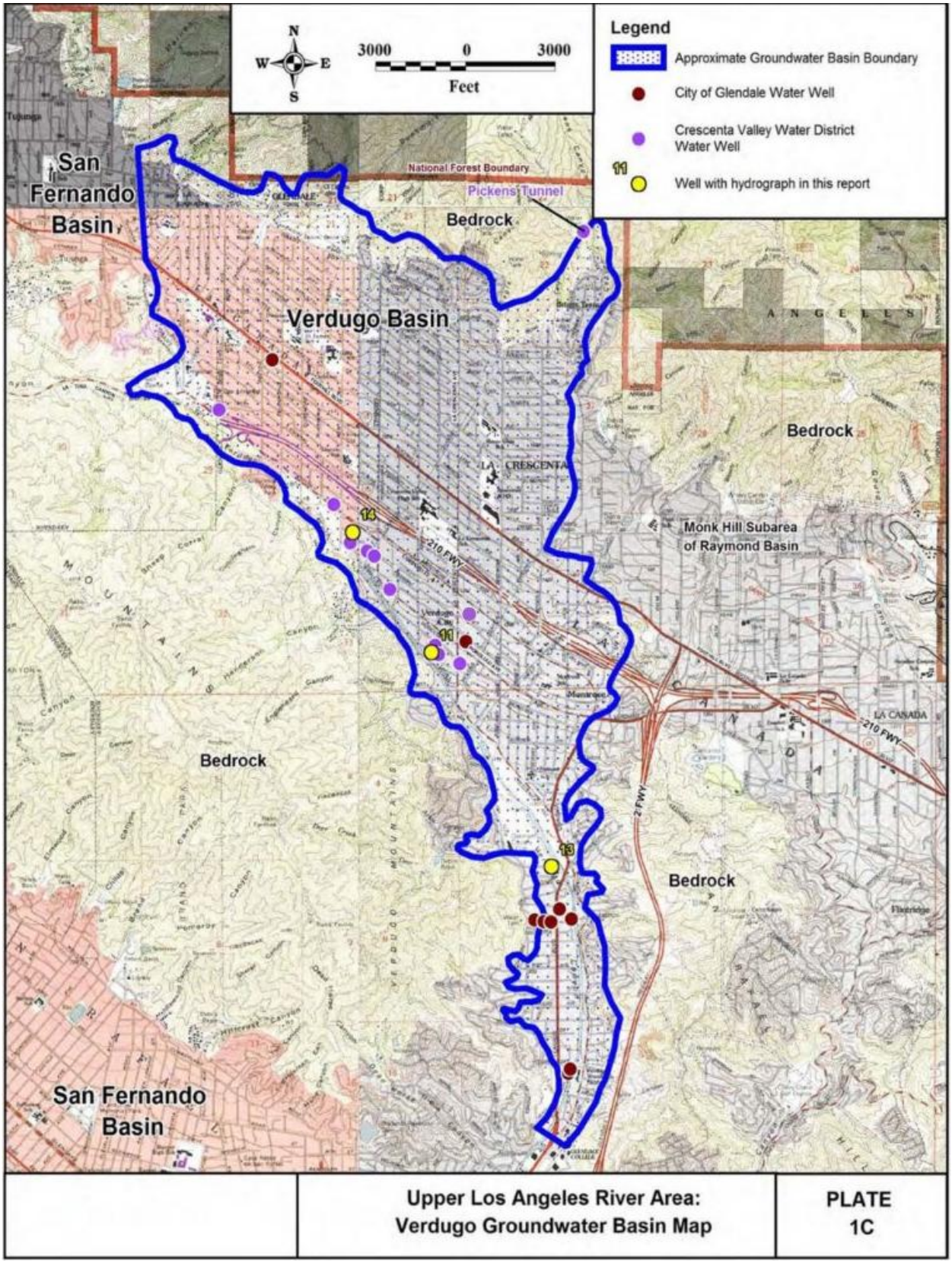

Figure 3.8 Verdugo Groundwater Basin

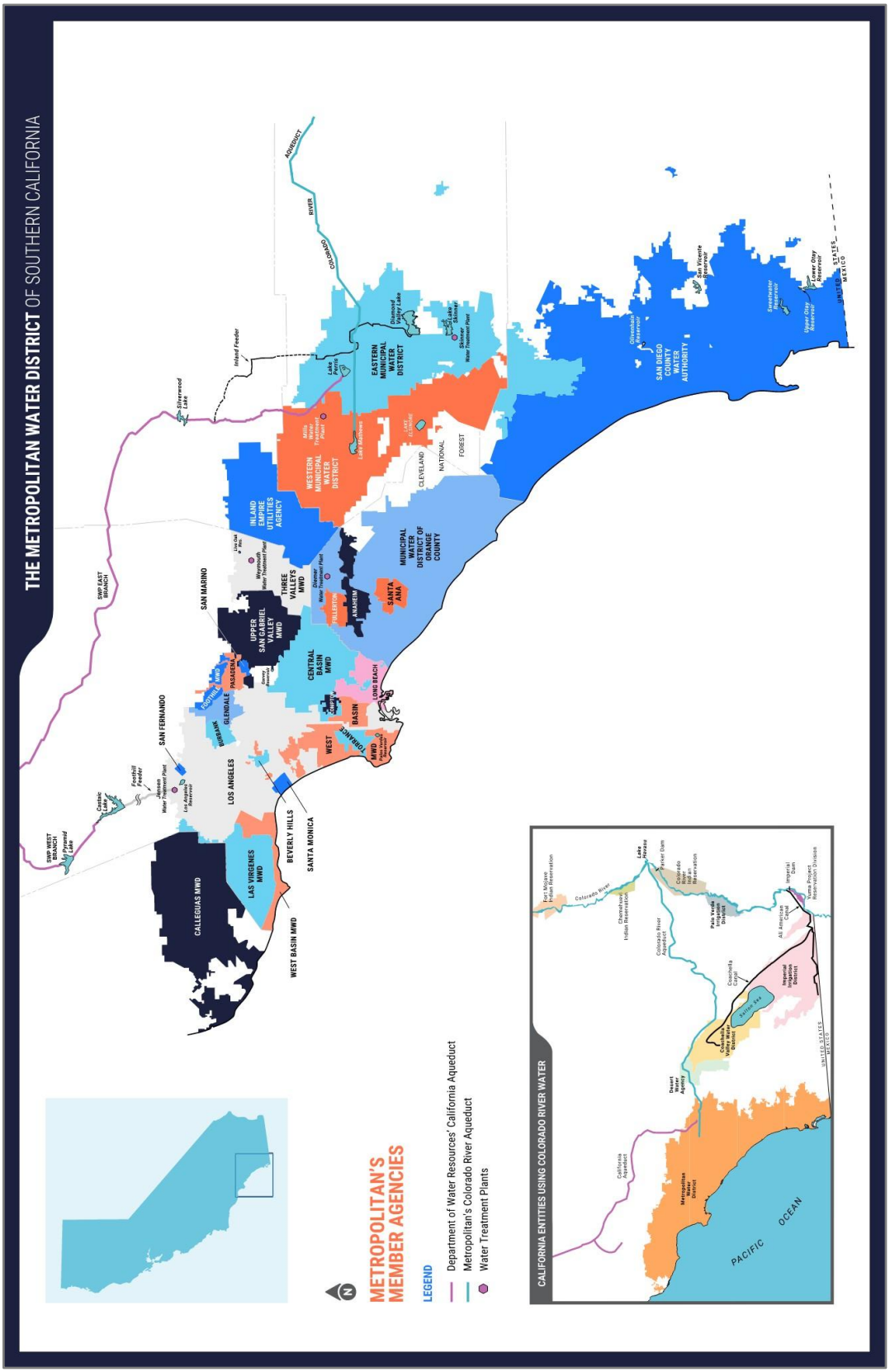

Figure 3.9 MWD Service Area Map

3.5. GROUNDWATER PRODUCTION

Statewide, storage reservoir levels rise and fall due to seasonal climate changes, which induce increase in demand. During periods of drought, reservoir levels typically drop significantly and may limit the amount of supplies available. As a result, both DWR and MWD monitor reservoir levels regularly. **Figure 7.4** shows current California State Reservoir Levels (May 2026) and **Figure 3.10** shows the MWD Reservoir Levels (May 2026). As shown, the majority of the state's reservoirs are back to average levels, after recovering from the recent drought of 2020-2022.

All wells within the District's service area are equipped with a flowmeter to measure water production. Water production is recorded monthly by District staff and reported annually to DWR. Over the past five years of operation, groundwater extraction has averaged 2,102 AFY. **Table 3.2** shows the District's groundwater supplies for years 2021 to 2025.

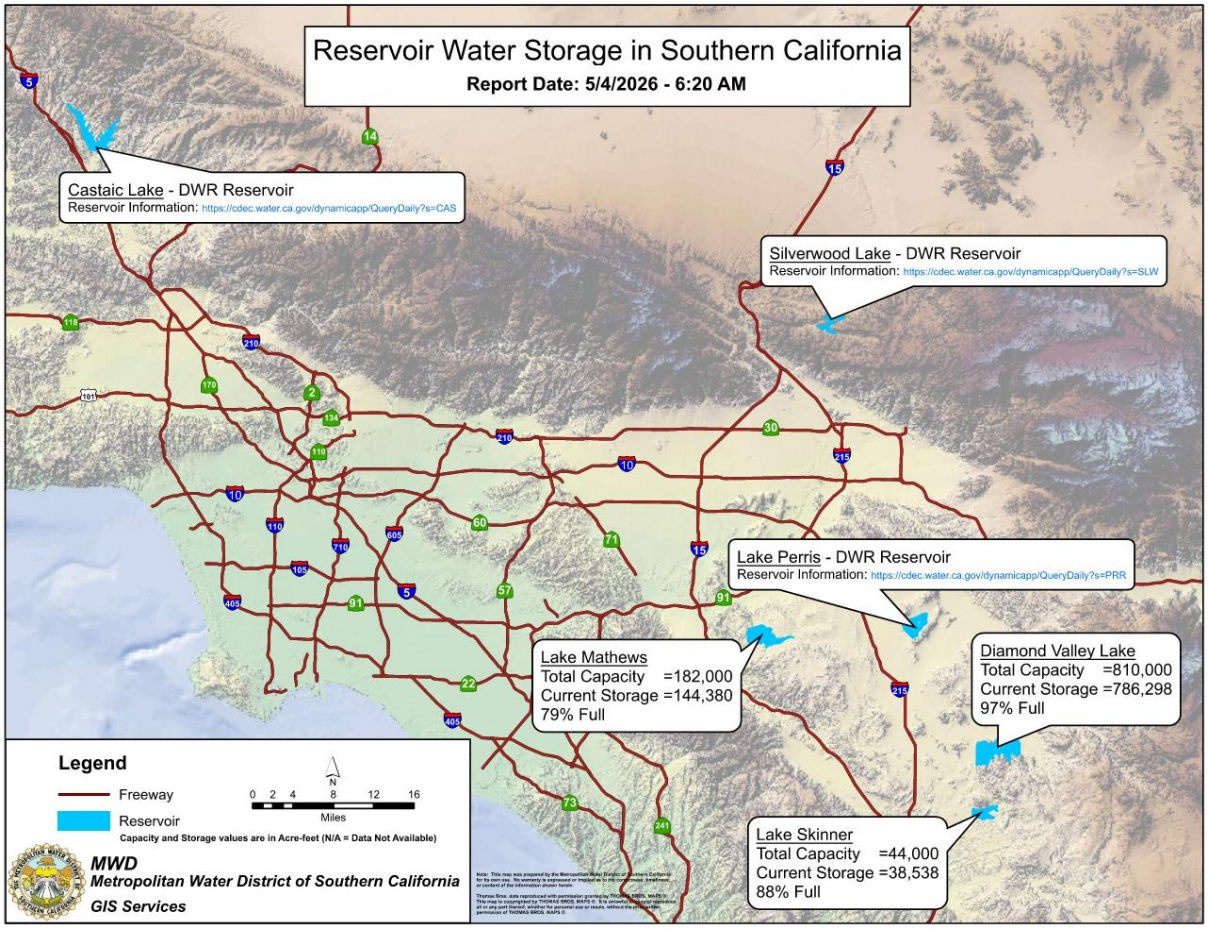

Figure 3.10 MWD Reservoir Levels (May 2026)

Table 3.2: Overall Groundwater Production

Year	Production (AF)
2021	2,127
2022	2,076
2023	2,017
2024	2,230
2025	2,061
Average:	**2,102**
2015-2020 Avg. (2020 UWMP)	**1,868**

As can be seen from the amounts shown, overall water production decreased slightly from 2021 to 2025, with a spike in 2024. This is most likely a result of the lingering effects of the State mandated drought restrictions (see **Section 7**) and only a slight increase in the District's population.

3.6. ROSEMONT PRESERVE STORMWATER RECHARGE PROJECT

Goss Canyon, an approximately 250-acre watershed at the base of the San Gabriel Mountains, is characterized by chaparral-covered hillsides and a lush, oak-lined stream bed, home to diverse wildlife. It is generally privately owned and crucial for recharging La Crescenta's Verdugo Groundwater Basin. With low water demands, the District has been increasingly reliant on groundwater and the Verdugo Basin has seen declining water levels over the past decades.

A material amount of stormwater is lost annually to the LA County flood control system and the ocean from this watershed. The Arroyo and Foothills Conservancy (AFC) manages the bottom of Goss Canyon in partnership with Crescenta Valley Water District and County Flood Control. The joint Rosemont Preserve stormwater recharge and water education project enables additional groundwater recharge from stormwater through a straightforward ditch and furrow method (**Appendix K)**.

On-site Stormwater Capture Structure (Bioswale):

- Utilizes nature-based solution (bioswale) to ensure more stormwater absorbs into soil and recharges local groundwater basin. Water would otherwise exit property through County storm channel to the ocean.
- Captures 10's to 100's of thousands of gallons of rainwater per year.
- Preserves full function of adjacent LA County flood control debris basin, ensuring public safety during large storm events.
- Provides proof of concept for other similar canyons & debris basins (160 debris basins exist in LA County alone), and test case for stormwater retention assessment tool, Data-Driven Resource Optimization and Planning System (DROPS).

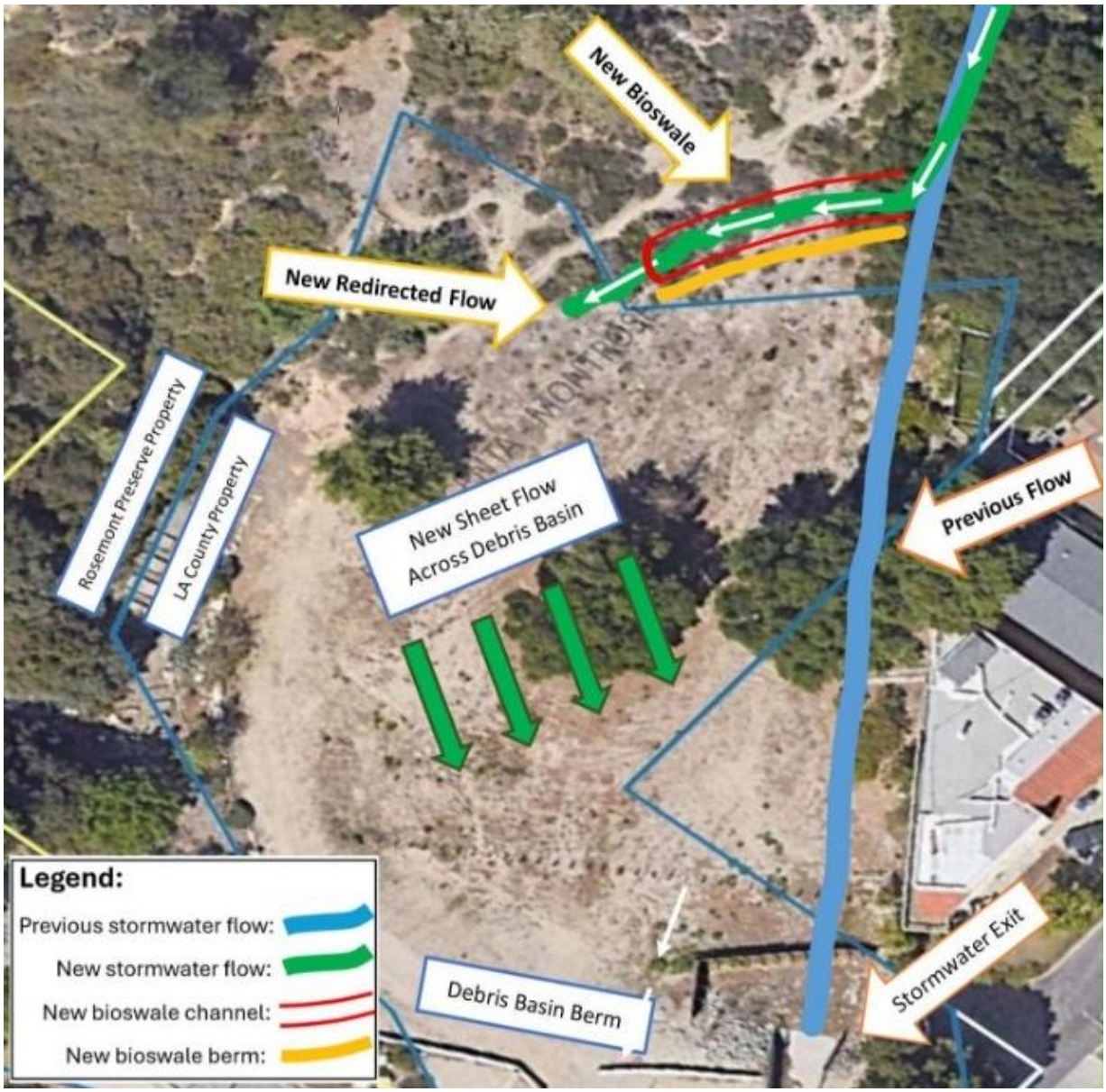

Figure 3.11 Rosemont Preserve Stormwater Recharge Project

3.7. PROJECTED WATER SUPPLIES

Based on MWD's supply projections that it will be able to meet full service demands under all three hydrologic scenarios, FMWD, the District's wholesale supplier, concludes that it would also be able to meet the demands of its retail agencies under these conditions.

CWC section 10631(k) requires the wholesale agency to provide information to the urban retail water supplier for inclusion in its UWMP which identifies and quantifies existing and planned sources of water available from the wholesale agency. **Section 7.7** indicates FMWD's water availability projections by source for the next 25 years, as provided to the District.

In addition to imported water supply availability, **Section 7.7** also shows the adjudicated amount of groundwater supply available to the District over the next 25 years. It also includes the District's projected amount of groundwater pumped from GWP's Rockhaven Well (Well #16). The projected amount of groundwater purchased from GWP over the next 25 years averages 500 AFY. In the past, various problems with the District's wells have hindered the amount that is able to be pumped. This is a contributing factor to District's intention to embark on a well rehabilitation and development plan to increase reliance on local supplies over imported sources.

3.7.1. Planned/Projected Supply Projects

The District rehabilitates its wells and reservoirs on a recurring basis to ensure operational efficiency and structural integrity. For example, the District is working towards the development of the Crescenta Valley County Park Multiuse Project. This Project will allow the District to increase groundwater storage in the Basin by installation and maintenance of underground infiltration galleries underneath portions of the existing park. This will be accomplished by utilizing the existing Los Angeles County flood control channels (Verdugo Wash) and surface flow within the Crescenta Valley to divert storm water during the rainy season and capturing dry weather flow to proposed underground infiltration basins within the recreational areas. The project will potentially increase the local water supply by an annual average of 340 AFY, thus enhancing the District's groundwater resource and reducing dependence on imported supplies. Also, through the process of capture, treatment, and reuse of storm water and dry weather flow, the project could potentially reduce pollutant load from contaminating the Los Angeles River.

The District rehabilitates its wells and reservoirs on a recurring basis

3.8. ALTERNATE WATER SOURCES

This section provides an overview of alternative water sources (non-potable supplemental supplies) and their potential uses. Alternative water sources include recycled water or greywater. A more detailed look into recycled water is found in **Section 4**.

3.8.1. Greywater

Greywater systems have been used in California to provide a source of water supply for subsurface irrigation and also as a means to reduce overall water use. Greywater consists of water discharged from sinks, bathtubs, dishwashers, and washing machines. Greywater systems consist of an underground tank and pumping system.

Greywater is currently legal for subsurface irrigation in the State of California; however, strict regulations and high installation costs have impeded installation of professional greywater systems and have the unintended consequence of undocumented and noncompliant use of greywater. An example of a Greywater System is shown in **Figure 3.12**.

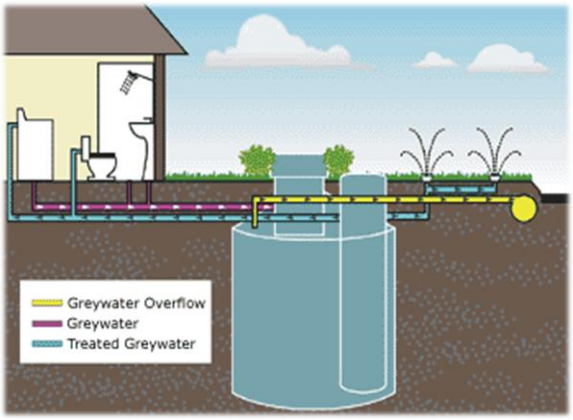

Figure 3.12 Greywater System

The District does not currently have a formal program in place to support greywater use. However, the promotion of greywater systems as a means to reduce the District's overall water use has not been considered at this time since the use of greywater is currently limited to subsurface irrigation, and therefore the overall service area-wide reduction in water use would be minimal. Additionally, any water diverted to greywater systems would no longer be available for treatment into recycled water.

3.8.2. Desalinated Water

The District has explored desalination of wastewater, groundwater, or seawater and has determined that currently desalination is considered cost-prohibitive and is not under consideration.

3.9. TRANSFERS OR EXCHANGES

The District has three (3) interconnections with other agencies [City of Glendale, La Cañada Irrigation District, and Los Angeles Department of Water and Power (LADWP)] that are capable of transferring water to the District during emergencies. The emergency connections are described in greater detail in **Section 8.8.2**.

3.10. ENERGY INTENSITY OF SUPPLY

According to the District's groundwater production figures shown in **Table 3.2**, the District pumped an average of 1,277 gpm in 2025. With a total nominal pumping capacity of the combined wells of 2,228 gpm, this means that on average each well's motor ran for a cumulative of 13.8 hours each day. The 2020 UWMP determined the District's energy intensity is approximately 1,019.4 kWh/AF or 3,128.6 kWh/MG, which was used to determine the total Energy Consumed in 2025, as shown in **Table 3.3** and **DWR Submittal Table O-1B** in **Appendix E.**

Table 3.3 Energy Reporting - Total Utility Approach

	2020	2025
Volume of Water Entering Process (AF)	4,216	2,061
Energy Consumed (kWh)	4,297,984	2,100,666
Energy Intensity (kWh/AF)	1,019	1,019
Energy Intensity (kWh/MG)	3,129	3,129

3.11. RELIABILITY OF SUPPLIES

The reliability of water supplies regarding regular threats to reliability, including droughts, is discussed in detail in **Section 7**.

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Section 4: Recycled Water Opportunities

Recycled water has increased overall water supply reliability for many cities in LA County.

4.1. OVERVIEW

Recycled water is defined as domestic wastewater purified through primary, secondary and tertiary treatment. The Southern California region, from Ventura County to San Diego County, discharges over 1 billion gallons of treated wastewater to the ocean each day. Since recycled water is acceptable for a variety of non-potable water purposes such as irrigation, groundwater recharge, and commercial/industrial processes, it is considered a reliable and drought-proof water source and could greatly reduce the region's reliance on imported water. As technological improvements continue to reduce treatment costs, and as public perception and acceptance continue to improve, more reuse opportunities should develop, which will increase demands for recycled water. Recycled water is a critical part of the California water picture because of the likelihood of droughts. As part of its overall water resources planning, the District continues to investigate the feasibility and cost-effectiveness of using recycled water.

Cost-effective opportunities for using recycled water are limited due to the lack of large users or large irrigated areas within the District's service area, especially when considering the large costs for developing and operating treatment facilities and distribution system. In addition, there is presently a possible source from Glendale Water and Power, but no infrastructure is available. This potential use of recycled water is continually assessed by the District, FMWD, and MWD.

This Section describes the existing and future recycled water use opportunities within the District's service area. The section also includes estimates of potential recycled water supply and recycled water demand from 2026 through 2050 in five-year increments.

4.2. WASTEWATER COLLECTION SYSTEM

Municipal wastewater is generated in the District's service area from a combination of residential, commercial, and industrial sources. Although the water and sewer service areas are slightly different, the quantities of wastewater generated are generally proportional to the population and the water used within the service area. It is estimated that customers within the District's service area generate wastewater based on approximately eighty percent (80%) of potable water demand, although that is not a strict figure. These values are also reflected in **DWR Submittal Table 6-2** in **Appendix E**.

The District operates a sewage collection system with approximately 6,000 connections. The system transports this wastewater outside District boundaries to a regional wastewater treatment plant owned by the City of Los Angeles. The District pays a flow-based share of treatment and disposal costs to the City of Los Angeles and the treated effluent from the Los Angeles-Glendale (LAG) Water Reclamation Plant (WRP) or LAGWRP. The District generates approximately 540 to 590 MG per year of raw sewage.

4.2.1. Wastewater Treatment

The LAGWRP serves a small portion of the west side of La Cañada Flintridge and La Crescenta. The wastewater is treated through a three- step process imitating nature's cleaning processes also referred as tertiary treatment. The LAGWRP processes approximately 20 MG of non-potable water each day. Five new concurrent projects are underway at the LAG campus to improve daily wastewater and recycled water treatment operations and to reduce the strain on major sewers and the Hyperion Water Reclamation Plant. All five projects were targeted to be completed by December 2024, but are still currently underway.

Figure 4.1 Los Angeles-Glendale Plant

4.3. RECYCLED WATER

Following a comprehensive evaluation, as shown in the 2025 Recycled Water Feasibility Study (**Appendix M**), the District determined that the capital and lifecycle

costs associated with all project alternatives exceeded its current financial capacity and did not offer sufficient cost-benefit advantages under present conditions. As a result, the District has elected to proceed with representing continued reliance on imported water and no recycled water development at this time. However, the planning-level work completed through the study provides a foundation for future consideration should conditions change.

4.3.1. Potential Recycled Water Use

Caltrans is currently the only high water user with potential for recycled within the District's service area. It is cost prohibitive due to the low demand for recycled water; however, the District will continue to evaluate potential projects.

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Section 5: Water Quality

Although offline, the District's Glenwood Nitrate Reclamation Facility (pictured) helped ensure high quality drinking water.

5.1. OVERVIEW

The quality of a natural body of water varies over time and location, and these variables must be recognized by water agencies. During periods of intense rainfall, contaminants can be washed into receiving waters, although dilution of existing contaminants may also occur. Conversely, during a drought, the concentration of existing contaminants may increase without additional incoming flows. These principles apply to both surface water and groundwater. As groundwater levels fluctuate, groundwater passes through different layers of rock and sediment and receives substances native to those strata. Also, groundwater wells that have not been used over long periods of time can have water quality issues resulting from stagnant water. For these reasons, the Crescenta Valley Water District (District) monitors its wells for water quality as required by State and Federal regulations.

This Section provides a general description of the District's water sources, water quality monitoring and reporting, and water treatment. A discussion of potential water quality impacts on the reliability of supplies is also provided.

5.2. WATER QUALITY STANDARDS

5.2.1. Federal Regulations

In 1974, Congress passed the Safe Drinking Water Act (SDWA) in order to protect public health by regulating the nation's municipal drinking water supply. As part of the SDWA,

powers were given to the Environmental Protection Agency (EPA) to regulate drinking water. The 1996 amendment to the SDWA required monitoring of new types of contaminants. Since the 1996 amendment to the SDWA, the EPA has identified over ninety (90) contaminants in its National Primary Drinking Water Regulations (NPDWR) or "primary standards"). The main categories the EPA has identified include: biological microorganisms, disinfectants, disinfection byproducts, inorganic chemicals, organic chemicals, and radionuclides. As required by the SDWA, water agencies must provide annual Water Quality Reports to its customers.

As part of Federal EPA standards, water agencies are required to prepare annual water quality reports.

5.2.2. State Regulations

Water quality regulations have changed since the Safe Drinking Water Act in 1974. Several state, regional and county agencies have jurisdiction and responsibility for monitoring water quality. The actual regulations on water quality have also changed over the years. This is the result of the discovery of new contaminants, changing understanding of the health effects of previously known as well as new contaminants, development of new analytical technology, and the introduction of new treatment technology. All water purveyors are subject to drinking water standards set by the EPA and the State Water Resources Control Board (SWRCB). The California Department of Public Health (CDPH) previously oversaw the water quality of the State's drinking water program and the environmental lab accreditation program. As of July 2014, those programs were transferred to the SWRCB. Under the SWRCB, the Division of Drinking Water (DDW) regulates public drinking water systems, including setting the maximum contaminant levels (MCLs) and regulating the operation of water systems. In addition to the SWRCB, several regional and county agencies have jurisdiction and responsibility for monitoring water quality and contaminant sites.

In 2014, the State's drinking water program was transferred from the Health Department to SWRCB.

5.2.3. State Drinking Water Standards

The State of California has established two (2) main types of drinking water standards:

1. Maximum Contaminant Level (MCL)
2. Public Health Goal (PHG)

MCLs are the drinking water standards to be met by public water systems. The levels set by the State consider a contaminant's health risk, detectability, treatability, and costs of

treatment. MCLs are further broken down into two (2) types:

1. Primary MCL – Health Related
2. Secondary MCL – Taste & Odor

Secondary MCLs are not federally enforceable according to the most recent SDWA amendments. However, they are regulated by the State of California. DDW publishes a list of Secondary MCLs, which include Copper, Iron, and Zinc.

PHGs are established by the Office of Environmental Health Hazard Assessment (OEHHA). They are concentrations of drinking water contaminants that pose no significant health risk if consumed for a lifetime, provided risk levels are not exceeded. Public water systems often use PHGs to provide information regarding drinking water contaminants in their annual water quality reports. PHGs are not regulatory standards. However, state law requires the SWRCB to set drinking water standards for chemical contaminants as close to the corresponding PHG as is economically and technologically feasible.

5.2.4. Hexavalent Chromium (Cr6)

Hexavalent chromium (Cr6) is a heavy metal that has been used in industrial applications and found naturally occurring throughout the environment. While chromium can exist in a nontoxic, trivalent form, the hexavalent form has been shown to be carcinogenic and toxic to the liver (OEHHA, 2011). Hexavalent chromium is among the chemicals known to the state to cause cancer (Title 27, California Code of Regulations, Section 27001), pursuant to California's Safe Drinking Water and Toxic Enforcement Act of 1986 ("Proposition 65"). The hexavalent chromium Maximum Contaminant Level (MCL) is 0.010 mg/L, 10 µg/L, or 10 parts per billion (ppb) became effective on October 1, 2024 and water systems with 10,000 or greater service connections, which does not apply to the District, are required to comply with this standard by October 1, 2026.

Prior to 2024, hexavalent chromium was regulated under California's total chromium MCL of 50-ppb. The Federal Standard is currently set at 100-ppb.

5.2.5. District Standards

To ensure quality of its water, the District conducts sampling and testing of water on a daily, weekly, and monthly basis. Testing is performed at several locations of the District's distribution system, as well as at the source (District wells). Results of the water quality testing are posted annually to the District's website. The District's water quality reports since 2007, are archived at the following link:

www.cvwd.com/water-quality-reports

The testing is conducted on several parameters, including organic & inorganic chemicals, bacteriological contaminants, pesticides and herbicides, and radiological contaminants. The District contracts with certified laboratories to perform water quality testing. The District's Annual Water Quality Reports (also known as "Consumer Confidence Reports") are filed with DDW and released to customers. The annual reports identify regulated substances (Primary MCLs), secondary substances (Secondary MCLs), and unregulated substances (PHGs). The District identifies all detected substances in the annual reports. In addition, the District conducted a lead service line inventory in 2024 and the results are available on CVWD's website at:

www.cvwd.com/lead-service-line-inspections

According to the District's 2024 Annual Water Quality Report, the results for this type of testing indicate that lead and copper were not detected above the action level (AL).

5.3. QUALITY OF WATER SOURCES

The two main sources of the District's water supply are imported water from FMWD (MWD water) and groundwater from the Verdugo Basin (Basin). Since MWD draws the majority of its water from the CRA and the SWP, the quality of the District's imported water supply is closely related to the quality of these two sources.

5.3.1. Imported Water Quality

MWD is responsible for providing water of a high quality throughout its service area. The water delivered by MWD is tested both for currently regulated contaminants and for additional contaminants of concern. Over 300,000 water quality tests are conducted each year to regulate the safety of its water. MWD's supplies originate primarily from the CRA and from the SWP. The two sources, proportional to each year's availability of the source, is then treated and delivered throughout MWD's service area.

Figure 5.1 MWD's Weymouth Treatment Plant Provides a Safe Supply of Water

MWD's primary sources face individual water quality issues of concern. The CRA water source contains a higher level of total dissolved solids (TDS) and a lower level of organic material. The SWP contains a lower TDS level while its level of organic materials is much higher, lending to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's

high level of organic materials, MWD has been blending CRA water with SWP supplies as well as implementing updated treatment processes to decrease the disinfection byproducts. In addition, MWD engages in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium VI while also investigating the potential water quality impact of emerging contaminants, N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). MWD has assured its ability to overcome the mentioned water quality concerns through its protection of source waters, implementation of renovated treatment processes, and blending of its two sources.

Figure 5.2 Native Rock adds to the Salinity of the Colorado River Water Supplies

5.3.2. Groundwater Quality

The water quality of the Verdugo Basin is high in nitrates and selected wells show the presence of Volatile Organic Compounds (VOCs), particularly tetrachloroethylene (PCE), which per the 2020 UWMP, were above the State Water Resources Control Board's Division of Drinking Water (DDW) maximum contaminant levels (MCLs). These wells are no longer above the MCL. In addition, District experienced Methyl tertiary butyl ether (MTBE) levels above the public health goal and removed a well from service in 2006. That well was placed back into service in May 2008; however, another well was taken out of service in September 2008 due to high levels of MTBE. That well was placed back into service in March 2011. While MTBE levels remain below detectable concentrations, District continues to monitor all sources on a quarterly or monthly basis.

5.4. IMPACTS OF WATER QUALITY

Water quality dictates the management strategies a water supplier will implement, including, but not limited to, the selection of water sources, treatment alternatives, blending options, and modifications to existing treatment facilities. A direct result of the degradation of a water source is the need to install wellhead treatment before consumption. The poorer quality of the source water, the greater the need (and cost) for treatment. This can also decrease water supply reliability. Due to the number of groundwater wells in the District's water system, the District has a degree of redundancy in the event of water quality impairments with a particular well. **Figure 5.3** shows a general procedure that the District may take when one of the District's wells is detected to have water quality concerns.

Salinity levels often exceed secondary drinking water standards and pose a challenge for well operations.

As a result of MWD's efforts, MWD's 2020 UWMP indicates that none of the water quality challenges described will impact the reliability of its supplies during the next 25 years. The District's water system is and has been in compliance with all DDW water quality standards. Groundwater quality does not impact water supply at this time due to the combination of imported water and blending prior to delivery to customers.

Histrocially, groundwater containing nitrate is either blended with imported water and/or treated at District's Glenwood Nitrate Reclamation Facility and AroNite Nitrate removal Treatment Plant for Well No. 2 to meet drinking water standards. However, both of these sites are currently offline, and only blending is being performed. Blending with other well water or imported water is sufficient to supply water at less than the MCL for PCE as approved by DDW. MTBE is not present in any of the District's wells above the secondary DDW standard. MTBE levels are monitored quarterly throughout District.
In the case that MTBE should reappear at levels above the secondary MCL, District has plans to utilize MWD water to blend down MTBE levels or the groundwater well will be shutdown.

5.4.1. Impacts of Abandoned Wells

The presence of abandoned groundwater wells represents a potential hazard to the quality of the groundwater basin. Abandoned and improperly destroyed wells can act as conduits for contaminants to reach drinking water supplies. It is vital for the long-term protection of the basin that abandoned wells be located and destroyed. While it is the landowner's responsibility to destroy an abandoned well, local water

agencies should be proactive about making sure that abandoned wells are in fact destroyed. The destruction of abandoned groundwater wells should be performed in accordance with state standards. California Water Code (CWC) Section 13750.5 requires that those responsible for the destruction of water wells possess a C-57 Water Well Contractor's License. Whenever a water well is destroyed, a report of completion must be filed with the California DWR within 60 days of the completion of the work. DDW and Los Angeles County (County) are responsible for permitting and inspecting construction and destruction of wells.

Abandoned private wells can pose a water quality concern if left unaddressed.

State policy for all functional and abandoned wells is to establish a "well site control zone", the area immediately surrounding the well alternatively referred to as the "wellhead". The purpose of this zone is to provide protection from vandalism, tampering, or other threats at the well site. The size of this zone can be determined by using a simple radius, or an equivalent area. The well site control zone should be managed to reduce the possibility of surface flows reaching the wellhead and traveling down the unprotected casing. SWRCB-DDW regulations recommend a minimum radius of 50 feet for well site control zones for all public water systems in the state. The requirement applies to abandoned wells as well as functional activities that could potentially lead to "source water contamination" according to EPA regulations (IWRP, 2007). Additionally, well owners are responsible for destroying abandoned wells per the Public Health and Safety Code, Part 9.5, Section 115700.

Figure 5.3 Well 10 Water Quality Sampling Cabinet

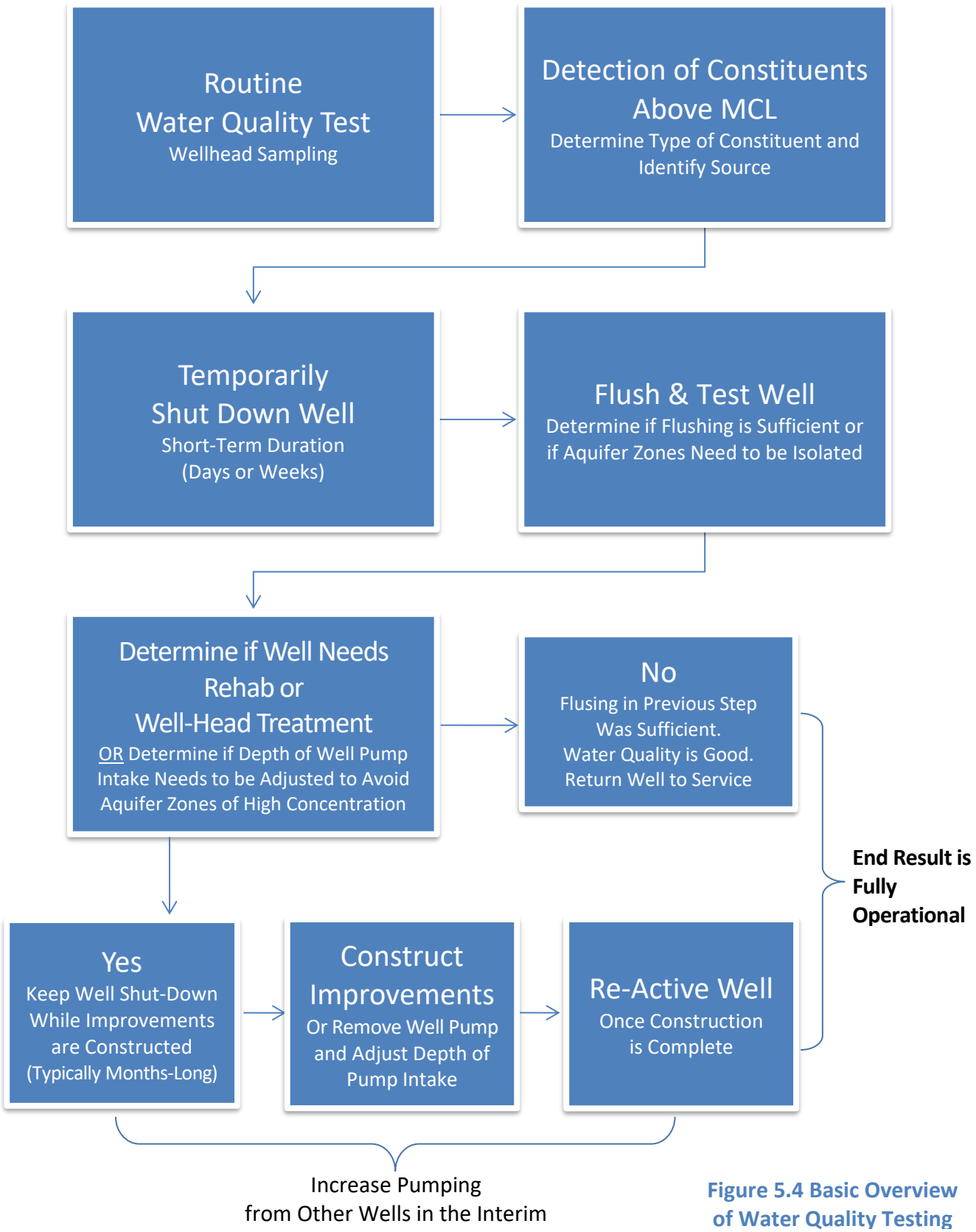

Figure 5.4 Basic Overview of Water Quality Testing

5.4.2. Groundwater Contamination Response

Currently, the District has a Water Shortage Contingency Plan (WSCP) Contingency Plan (WSCP), Cross Connection Control Plan (CCCP), and Sewer System Management Plan (SSMP) and Spill Emergency Response Plan (SERP) that work in conjunction to handle the effects of potential groundwater contamination and mitigate disasters such as sudden water shortages. This information is provided in **Section 8**.

The WSCP can provide guidance for dealing with the effects of a water shortage, which may be due to groundwater contamination. The District also has emergency response policies in place to respond to emergencies. Two recent tests of the District's emergency response network were seen in the year 2020, when the District responded to the Covid-19 pandemic, and in 2021, when Governor Newsom issued a State of Emergency due to drought that required Statewide correspondence with Level 2 of agency's WSCP. In the event of a groundwater contamination shortage, the District will work in conjunction with FMWD and the County's Emergency Operations Center to deal with the effects of potential water shortages.

The District will work with FMWD and the County's Emergency Operations Center.

5.4.3. Sanitary Surveys by DDW

The quality of water dictates numerous management strategies a water purveyor will implement, including, but not limited to, the selection of water sources, treatment alternatives, blending options, and modifications to existing treatment facilities. A direct result from the degradation of a water source is increased treatment cost before consumption. The poorer the quality of the source water, the greater the treatment cost. This in turn can decrease water supply reliability by potentially decreasing the total supply.

A Watershed Sanitary Survey examines the potential sources of contaminants in the watersheds and includes recommendations for managing these effects. Per DDW guidelines, the Watershed Sanitary Surveys must be updated every five (5) years. Since the District does not use any surface water directly, the District does not prepare Watershed Sanitary Surveys. However, the District is still subject to periodic inspections by DDW staff every three (3) years. The Sanitary Surveys conducted by DDW include inspection and evaluation of the following:

1. Water Sources
2. Treatment
3. Distribution System
4. Finished Water Storage
5. Pumping Facilities
6. Monitoring & Reporting

7. System Management/Operation
8. Operator Compliance (with State Requirements)

5.4.4. Impacts on Management & Reliability

As a result of the District's water quality policies, the District has not experienced water quality issues that affect its ability to meet demands. As shown in Figure 5.4, when wells are offline, additional groundwater will be available through other wells to supplement water supplies.

The District will also be constructing additional wells over the course of this UWMP planning period (2050), to create greater operational flexibility and redundancy. Therefore, the District does not anticipate any significant impacts to water supply reliability due to water quality issues.

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Section 6: Water Use

Water use within the District's service area includes residential, commercial, institutional, and landscape irrigation.

6.1. OVERVIEW

The District's water consumption is subject to significant change from year to year. Further, water use within the District's service area is also variable over the course of a given month or due to climate conditions. This section explores the water usage trends within the District and quantifies total water usage per customer type. In addition, the provisions of Senate Bill x7-7 (Water Conservation Act) are explored in detail.

6.2. COVID PANDEMIC'S EFFECT ON THE WATER SYSTEM

As a result of the Coronavirus Disease 2019 (COVID-19) Pandemic, Commercial and Institutional water use had declined. On March 19, 2020, an Executive Order and Public Health Order directed all Californians to stay home, except to go to an essential job or to shop for essential needs. It was then modified on May 4, 2020. The Regional Stay Home Order, announced December 3, 2020, triggered additional restrictions after the region was announced to have less than 15% ICU availability. It prohibited private gatherings of any size, closed sector operations except for critical infrastructure and retail, and required 100% masking (with certain exceptions as indicated in guidance for use of face coverings) and physical distancing. The Regional Stay Home Order was lifted January 25, 2021. During his 2021 State of the State Address Governor, Gavin Newsom reported that California had

administered nearly eleven (11) million doses of the vaccine, and that the State was well on its way to seeing an end to this pandemic.

The DDW has stated that the PWS operations are designated as essential functions and staff and suppliers are not restricted by any current orders. This has allowed water system operators and maintenance workers to keep the PWS providing safe and clean drinking water to its customers.

The COVID-19 pandemic temporarily altered water-use patterns and utility operations across California. Stay-at-home orders in 2020 and 2021 led to higher residential water use, while commercial, industrial, and institutional demand declined due to widespread facility closures. Many agencies observed shifts in peak-hour demand and changes in spatial distribution, with more water used in neighborhoods and less in business districts. Although these patterns gradually normalized as restrictions eased, the pandemic highlighted how quickly demand can shift during major disruptions.

The Covid-19 Pandemic has impacted water use in the residential and commercial sectors.

Water utilities also experienced operational and financial impacts during the pandemic. Many households faced economic hardship, leading to increases in delinquent customer payments and reduced revenue stability for some agencies. Utilities also had to deal with staffing shortages, supply-chain delays, and the need for enhanced safety protocols to maintain essential services. While most systems remained resilient, the pandemic underscored the importance of emergency planning, financial reserves, and operational flexibility for maintaining reliable water service during large-scale disruptions.

6.3. CURRENT DISTRICT WATER NEEDS

Water use within the District's service area includes residential potable use, landscape irrigation use, commercial and institutional uses, and of course water losses. Water use is variable and depends on a number of factors which include seasonal climate changes, demographic shifts, changes in land use or redevelopment, and of course legislation. Since the District's service area is largely residential, changes in residential plumbing fixtures and customer usage habits can significantly affect water usage.

6.4. CLIMATE IMPACTS ON WATER USE

California faces changes in water use habits due to a variety of issues including population growth, regulatory restrictions, and climate change (including the severe drought of 2020-2022). More specifically, weather unpredictability (more extreme

drought and flood events) poses additional challenges to water agencies, not only due to impacts on water supplies but also due to impacts on water demands.

Since the preparation of the 2020 UWMP, there have been local and statewide influences on water use in the District. California experienced a multi-year drought from 2020 through 2022, with precipitation consistently below average and record-high temperatures which exacerbated water scarcity. Water year 2022, covering October 2021 to September 2022, ended with 77% of average precipitation, following an even drier 2021, making the three-year stretch drier than the previous record dry period of 2013–2015. Snowpack, a critical water source, fell to 35% of average by April 1, 2022, despite a strong start in December. Drought severity varied regionally, with the Central Valley and northern basins experiencing the most extreme conditions.

Snowpack, a critical water source, fell to 35% of average by April 1, 2022.

Environmental Impacts: The drought led to dry soils, reduced water availability, and increased wildfire risk. Wildfire activity fluctuated, with 4.3 million acres burned in 2020, decreasing to 2.57 million acres in 2021 and 362,455 acres in 2022, reflecting both drought intensity and mitigation efforts. Reduced snowpack and low precipitation stressed rivers, reservoirs, and groundwater systems, affecting ecosystems and water supply reliability.

Agricultural and Economic Impacts: Agriculture was heavily affected, particularly in the Sacramento Valley and rice-producing counties. In 2022, 750,000 acres of farmland were idled, more than half in the Sacramento area. Direct economic losses to farm activity were estimated at $1.2 billion in 2022, up from $810 million in 2021, with additional losses of $845 million in food processing industries, totaling $2 billion in value-added losses and 19,420 jobs lost. Increased evapotranspiration due to higher temperatures further stressed crops, requiring more irrigation to maintain productivity.

Regional and Temporal Variability: Drought intensity varied across the state and over time. In 2020, drought conditions were less severe, while 2021 and 2022 saw widespread and more intense drought, particularly in the Central Valley. Northern California basins faced early water curtailments, and the Sacramento Valley experienced unprecedented climatological stress due to limited groundwater pumping capacity. Despite these challenges, mitigation measures such as land idling, water trading, and increased groundwater pumping helped reduce potential losses.

Changes in water usage habits have a special concern for the State due to the inter-dependence of many agencies for the transfer and use of water. For example, some agencies are unable to produce water locally and are entirely dependent on imported water sources, while others are able to produce all water locally (i.e., groundwater). Also, some agencies are able to reduce demands with minimal economic impacts (only water sales revenues), while other agencies will suffer economically (i.e., agricultural & industrial users) if required by State or local agencies to reduce water consumption. Therefore, the State will likely face challenges in the near future to find the correct balance of water supply allocations to meet demands under various weather conditions. For State Water Project (SWP) water rights holders, this is an extremely critical issue.

The State will likely face challenges in the near future to find the correct balance of water supply allocations.

6.4.1. California Water Plan Update 2023

DWR's California Water Plan Update 2023 emphasizes the urgency of climate change impacts, the need for watershed resilience, and the importance of equity in water management. It is designed to ensure that all Californians benefit from water resources that are sustainable and resilient to climate change. There are three themes including:

Addressing Climate Urgency: The plan recognizes the increasing variability in California's hydrology due to climate change and promotes adaptive infrastructure and emergency planning to enhance resilience.

Strengthening Watershed Resilience: It encourages coordinated efforts at the watershed level to integrate engineered systems with natural processes, to achieve multiple benefits across water, agriculture, and ecology.

Achieving Equity: For the first time, the update includes a dedicated chapter on the challenges and resources of California Native American Tribes, ensuring that Indigenous knowledge and priorities are integrated into statewide planning.

6.5. WATER USE

6.5.1. Past Water Use

As the population of the District has mildly increased over the past two decades, overall water use within the District's service area has increased steadily. Annual water consumption from 2015 to 2020 listed in the 2020 UWMP ranged from a high of 4,216 AF in 2020 to a low of 3,647 AF in 2015 with an average of 3,869 AF as shown in **Table 6.1.**

Table 6.1 District Past Water Use

Year	Total Potable Consumption (AF)	Per Capita (GPCD)
2015	3,647*	100.5*
2016	4,154	114.5
2017	4,256	117.2
2018	4,039	111.2
2019	4,175	114.9
2020	4,618	127.0
Average:	**3,869**	**116.9**

Note: As Water Loss Audits were not performed until 2016, the 2015 values don't include water loss and were excluded from average.

As indicated by **Table 6.1**, water use has been fluctuating, although generally trending upward since 2015. This correlates to the increasing population that is shown in **Section 2.** Based on the values shown in **Table 6.1**, water use had increased by approximately 14% since 2015.

6.5.2. Recent Water Use

Table 6.2 shows the District's water consumption over the past five (5) years. As indicated by **Table 6.2**, water demands within the District's service area over the past five (5) years were met by groundwater from the Verdugo Groundwater Basin (Basin) and imported water from FMWD.

Table 6.2 District Recent Water Use

Year	Total Potable Consumption (AF)	Per Capita (GPCD)
2021	4,197	137.9
2022	3,589	117.8
2023	3,467	110.4
2024	3,655	120.0
2025	3,662	116.1
Average:	**3,715**	**120.4**
2020 Water Use Target:		**142**

Annual water use since 2021 has ranged from approximately 3,467 AF to 4,197 AF, with an average 3,715 acre-feet per year (AFY). As indicated by **Table 6.2**, water use has been fluctuating, although generally trending downward since 2021.

6.6. WATER USE BY SECTOR

6.6.1. Service Connections/Accounts

The District maintains records of water consumption and, as of July 1, 2025, bills its customers on a monthly basis for water and sewer service. Prior to this customers were billed bi-monthly. Approximately eighty percent (80%) of the District's water demand is residential. CII sectors account for approximately under seven percent (7%) of the District's potable water supply. The remaining portion of the District's demand pertains to fire service and irrigation purposes. The District does not provide any

sales to agriculture, nor other agencies, saline water intrusion barriers, groundwater recharge, or conjunctive use. Water losses due to leakage or inaccurate water meters, are calculated in accordance with CWC 10631(e)(3)(B). The total number of service connections and water consumption is shown in **Table 6.3**, respectively.

Table 6.3 Service Connections (2025)

Sector	Service Accounts
Single-Family Residential	6,947
Multi-Family Residential	699
Commercial/Institutional	536
Industrial	0
Landscape Irrigation	75
Other	0
Total Connections:	**8,257**

Nearly ninety-three percent (93%) of the total service connections are residential (single- or multi- family), since the District consists primarily of residential properties. Single-family comprises the largest individual sector with eighty-four percent (84%) of the total service connections. Commercial and institutional accounts comprise approximately six-and-a-half percent (6.5) of the total accounts. The District currently has no industrial accounts. The District has approximately seventy-five (75) landscape irrigation accounts, including the Two Strike Park located in La Crescenta-Montrose. There are multiple grass-covered landscapes in its service area (including sports fields and parks). The parks and schools within the District are not District-owned, but the District meters these locations and bills for the use of water.

The District's water rates are listed in **Section 9.4**. Water sales data is compiled by District water staff and submitted to DWR in the Electronic Annual Report (eAR). The total water consumption by customer type since 2021 is shown on **Table 6.4**. As indicated by **Table 6.4**, Single-Family Residential accounts are the highest consuming sector in the District since most of the District is zoned for single-family accounts (with higher densities for multi-family accounts).

Figure 6.1 Two Strike Park located in La Crescenta-Montrose

Table 6.4 Recent Water Demand by Sector (AF)

Sector	2021	2022	2023	2024	2025
Single Family Residential	2,481	2,158	1,881	2,142	2,088
Multi-Family Residential	830	763	729	800	856
Commercial	149	152	152	190	165
Institutional	134	135	124	136	157
Industrial	0	0	0	0	0
Landscape Irrigation	223	155	169	117	226
Other	2	0	0	0	0
Total Water Sales:	**3,819**	**3,362**	**3,055**	**3,384**	**3,492**
Water Loss (Real Loss + Apparent Loss)	378	227	412	270	171*
Total Water Consumption (Total Supply into System):	**4,197**	**3,589**	**3,467**	**3,655**	**3,662**

**Estimated Water Loss value for 2025 was determined from District internal supply/demand data. However, value cannot be verified until validation of 2025 Water Audit and has therefore been excluded from the average.*

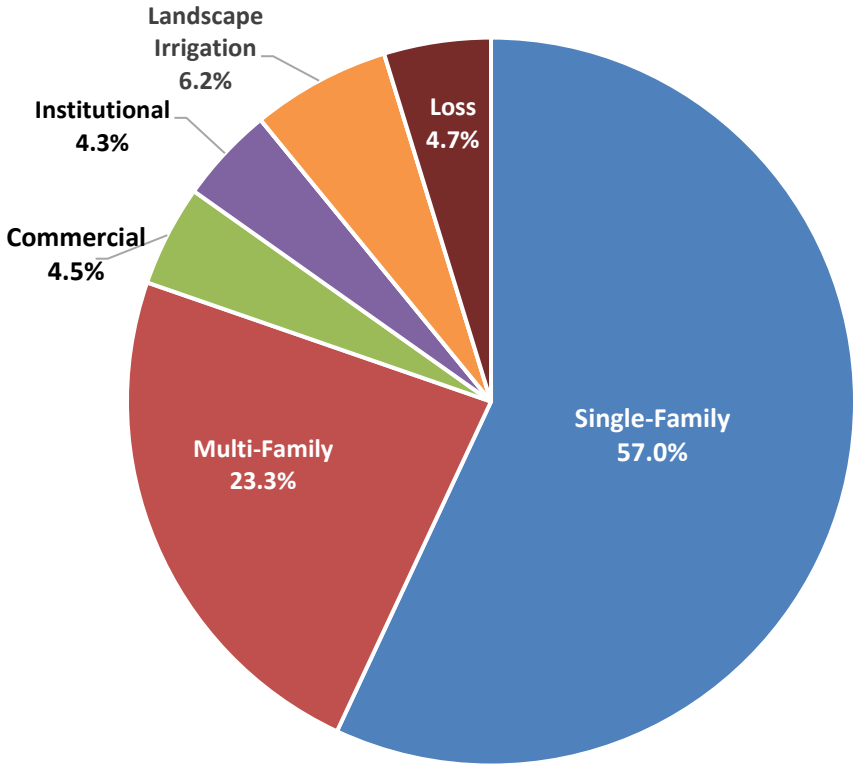

Figure 6.2 Current Water Demand by Sector (in 2025)

6.6.2. Distribution System Losses

As indicated by **Table 6.4**, the District's Water Loss ranged from 171 to 412 AF, which on average is approximately eight percent (8%) of the total water supply into the District's distribution system. Water Loss is determined as the sum of apparent loss and real loss, as determined in each years Validated Water Loss Audit. Examples of Water Loss consists of routine flushing, unmetered use, and main breaks, to name a few. Although water losses have cost impacts on water agencies, they cannot be prevented entirely.

Instead, effort is directed at controlling the quantity of water losses (to a cost-effective extent) in order to reduce the cost impact of water losses on water operations. For this reason, the District's Staff prepares annual Water Loss Audits, using AWWA software. The 2024 Audit shows that the District's Leakage Index (the ratio of real loss to unavoidable loss) was 0.9, which is below the 10th percentile of Water Purveyors. The District's Validated Water Loss Audits can be found on DWR's WUE Portal:

wuedata.water.ca.gov/awwa_plans

6.6.3. 2028 Water Loss Standard

California Water Code (CWC) Section 10608.34 requires SWRCB to develop water loss performance standards for urban retail water suppliers. Executive Orders B-37-16 and B-40-17 direct SWRCB and DWR to minimize water waste through system leaks. Water loss performance standards became effective in 2023. As part of a proposed water conservation regulation, urban retail water suppliers (not individual households or businesses) will be held to "urban water use objectives." An urban water use objective is the sum of standard-based budgets for a subset of water uses, such as residential outdoor use, as further described in **Section 6.7**.

Retail Suppliers must meet water loss standards by January 1, 2028, calculated on a system level. Ongoing compliance will be on a three-year average basis. The baseline period for the 2028 Water Loss Standard is 2017-2020. Real loss and apparent losses used to calculate the standard are the average real losses and apparent losses in the baseline period. SWRCB staff can initiate an adjustment process for any system that has significant changes in data compared to the baseline if at least three (3) compliance assessments have passed. Suppliers can request an adjustment to the baseline period data if significant data improvements have been made.

Suppliers must either meet their apparent loss standard (equivalent to their baseline period (2017-2020) apparent losses) or submit an inventory of all apparent losses. Meeting the apparent loss standard is not

required as long as an inventory of apparent losses is submitted.

The District's Baseline Real Loss is 25.8 gallons per service connection per day (GPSCD) and Real Loss Standard is 24.2 gpscd, resulting in a Required Real Loss Reduction from Baseline of 6%. Apparent Loss Standard is 9.1 gpscd.

6.7. URBAN WATER USE OBJECTIVE

The "Making Conservation a California Way of Life" regulation went into effect on January 1, 2025 and establishes unique efficiency goals for each urban retail water supplier in California and provides those suppliers flexibility to implement locally appropriate solutions. The regulation seeks to cultivate long-term practices that help communities adapt to California's ongoing water challenges. The regulation requires suppliers to:

- Annually calculate urban water use objectives for a subset of urban water uses: residential indoor water use, residential outdoor water use, real water loss, and commercial, industrial, and institutional (CII) landscapes with dedicated irrigation meters (DIMs).
- Carry out performance measures for CII water us.
- Annually report to SWRCB.

Thie District's Compliance Summary Report, prepared by SWRCB staff on February 23, 2026, summarizes the supplier's compliance with annual reporting requirements under the "Making Conservation a California Way of Life" regulation for the state fiscal year 2024-2025. This report was due on January 1, 2026.

6.7.1. Key Highlights from the Report

The following points are a summary of Sections 3 through 7 of the District's Compliance Summary Report:

- The report was submitted on time, on December 2, 2025.
- The supplier has met its calculated objective for fiscal year 2024-2025.
- The supplier has no approved variances or temporary provisions for fiscal year 2024-2025.
- The report contains zero (0) data quality flags.

6.7.2. Objectives Calculated with Future Standards

The water use objectives will become progressively lower as standards change through 2040. **Table 6.5** compares the current water use objective and reported water use to future efficiency requirements; the full summary can be found in Section 8 of the District's Compliance Summary Report. While this table does not capture how future water use objectives will be influenced by changes in local climatology,

service area population, square footage of irrigated landscapes, and other data that will factor into future water use efficiency objectives, it is provided as a tool for local planning purposes.

Table 6.5 Objectives Calculated with Future Standards

Fiscal Year	FY 24-25 Use (AF)	Calculated/Projected Objective (AF)	Current use lower than objective?
24-25	3,661.8	4,313.6	Yes
25-26	3,661.8	4,151.6	Yes
30-31	3,661.8	3,950.9	Yes
35-36	3,661.8	3,619.4	No (objective is 1.2% lower)
40-41	3,661.8	3,430.4	No (objective is 6.3% lower)

As **Table 6.5** shows, the District has met its calculated objective for fiscal year 2024-2025. The District's Compliance Summary Report can be located on DWR's WUE Portal:

wuedata.water.ca.gov/uwuo_plans

6.8. WATER CONSERVATION ACT

6.8.1. Act Background (SBx7-7)

Due to the limited amount of water allowed to be pumped in the San Joaquin Delta, the California State Legislature drafted the Water Conservation Act of 2009 (SBx7-7) to protect statewide water sources. The legislation called for a twenty percent (20%) reduction in water use in California by the year 2020. The legislation amended the Water Code to call for 2015 and 2020 water use targets in the 2010 UWMPs, updates or revisions to these targets in the 2015 and 2020 UWMPs, and allows DWR to enforce compliance to the new water use standards. In essence, the bill requires each urban retail water supplier to develop urban water use targets to help meet the twenty percent (20%) goal by 2020 and an interim 10 percent goal by 2015.

The bill establishes methods for urban retail water suppliers to determine their targets to help achieve statewide water reduction targets, which may or may not be a strict twenty percent (20%) level. The retail water supplier must select one of the four target-setting methods as described in **Section 2.4.3**. The retail agency may also choose to comply with SBx7-7 as an individual or as a region in collaboration with other water suppliers. Under the regional compliance option, the retail water supplier is mandated to report the water use target for its

individual service area. The bill also includes reporting requirements in the 2010, 2015, and 2020 UWMPs. Beginning in 2016, failure to comply with interim and final targets makes a retail agency ineligible for grants and loans from the state needed to attain water self-sufficiency by 2020; however, if an agency which is not in compliance documents a plan and obtains funding approval to come into compliance, it could then become eligible for grants or loans.

In addition to an overall statewide 20 percent water use reduction, the objective of SBx7-7 is to reduce water use within each hydrologic region in accordance with the agricultural and urban water needs of each region. Currently, DWR recognizes 10 separate hydrologic regions in California as shown in **Figure 6.4**. Each hydrologic region was established for planning purposes and corresponds to the State's major drainage areas. The service area of the District is located in the South Coast Hydrologic Region (HR), as shown in **Figure 6.5**.

Wholesale water suppliers, including FMWD, are not required to determine baseline daily per capita water use, urban water use target, interim urban water use target, or compliance daily per capita water use. Instead, wholesale water suppliers are required to include in their UWMPs discussions of programs they intend to implement to support the retail water suppliers, such as the District, in attaining their reduction goals and targets.

Figure 6.3 California's 2020 Water Conservation Goals

6.8.2. Exempt Agencies

If an agency has a baseline per capita water use of 100 GPCD or less, that agency will not have to adhere to any reduction targets as that agency is already considered water efficient. In such a case, that agency must document in subsequent UWMPs that its water usage is still under 100 GPCD.

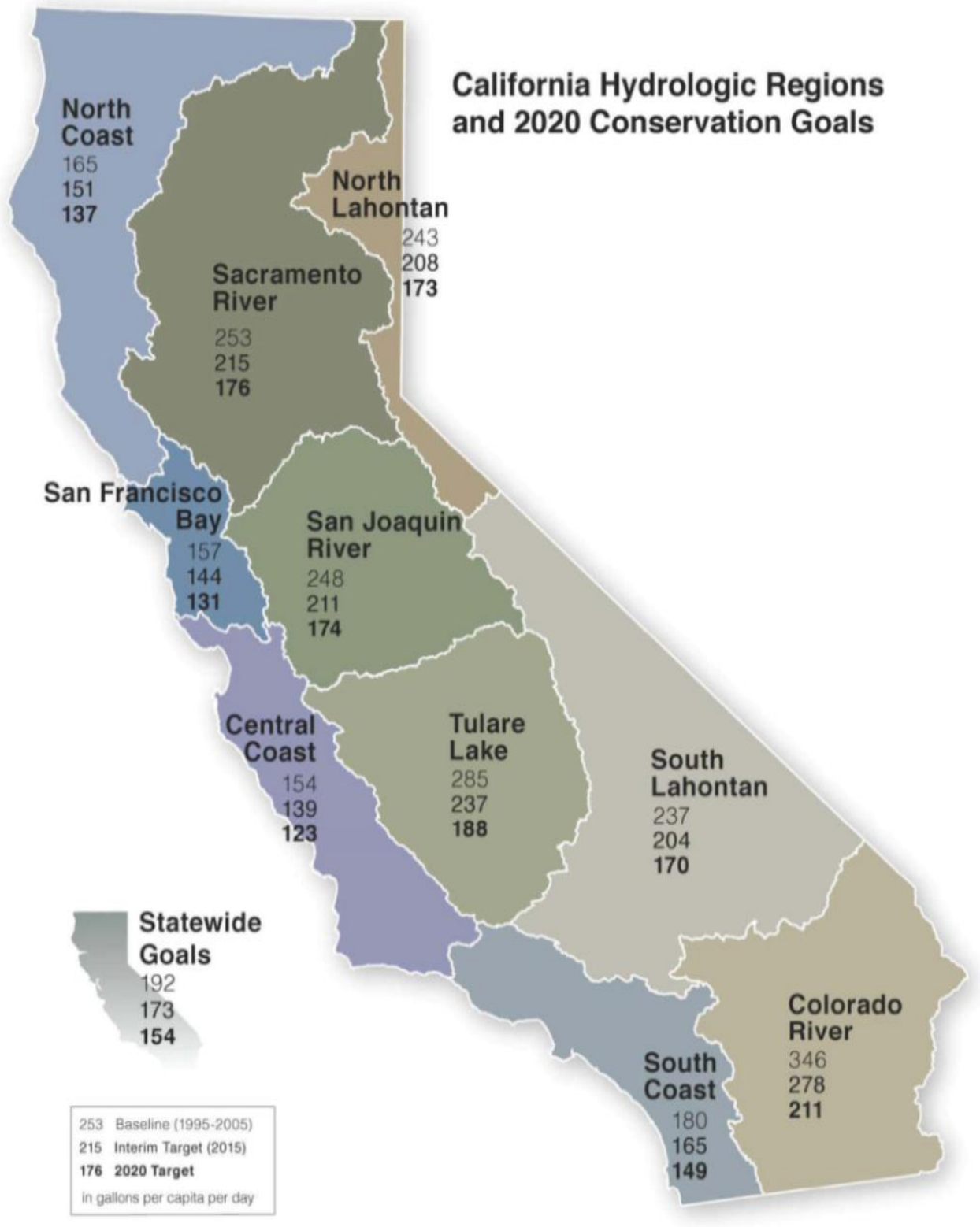

Figure 6.4 California's 2020 Water Conservation Goals

Figure 6.5 South Coast Hydrologic Region

6.8.3. SBx7-7 Baseline & Target

The District previously established water use targets for 2015 and 2020. DWR provided guidelines for determining these targets in its *Methodologies* guidebook for the 2010 and 2015 UWMPs. In the 2010 and 2015 UWMPs, the District's baseline water use and targets were determined based on the procedures shown in **Figure 6.6** and **Figure 6.7**.

If an agency's 10-year baseline is slightly higher than the Hydrologic Region's target, that agency still must achieve a five percent (5%) reduction from its 5-year baseline. If an agency has a per capita water use of 100 GPCD or less, that agency will not have to adhere to any reduction targets as that agency is already considered water efficient.

Since the District does not use recycled water, a 10-year instead of a 15-year rolling average was previously calculated. The District's baseline water use is 160.6 GPCD, which was calculated from a 10-year period from January 1, 1996 to December 31, 2005. **Table 6.6** shows historic (January 1, 1996 to December 31, 2005) water use and provides the base period annual water use used to calculate the baseline water use for District. The data was used to calculate the continuous 10-year and 5-year average baseline. Regardless of the compliance method adopted by the District it will need to meet the minimum water use target of five percent (5%) reduction from a 5-year baseline as calculated. Values for 1996 to 2007 are from the 2010 UWMP.

As shown in **Table 6.7**, the District's 10-yr and 5-yr baselines were determined to be 160.6 GPCD and 159.1 GPCD, respectively. The District's baseline water use was then compared to the regional compliance target to determine the applicable reduction amounts per the SBx7-7 additions to the water code. The legal stipulations applicable to the District and the required target to be enforced by DWR are shown in **Table 6.7**.

The selected SBx7-7 target is 142 GPCD [five percent (5%) reduction from the South Coast HR's target] because this amount is greater than 128 GPCD [twenty percent (20%) from its 10-year baseline]. Since the District's minimum reduction requirement of 151 GPCD [five percent (5%) reduction from 5-yr. Baseline] is greater than the regional target of 149 GPCD, the District must select **Method 3** (142 GPCD) as its 2020 water use target. Therefore, the District's compliance target for 2020 per capita water consumption was 142 GPCD in accordance with Section 10608.22 of the Code.

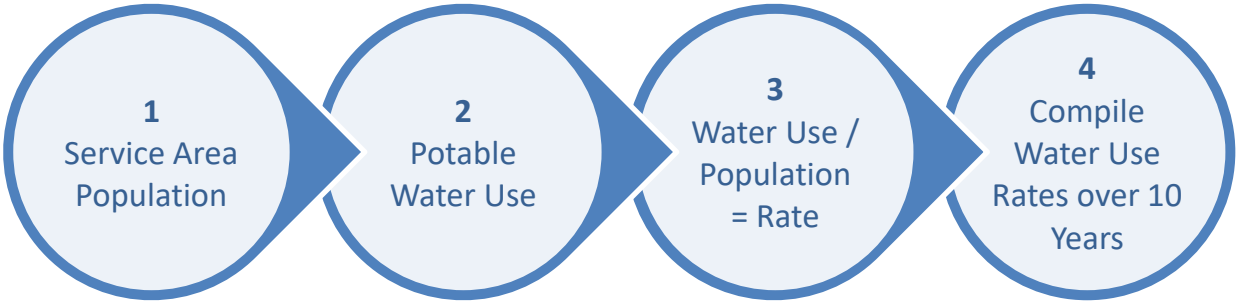

Figure 6.6 Procedure for Determining Baseline Per Capita Water Use

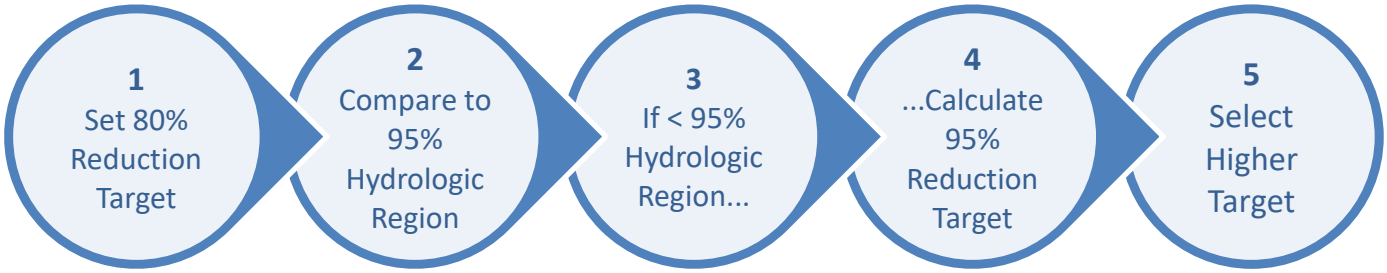

Figure 6.7 Procedure for Determining Target Per Capita Water Use

Table 6.6 Crescenta Valley Water District Water Use (GPCPD)

Year	Service Area Population	Total Potable Consumption (AF)	Per Capita (GPCD)
1996	30,390	5,277	155.0
1997	30,475	5,497	161.0
1998	30,560	5,076	148.3
1999	30,645	5,608	163.4
2000	30,731	5,717	166.0
2001	30,817	5,635	163.0
2002	30,903	5,792	167.0
2003	30,989	5,724	164.7
2004	31,075	5,726	165.2
2005	31,162	5,327	152.6
2006	31,249	5,463	156.8
2007	31,336	5,525	155.2
		10-yr. Baseline (1996-2005) (SB7: 10608.20)	**160.6**
		5-yr. Baseline (2003-2007) (SB7: 10608.22)	**158.9**
		State Hydrologic Region Baseline	**180**
		State Hydrologic Region Target	**149**

Table 6.7 Crescenta Valley Water District SBx7-7 2020 Water Use Targets

Min. Reduction Requirement (10608.22)	20% Target (10608.20) (b)(1)	5% Reduction from Regional Target (10608.20) (b)(3)
151	**128**	**142**
	2020 Per Capita Target:	**142**
	Interim (2015) Target:	**151**

6.8.4. SBx7-7 Target Compliance

Although the requirements of SBx7-7 were stringent, the District has seen an increase in water efficiency in the past ten years. This is due in part to State legislation, stricter conservation measures, saturation of water-saving plumbing fixtures, and overall water conservation awareness. As indicated by **Table 6.7**, the District has already achieved not only its interim (2015) target, but also its final 2020 target. The District can maintain its consumption rates below the SBx7-7 target by continuing to focus on water conservation.

6.9. PROJECTED WATER DEMAND

Future water use projections must consider significant factors which will affect water demand, such as development and/or redevelopment, and climate patterns. Climate conditions will continue to be a major influence on demand as it will lead to more frequent and severe drought conditions, that will increase demand at times when these supplies are limited.

6.9.1. Passive Savings

The District should experience modest increases in its water consumption in spite of population increases through 2050. This is due to "passive savings." Passive savings would be realized by more homes being equipped with water-saving fixtures and landscapes. As a result of ongoing water conservation programs to educate the District's water customers, water customers will become more aware of water conservation and District-specific policies such as limitations on landscape irrigation and car washing. These "passive savings" will assist in offsetting a portion of new water demands from anticipated population growth in the District.

For future water demand projections in this UWMP, these "passive savings" were calculated by analyzing the declines in water consumption rates. Beginning with a consumption rate of **118.7 GPCD** (average of the past 10 years), the rate of decline in GPCD is projected to be half a percent (0.5%) annually. It is assumed that water use efficiency will continue to increase through water code changes over the next twenty-five years.

6.9.2. Low-Income Water Demands

Over time, "Passive Savings" will help offset water demands from new growth in the District.

One significant change to the UWMP Act since 2005 is the requirement for retail water suppliers to develop water use projections for "low-income" households at the single- family and multi-family level. These projections assist retail suppliers with compliance with Section 65589.7 of the Government Code, which requires suppliers to grant priority for the

provision of service to low-income households. Consistent with this Code section, a low-income household is defined as a household earning eighty percent (80%) or less of the area's median income.

The 2010 UWMP utilized the Regional Housing Needs Assessment (RHNA) or Regional Housing Needs Plan information to obtain a percentage of low-income households within an area. The information was developed by the Local Council of Governments, in coordination with the California Department of Housing and Community Development. The RHNA plan lists every city within the Southern California region and provides percentages of very low- and low-income households. The area the District mainly serves is La Crescenta-Montrose, an unincorporated area and a census-designated place.

Existing and projected housing needs for Los Angeles County were incorporated into the most recent RHNA Subcommittee's report titled 6th Cycle Final RHNA Allocation Plan of the Southern California Association of Governments (SCAG). This plan covers the planning period from October 2021 to October 2029. Based on the RHNA plan, the percentage of very low- and low-income households combined was 43.7% within unincorporated areas. This value is not a valid representation and will not be used.

Instead, a percentage was obtained from records from the US Census Bureau. It provides information regarding the breakdown of households per income range and the percentages for each range. Based on their latest records (2024), approximately 5.1% of households is considered in poverty.

Therefore, from inference, it is estimated that approximately 5.1% of the projected water demands within the District service area will be for housing needed for low-income households.

6.9.3. Projected Water Use by Sector

For planning purposes, the District's projected water use for 2030-2050 is broken down by sector in **Table 6.8**. The estimates per sector are based on the ratios of water use by sectors shown in **Table 6.4**, the population projections shown in **Table 2.5,** and a "passive savings" of half a percent (0.5%). **Figure 6.8** also shows the Projected Water Demand by Sector (in 2050).

Since the District has not yet Validated its 2025 Water Loss Audit (due January 1, 2027), the Water Loss value for 2025 was estimated by taking the difference in supply and use for that year. However, these values cannot be verified until validation of 2025 Water Loss Audit and have therefore been excluded from the ratios. Water Loss projections utilized District averages from 2020-2024.

Table 6.8 Projected Water Demand by Sector

Sector	2030	2035	2040	2045	2050
Water Service Area Population	28,649	29,719	30,788	31,857	32,926
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	115.8	112.9	110.1	107.4	104.7
Demands					
Single Family Residential	2,124	2,149	2,171	2,191	2,208
Multi-Family Residential	786	795	803	811	817
Commercial	160	161	163	165	166
Institutional	135	137	138	140	141
Landscape Irrigation	176	178	180	182	183
Total Water Sales:	**3,381**	**3,420**	**3,456**	**3,487**	**3,515**
Water Loss (Real Loss + Apparent Loss)	334	338	341	344	347
Total Water Consumption (Total Supply into System):	**3,715**	**3,758**	**3,797**	**3,831**	**3,862**

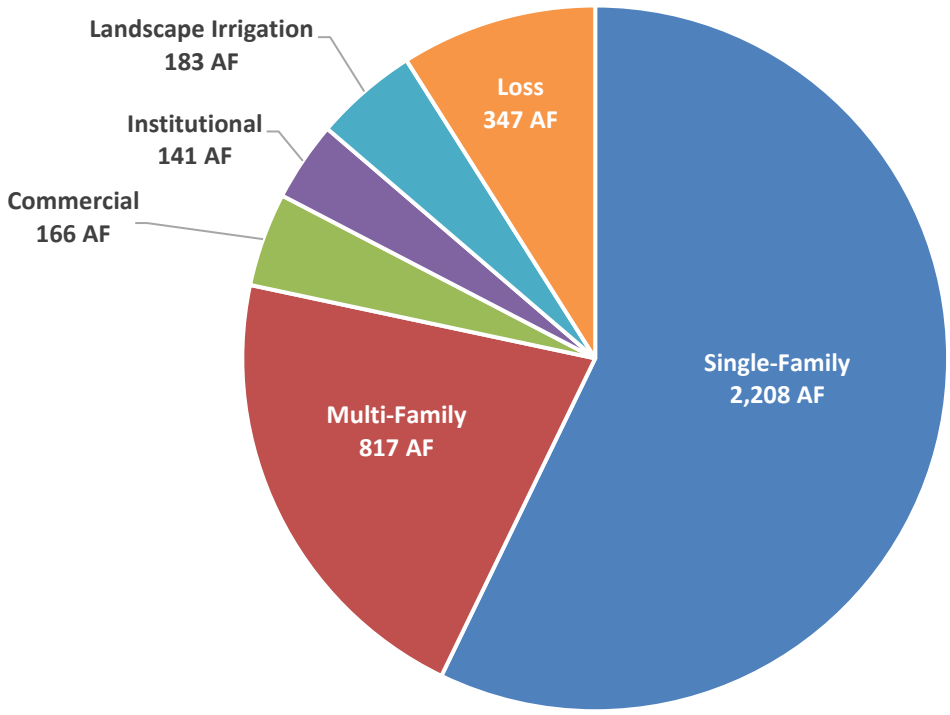

Figure 6.8 Projected Water Demand by Sector (in 2050)

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7

Section 7: Reliability Planning

The recent drought in the Lower Colorado River Basin (pictured), has brought changes to water supply management.

7.1. OVERVIEW

Drought conditions continue to be a critical issue for Southern California's water supply. The recent drought of 2020-2022 has impacted deliveries of imported water to Southern California cities. The documented deliveries of water from the State Water Project (SWP) for Water Year 2022 (October 1st, 2022, to September 30, 2023) indicate that the volume of water delivered to SWP Contractors was the lowest since Water Year 2020. Therefore, it is important that agencies manage water consumption and reduce reliance on imported water through local groundwater and surface water supplies. Water agencies should prepare for prolonged droughts for up to five (5) years to ensure a reliable supply of water.

Since the District does rely on imported water, drought conditions are a critical issue for the District's water supply. A strong understanding of water supply sources, and the current state, regional, and local issues affecting those sources, are a first step to properly managing supply and demand. Water agencies should prepare for prolonged droughts for up to five (5) years to ensure a reliable supply of water.

This Section discusses historic and recent droughts in the State and in the region. This Section also compares projected supply to projected demand over a 25-year planning period (through 2050) for various climate scenarios. Demand and supply projections are provided in **Table 7.1** - **Table 7.7.**

7.2. HISTORIC DROUGHTS

Climate data has been recorded in California since 1858. Since then, California has experienced several periods of severe drought, including: 1928-34, 1976-77 and 1987-91, 2007-2009, 2011-2017 and most recently in 2020-2022. In addition to these, California has also experienced several periods of less severe drought. Among the previously listed droughts, the year 1977 is still considered to be the driest year of record in the Four Rivers Basin by DWR (these rivers flow into the Sacramento Delta and are the source of water for the State Water Project) which had an all-time low of 15 million acre-feet of average annual runoff.

In 1983, as a result of previous droughts, the State legislature enacted the UWMP Act, which requires the preparation of an UWMP. Several subsequent amendments have been made to the Act to include such elements as public coordination, recycled water, and contingency response plans are included in UWMPs.

In 1991, as a result of the 1987-1991 drought, over one hundred water agencies and environmental groups came together to form the California Urban Water Conservation Council (CUWCC) to manage the impacts of drought and promote water conservation. In January 2018, the CUWCC became the California Water Efficiency Partnership (CalWEP), and consists of over two hundred water agencies and private companies. CalWEP assists its member agencies with public policy, research, and education tools.

As a result of the drought of 2007-2009, Governor Schwarzenegger signed the Water Conservation Act of 2009 (SBx7-7), requiring mandatory water conservation up to twenty percent (20%) by 2020.

In January of 2014, Governor Brown declared a state of emergency and directed state officials to take all necessary actions to prepare for water shortages. As the drought continued into Water Year 2015, Governor Brown issued an executive order in April 2015, which mandated a statewide twenty-five percent (25%) reduction in water use, with each agency assigned specific target reductions.

At the local level, water agencies have enacted their own ordinances to deal with the impacts of drought. The District's Water Shortage Contingency Plan (WSCP), as contained in **Section 8**, deals with Water Conservation.

7.3. RECENT DROUGHT (2020-2022)

California experienced a significant and prolonged drought in 2020-2022. The drought depleted reservoir levels across the state, as reflected by **Figure 7.1**. On July 8, 2021, Governor Newsom declared a state of emergency and issued an Executive Order

calling for a statewide voluntarily reduction of fifteen percent (15%) from consumer's 2020 levels in order to preserve the State's surface and groundwater supplies, better prepare for the potential for continued dry conditions next year, and to join existing efforts by agricultural water users, public water systems, and governmental agencies to respond to water shortages. On October 19, 2021, Governor Newsom issued an Executive Order declaring a statewide drought emergency.

Figure 7.1 Governor Newsom at Lake Mendocino in Ukiah on April 21, 2021

In May 2022, Governor Newsom ordered the SWRCB to evaluate the adoption of regulations banning irrigation of "non-functional" turf (or grass), such as decorative grass adjacent to large industrial and commercial buildings. The ban would not include residential lawns or grass used for recreation, such as school fields, sports fields, and parks. The DWR estimated this ban alone would result in potential water savings of several hundred thousand acre-feet. An acre-foot of water serves the needs of approximately three households for a year.

In March 2024 DWR finalized the 2024 State Water Project Long-Term Drought Plan. The 2024 State Water Project Long-Term Drought Plan consolidates information and actions taken during past droughts along with descriptions of the actions taken by the SWP to plan for and prepare for future droughts.

The scope of the SWP's drought planning activities is driven by the role the SWP plays within California's water management system during times of drought. The SWP's planning is specific to its role as a wholesale water provider. The SWP's drought planning is different from the planning by other water managers that are responsible for providing water directly to end-use customers. For these water managers, drought planning generally includes identifying a portfolio of different water supplies and demand management actions that ensure a minimum amount of water can be provided with a set degree of certainty. Retail water suppliers have a "duty to serve" water demand within their service areas and must have detailed contingency plans for meeting demand during drought conditions.

2024 SWP Drought Plan consolidates information and actions taken during past droughts.

Although the recent droughts have more significantly impacted northern and central-valley agencies that use SWP water for agriculture, the District is indirectly impacted by the recent drought conditions on Northern California Waters since this water source is the majority source of water imported from the MWD.

7.4. STATE WATER SUPPLY RELIABILITY

As a result of continued drought challenges to the State's water supplies, SWP Contractors understand the unpredictability of imported water allocations from the SWP.

With participation of the SWP Contractors, DWR strives to meet the water needs of Southern California by developing new projects to increase the capacity of its supplies while encouraging its member agencies to develop local supply projects to meet the needs of its customers. Also, DWR is committed to developing and maintaining high-capacity storage reservoirs, including both DWR-owned and Contractor-owned (such as Diamond Valley Lake, an MWD-owned reservoir, the largest in Southern California), to meet the needs during times of drought and emergency.

The large reservoirs help to avoid the repercussions of reduced supplies not only from the SWP but also the Colorado River Aqueduct (CRA). Throughout the Southern California Region, a total of three (3) DWR-owned reservoirs, nine (9) MWD-owned reservoirs, and twenty-four (24) SDCWA reservoirs contain up to 2.2 million acre-feet (MAF) of water storage.

One of the State's largest reservoirs, Lake Oroville in Butte County, experienced low water conditions at Enterprise Bridge (**Figure 7.5**). On this date (October 4, 2022), the water storage was 1.22 MAF, thirty-five percent (35%) of the total capacity.

Figure 7.6 shows an aerial view of high-water conditions at Enterprise Bridge. On this date (June 12, 2023), the water storage was 3.52 MAF, one hundred percent (100%) of the total capacity. Rainfall during the 2024-2025 water year was also below the average, with a total recorded rainfall at the District's Main Office of 13.02 inches.

7.4.1. State Water Project (SWP) Reliability

As a SWP contractor, MWD has a "Table A" allocation of up to 1,911,500 acre-feet per year (AFY). Since MWD began receiving SWP water, however, the average amount of water received each year was approximately 58% of the full Table A amount. On an annual basis, each of the twenty-nine (29) SWP Contractors request amounts of SWP water based on their anticipated yearly demand. Each SWP contractor's Water Supply Contract contains a "Table A" amount that identifies the maximum amount of water

that a contractor may request. However, the amount of SWP water actually allocated to contractors each year is dependent on a number of factors that can vary significantly from year to year. The availability of SWP supplies is generally less than their full Table A amounts in many years and can be significantly less in very dry years. After receiving the requests, DWR assesses the amount of water supply available based on precipitation, snowpack on Northern California watersheds, volume of water in storage, projected carry over storage, and Sacramento-San Joaquin Bay Delta regulatory requirements. For example, according to the State Water Project Delivery Reliability Report (2023), the total SWP annual delivery of water to contractors ranged from a low of 278 thousand acre-feet (TAF) in 2022 to a high of 3,094 TAF in 2017. Due to the uncertainty in water supply, contractors are not typically guaranteed their full Table A amount, but instead receive a percentage of that amount based on available supply. For instance, the current DWR Notice to Contractors 26-01 (January 2026) indicated that the initial allocation is set at thirty percent (30%), which higher than the ten percent (10%) per initial allocation. For MWD, the current allocation based on the Notice to Contractors for this year is set at 573,450 AF.

SWP supplies are typically less than the maximum "Table A" amounts requested by the Contractors each year.

The reliability of the SWP impacts the Contractors ability to plan for future growth and supply. SWP Contractors can seek out other local supply sources or transfer agreements (such as transfers with Colorado River rights holders). Although not directly important for the District, matters involving the SWP do impact the District indirectly.

Figure 7.2 Lake Oroville During Drought of 2020-2022 (October 4, 2022)

Figure 7.3 Lake Oroville After Drought (June 12, 2023)

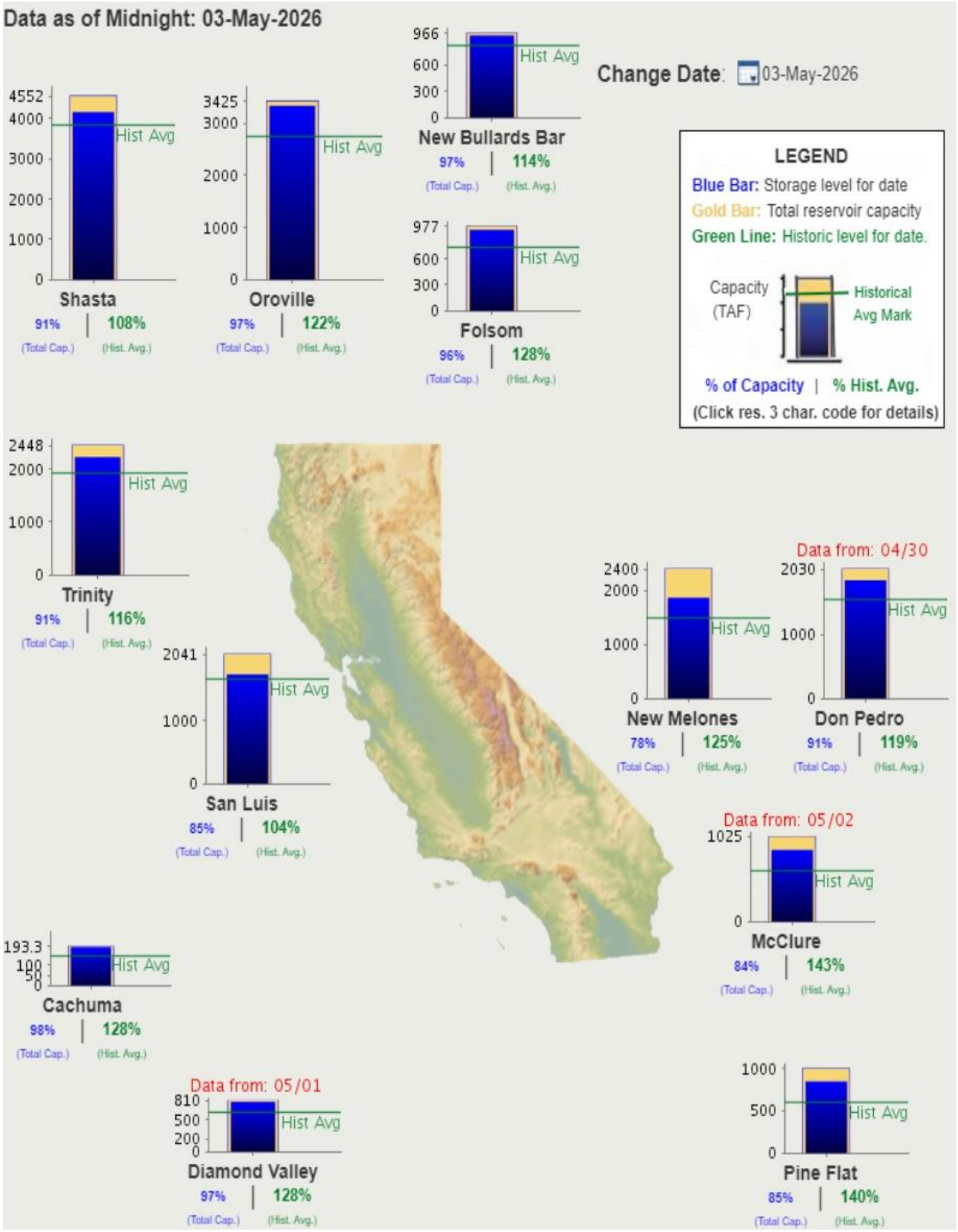

Figure 7.4 California State Reservoir Levels (May 2026)

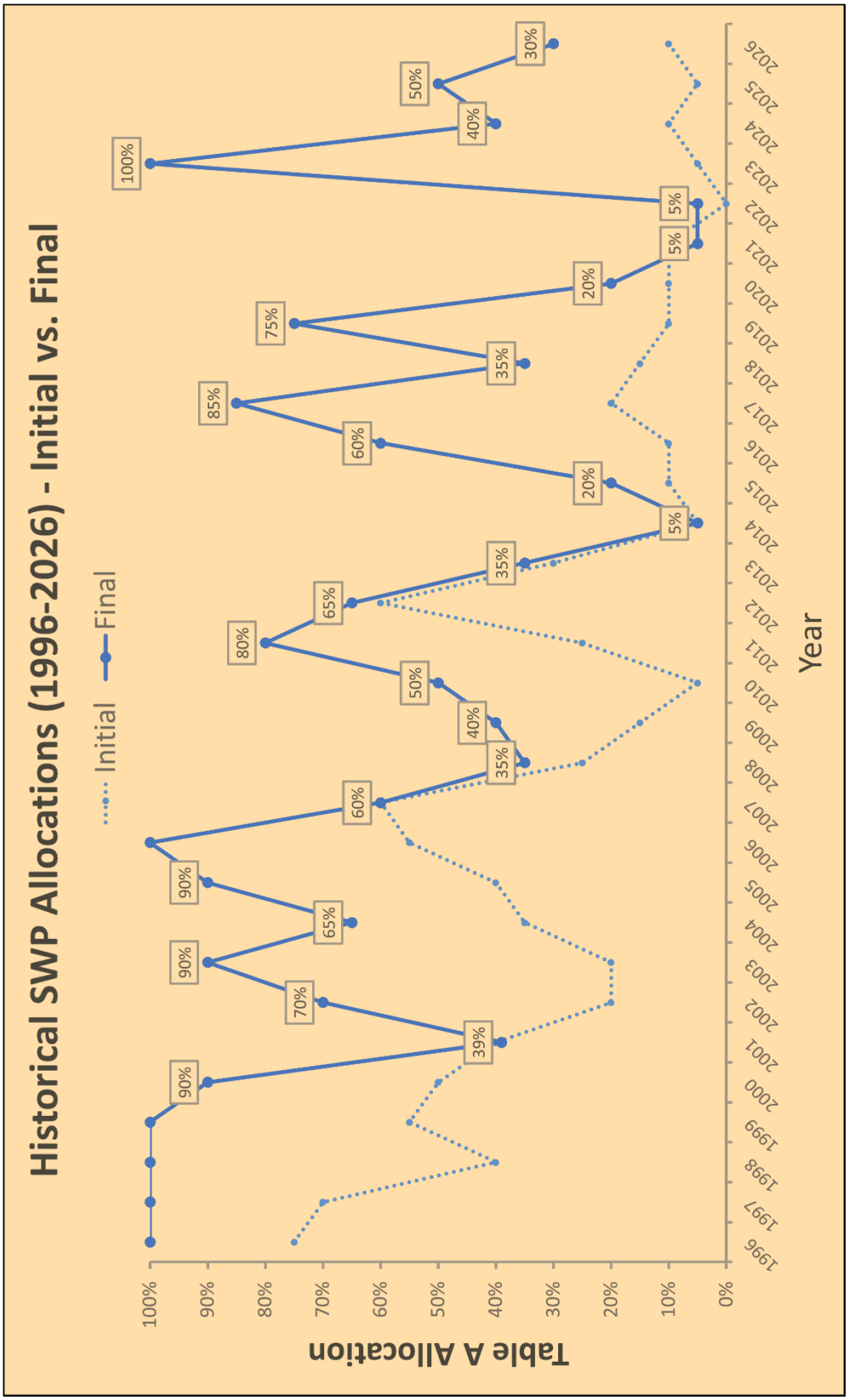

Figure 7.5 SWP Table A Deliveries

7.5. COLORADO RIVER RELIABILITY

Since 2020, the Colorado River has been under severe stress due to more than two decades of drought and very low runoff. Water levels in Lakes Mead and Powell dropped to historic lows in 2021 and 2022, which forced the United States Department of the Interior - Bureau of Reclamation (Reclamation) to take emergency actions to keep the system functioning. These actions included releasing extra water from upstream reservoirs to help stabilize Lake Powell and declaring the first-ever Tier 1 shortage in 2022.

From 2023 through 2025, conditions improved slightly after a strong winter, but long-term challenges remained. The federal government and the seven (7) Basin States began working on new operating rules to replace the current guidelines that expire in 2026. During this period, the Lower Basin states—California, Arizona, and Nevada—agreed to conserve up to 3 MAF of water through 2026, supported by federal funding. These conservation efforts helped slow the decline of Lake Mead but did not solve the long-term supply and demand imbalance in the river.

California, Arizona, and Nevada agreed to conserve up to 3 MAF of water through 2026.

Negotiations for new post-2026 operating guidelines have become the main focus. Modeling has shown that without major changes, the risk of critically low reservoir levels will continue to increase. The new rules, expected to take effect in 2027, will likely reshape how shortages are shared and how the major reservoirs are operated. For California water agencies, these developments highlight the increasing uncertainty of Colorado River supplies and the need to plan for continued conservation, efficiency, and diversified water sources

Over the past six-months, Lake Mead has stayed at approximately thirty-one to thirty-two percent (31–32%) of capacity, with storage measured at approximately 8.3 MAF out of 26.1 MAF as of April 2026. Month-to-month changes have been small, showing a system that is no longer in freefall but still far from recovery. Snowpack feeding the Colorado River has been well below normal, with a snow water equivalent at approximately twenty-one (21%) of median in April 2026, limiting the potential for significant inflows. Reclamation's 24-Month Study continues to project Tier 1 shortage operations through 2026, meaning mandatory reductions will remain in effect.

7.5.1. Competition for Water Rights

For Colorado River rights holders, the "*Law of the River*" is essentially a compilation of numerous compacts, state and federal laws, court decisions and decrees, contracts, and

regulatory guidelines which define rights to water from the Colorado River. These documents apportion the water and regulate the use and management of the Colorado River among the seven basin states and Mexico. A brief listing of these compacts and acts include:

- Colorado River Compact (1922)
- Boulder-Canyon Project Act (1928)
- CA Seven Party Agreement (1931)
- Arizona v. California (1964)
- CO River Basin Project Act (1968)
- Arizona v. California (1979)
- Quantification Settlement Agreement (2003)

Per the 2003 Quantification Settlement Agreement (QSA), California's allocation has been confirmed at 4.4 MAF per year, with MWD maintaining just over 1 MAF in rights. Likewise, the Coachella Valley Water District (CVWD) holds rights to the CRA. As SWP contractors, MWD's and CVWD's extractions from the CRA impact their annual requests for SWP Table A amounts.

7.6. DISTRICT SUPPLY RELIABILITY

As the District obtains its water sources from a combination of local groundwater and imported water, the supply reliability is based on the reliability of the Verdugo Groundwater Basin, the Colorado River, and the Sacramento-San Joaquin River Delta. The basin is considered to be a reliable source of supply since its current storage levels far exceed any planned pumping.

MWD is participating in the development of groundwater, groundwater recovery, recycled water systems, desalination opportunities, and collection of urban return flows to augment the reliability of the imported water system. There are various factors that may impact reliability of supplies, such as legal, environmental, water quality, and climatic, which are discussed. The water supplies are projected to meet full-service demands; MWD's 2020 UWMP finds that MWD is able to meet with existing supplies full service demands of its member agencies in 2025 through 2045 during normal years, single dry year, and multiple dry years.

Supply reliability is based on the Verdugo Basin, Colorado River, and Sacramento-San Joaquin River Delta.

MWD's 2020 Integrated Water Resources Plan (IRP) update describes the core resource strategy used to meet full-service retail demands under all foreseeable hydrologic conditions from 2025 through 2045. The foundation of MWD's resource strategy for achieving regional water supply reliability consists of developing and implementing water resources programs and activities through its IRP preferred resource mix. This preferred resource mix

includes conservation, local resources, such as water recycling and groundwater recovery, Colorado River supplies and transfers, SWP supplies and transfers, in-region surface reservoir storage, in-region groundwater storage, out-of-region banking, treatment, conveyance and infrastructure improvements. FMWD is reliant on MWD for all of its imported water. With the addition of planned supplies under development, MWD's 2020 UWMP found that MWD will be able to meet full-service demands from 2025 through 2045, even under a repeat of the worst drought. MWD's single dry year is based on the drought in 1977. MWD's five-consecutive dry years is based on from 1988 to 1992, which represents as the driest five-consecutive year historic sequence for MWD's water supply. In addition to meeting full- service demands from 2025 through 2045, MWD projects reserve and replenishment supplies to refill system storage.

7.6.1. Reliability of Alternative Sources

Since recycled water is produced from wastewater, this source has the advantage of consistently being available during any type of average, single-dry, or multiple-dry year as discussed in **Section 4**. If the District were to use recycled water at some point in the future, it would genuinely add to the District's overall supply reliability, especially since approximately five percent (5%) of the District's water is used for landscape irrigation (i.e. lawns, parks, athletic fields, etc).

7.7. DROUGHT RISK ASSESSMENT

The quantity of supply available from different water supply sources can vary from one year to the next depending on hydrologic conditions. The drought risk assessment is an assessment of the reliability of the District's water supplies by comparing projected future water demands with expected available water supplies under three different hydrologic conditions: (1) normal water year, (2) single dry year, and (3) multiple dry years. For the sake of this UWMP, the multiple dry-year period is taken to be five (5) years. Future supply and demand conditions can be determined from the following data:

- Population forecasts (**Section 2.5**)
- Water supply capacity (**Section 3:)**
- Recent water use trends (**Section 6)**

7.7.1. Basis for Projected Demands

To project future demands, it was assumed that total demand will change annually based on changes in population multiplied by the individual demand per-person ("per-capita" consumption rate). The per-capita rates used in the future projections were based on actual water use data from the last ten (10) years. The District's averages for the last ten (10) years were used as the basis to project demands through the year 2050. To

project demands and supplies, the following was assumed:

- Consumption rate of 118.7 gallons per capita per day (GPCD) as the average consumption of the District in the last 10 years

- *Decreasing* consumption rate (from 118.7 GPCD) starting in 2026 with a passive savings of half a percent (0.5%) annually. This brings the 2026 consumption rate to **118.1 GPCD**

Although a constant consumption rate provides a more conservative approach, the decreasing consumption rate scenario provides a realistic basis for planning purposes since it considers gradual improvements in water-use efficiency Since 2020, the District has seen an approximately 8.5% decrease in GPCD, revealing an increase in water use efficiency. The District's consumption rate in 2020 was 127.0 GPCD, and the District's consumption rate in 2025 was 116.1 GPCD. This amounts to an average decrease of approximately 1.7% annually.

For drought-period demands, is expected that there will be a small degree of increase due to the lack of rainfall on landscapes. To project demands during single and multiple (five) year drought periods, the following increase factors will be assumed:

- Dry Year: Eleven percent (11%)

- Multiple Dry Years: Fifteen percent (15%), Twenty-One percent (21%), Twenty-Two percent (22%), Fifteen percent (15%), and negative five percent (-5%)

These values are also reflected in **DWR Submittal Table 7-1** in **Appendix E**. During the recent drought of 2011 to 2017, water agencies in the State experienced an increase in water demands, until former Gov. Brown's Emergency Declaration in 2015. Nevertheless, the increase factors listed are reasonable for the purposes of demand projections since they provide reasonable estimates of increases in water use for irrigation during dry-years.

7.7.2. Basis for Projected Supplies

As for projected supplies, because the District's supplies are generally drought-proof as stated previously in this Section, it is very unlikely that supplies will be restricted, even during multi-year periods. Thus, for conservative planning purposes, the District's projected water supplies will be based off of 80% of its active well capacity and imported/purchased water. With a current total supply capacity of approximately 3,563 gpm (including CVWD's 11 wells, Glendale's Well # 16 and Imported water supplies through FMWD), 80% capacity equates to approximately 2,851 gpm, or approximately 4,758 acre-feet per year (AFY).

7.7.3. Tabular Comparisons

Table 7.1 - Table 7.7 provide an analysis of the District's supply and demand projections to the year 2050. **Figure 7.6 to Figure 7.7** show a visual pie-chart for the year 2050. Based on the data contained in these tables, the District can expect to meet future demands for all climate conditions through 2050.

Table 7.1 Crescenta Valley Water District Water Supply Availability & Demand Projections Normal Water Year (AF)

Water Sources	2030	2035	2040	2045	2050
Population					
Water Service Area Population	28,649	29,719	30,788	31,857	32,926
Consumption Rate (GPCD)[1] *Including 0.5% Annual Passive Savings*	115.8	112.9	110.1	107.4	104.7
Supply					
Groundwater Pumped (Total)[2]	1,930	1,953	1,973	1,991	2,007
Recycled Water	0	0	0	0	0
Purchased Water	1,785	1,805	1,824	1,841	1,855
Total Anticipated Use of Supplies[3] ***(Estimated Production)***	**3,715**	**3,758**	**3,797**	**3,831**	**3,862**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Demand					
Estimated Potable Water Demand	**3,715**	**3,758**	**3,797**	**3,831**	**3,862**
Estimated Recycled Water Demand	0	0	0	0	0
Total Estimated Demand	**3,715**	**3,758**	**3,797**	**3,831**	**3,862**
Compare to Avg. Demand from 2015-2025 (3,666 AF)	101%	103%	104%	105%	105%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity[4]	1,044	1,000	962	927	896

Notes:

1. Total Demand = Consumption Rate x Projected Population

   a. Average consumption rate of last 10 years = 118.7 gallons per capita per day (GPCD)
   b. Estimated starting consumption rate in 2026 = 118.1 GPCD
   c. Approximate "passive" savings: 0.5% per year
   d. Projected "passive" savings: 0.5% per year = 104.7 gpcd by 2050

2. Groundwater production capacity (total available supply) represents the District's active wells:

   a. Wells in District area: CVWD's 11 wells
   b. Wells outside District area: Glendale Well #16
      Total well capacity: 2,228 gpm (3,794 AFY)

3. Projected groundwater pumping and purchased water is set equal to the projected water consumption (demands) shown in **Table 6.8**.

4. No other potable supply sources are expected to become available.

Table 7.2 Crescenta Valley Water District Water Supply Availability & Demand Projections Single Dry Year (AF)

Water Sources	2030	2035	2040	2045	2050
Population					
Water Service Area Population	28,649	29,719	30,788	31,857	32,926
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	115.8	112.9	110.1	107.4	104.7
Supply					
Groundwater Pumped (Total)	2,142	2,167	2,190	2,210	2,227
Recycled Water	0	0	0	0	0
Purchased Water	1,981	2,004	2,025	2,043	2,059
Total Anticipated Use of Supplies ***(Estimated Production)***	**4,123**	**4,171**	**4,214**	**4,253**	**4,287**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Normal Year Supply	3,715	3,758	3,797	3,831	3,862
% of Normal Year	111%	111%	111%	111%	111%
Demand					
Total Dry Demand	**4,123**	**4,171**	**4,214**	**4,253**	**4,287**
Normal Year Demand	3,715	3,758	3,797	3,831	3,862
% of Normal Year	111%	111%	111%	111%	111%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity	635	587	544	506	472

Notes:

1. Dry Demand = Normal Year Demands x Single Dry Year Increase of 111%.

2. All other items determined in similitude to **Table 7.1**.

Table 7.3 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2026-2030) (AF)

Water Sources	2026	2027	2028	2029	2030
Population					
Water Service Area Population	28,259	28,357	28,454	28,552	28,649
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	118.1	117.5	116.9	116.3	115.8
Supply					
Groundwater Pumped (Total)	2,234	2,347	2,362	2,223	1,834
Recycled Water	0	0	0	0	0
Purchased Water	2,065	2,170	2,184	2,056	1,695
Total Anticipated Use of Supplies ***(Estimated Production)***	**4,299**	**4,516**	**4,546**	**4,279**	**3,529**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Normal Year Supply	3,738	3,732	3,727	3,721	3,715
% of Normal Year	115%	121%	122%	115%	95%
Demand					
Total Dry Demand	**4,299**	**4,516**	**4,546**	**4,279**	**3,529**
Normal Year Demand	3,738	3,732	3,727	3,721	3,715
% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity	459	242	212	480	1,229

Notes:

1. Dry Demand = Normal Year Demands x Multiple Dry Year Increases of 115%, 121%, 122%, 115%, and 95%.

2. All other items determined in similitude to **Table 7.1**.

Table 7.4 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2031-2035) (AF)

Water Sources	2031	2032	2033	2034	2035
Population					
Water Service Area Population	28,863	29,077	29,291	29,505	29,719
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	115.2	114.6	114.0	113.5	112.9
Supply					
Groundwater Pumped (Total)	2,225	2,347	2,371	2,240	1,855
Recycled Water	0	0	0	0	0
Purchased Water	2,057	2,170	2,193	2,072	1,715
Total Anticipated Use of Supplies ***(Estimated Production)***	**4,282**	**4,516**	**4,564**	**4,312**	**3,570**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Normal Year Supply	3,724	3,733	3,741	3,750	3,758
% of Normal Year	115%	121%	122%	115%	95%
Demand					
Total Dry Demand	**4,282**	**4,516**	**4,564**	**4,312**	**3,570**
Normal Year Demand	3,724	3,733	3,741	3,750	3,758
% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity	476	242	194	446	1,188

Notes:

1. Dry Demand = Normal Year Demands x Multiple Dry Year Increases of 115%, 121%, 122%, 115%, and 95%.

2. All other items determined in similitude to **Table 7.1**.

Table 7.5 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2036-2040) (AF)

Water Sources	2036	2037	2038	2039	2040
Population					
Water Service Area Population	29,932	30,146	30,360	30,574	30,788
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	112.3	111.8	111.2	110.6	110.1
Supply					
Groundwater Pumped (Total)	2,250	2,373	2,397	2,264	1,874
Recycled Water	0	0	0	0	0
Purchased Water	2,081	2,194	2,217	2,094	1,733
Total Anticipated Use of Supplies ***(Estimated Production)***	**4,331**	**4,567**	**4,614**	**4,358**	**3,607**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Normal Year Supply	3,766	3,774	3,782	3,789	3,797
% of Normal Year	115%	121%	122%	115%	95%
Demand					
Total Dry Demand	**4,331**	**4,567**	**4,614**	**4,358**	**3,607**
Normal Year Demand	3,766	3,774	3,782	3,789	3,797
% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity	427	192	145	401	1,151

Notes:

1. Dry Demand = Normal Year Demands x Multiple Dry Year Increases of 115%, 121%, 122%, 115%, and 95%.

2. All other items determined in similitude to **Table 7.1**.

Table 7.6 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2041-2045) (AF)

Water Sources	2041	2042	2043	2044	2045
Population					
Water Service Area Population	31,002	31,216	31,429	31,643	31,857
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	109.5	109.0	108.5	107.9	107.4
Supply					
Groundwater Pumped (Total)	2,273	2,396	2,420	2,285	1,891
Recycled Water	0	0	0	0	0
Purchased Water	2,102	2,215	2,238	2,113	1,749
Total Anticipated Use of Supplies ***(Estimated Production)***	**4,375**	**4,611**	**4,658**	**4,399**	**3,640**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Normal Year Supply	3,804	3,811	3,818	3,825	3,831
% of Normal Year	115%	121%	122%	115%	95%
Demand					
Total Dry Demand	**4,375**	**4,611**	**4,658**	**4,399**	**3,640**
Normal Year Demand	3,804	3,811	3,818	3,825	3,831
% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity	384	147	100	360	1,119

Notes:

1. Dry Demand = Normal Year Demands x Multiple Dry Year Increases of 115%, 121%, 122%, 115%, and 95%.

2. All other items determined in similitude to **Table 7.1**.

Table 7.7 Crescenta Valley Water District Water Supply Availability & Demand Projections Multiple Dry Years (2046-2050) (AF)

Water Sources	2046	2047	2048	2049	2050
Population					
Water Service Area Population	32,071	32,285	32,499	32,712	32,926
Consumption Rate (GPCD) *Including 0.5% Annual Passive Savings*	106.8	106.3	105.8	105.2	104.7
Supply					
Groundwater Pumped (Total)	2,293	2,417	2,441	2,304	1,906
Recycled Water	0	0	0	0	0
Purchased Water	2,120	2,235	2,257	2,130	1,763
Total Anticipated Use of Supplies ***(Estimated Production)***	**4,414**	**4,651**	**4,697**	**4,435**	**3,669**
Minimum Available Supply	4,758	4,758	4,758	4,758	4,758
Normal Year Supply	3,838	3,844	3,850	3,856	3,862
% of Normal Year	115%	121%	122%	115%	95%
Demand					
Total Dry Demand	**4,414**	**4,651**	**4,697**	**4,435**	**3,669**
Normal Year Demand	3,838	3,844	3,850	3,856	3,862
% of Normal Year	115%	121%	122%	115%	95%
Supply/Demand Comparison					
Supply-Demand (Difference)	0	0	0	0	0
Supply/Demand (%)	100%	100%	100%	100%	100%
Available Supply Capacity	345	107	61	324	1,090

Notes:

1. Dry Demand = Normal Year Demands x Multiple Dry Year Increases of 115%, 121%, 122%, 115%, and 95%.

2. All other items determined in similitude to **Table 7.1**.

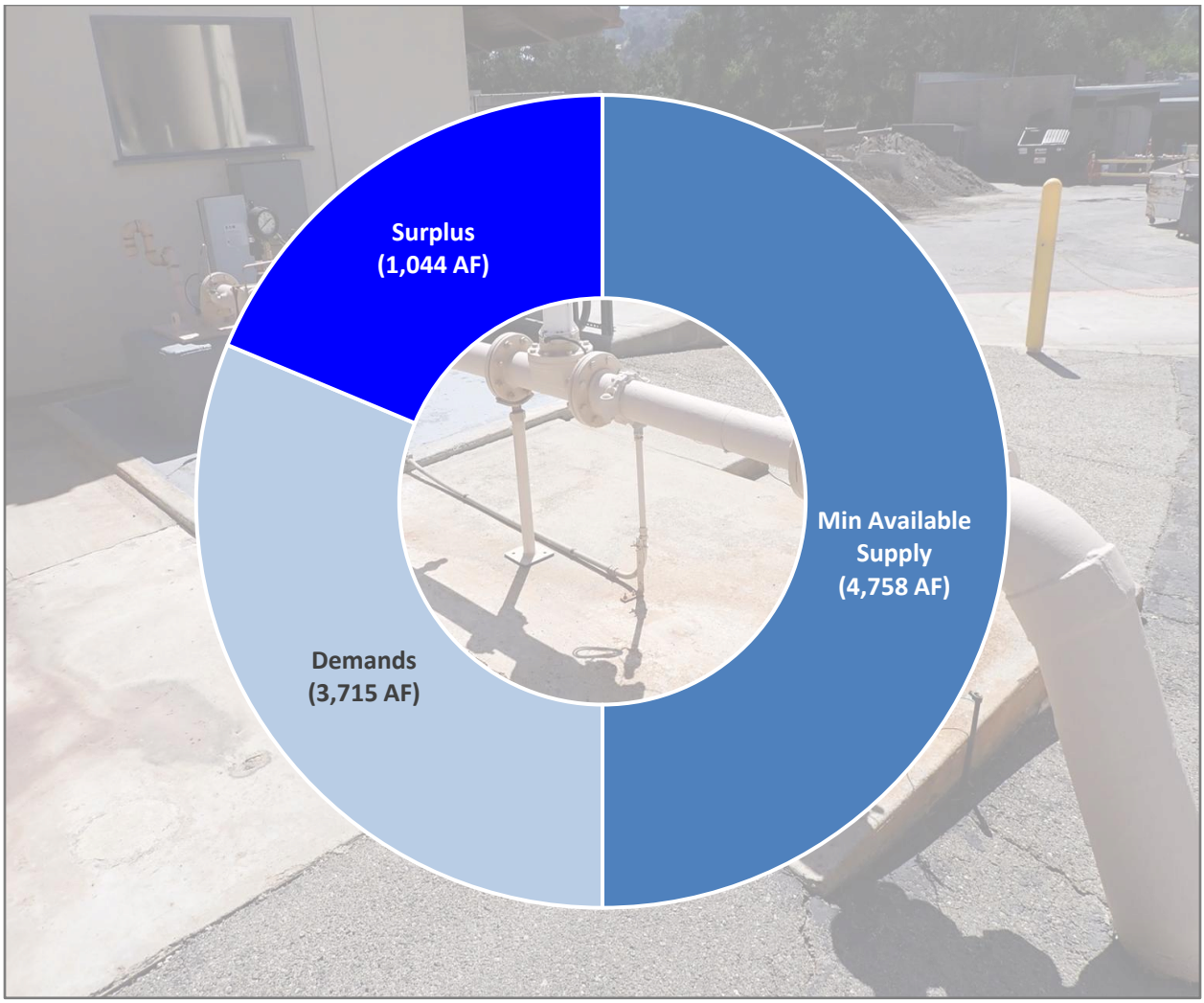

Figure 7.6 Projected Normal Water Supply: Year 2030

Notes:

1. See Notes Under **Table 7.1**.
2. Surplus = Minimum Available Supply – Demands

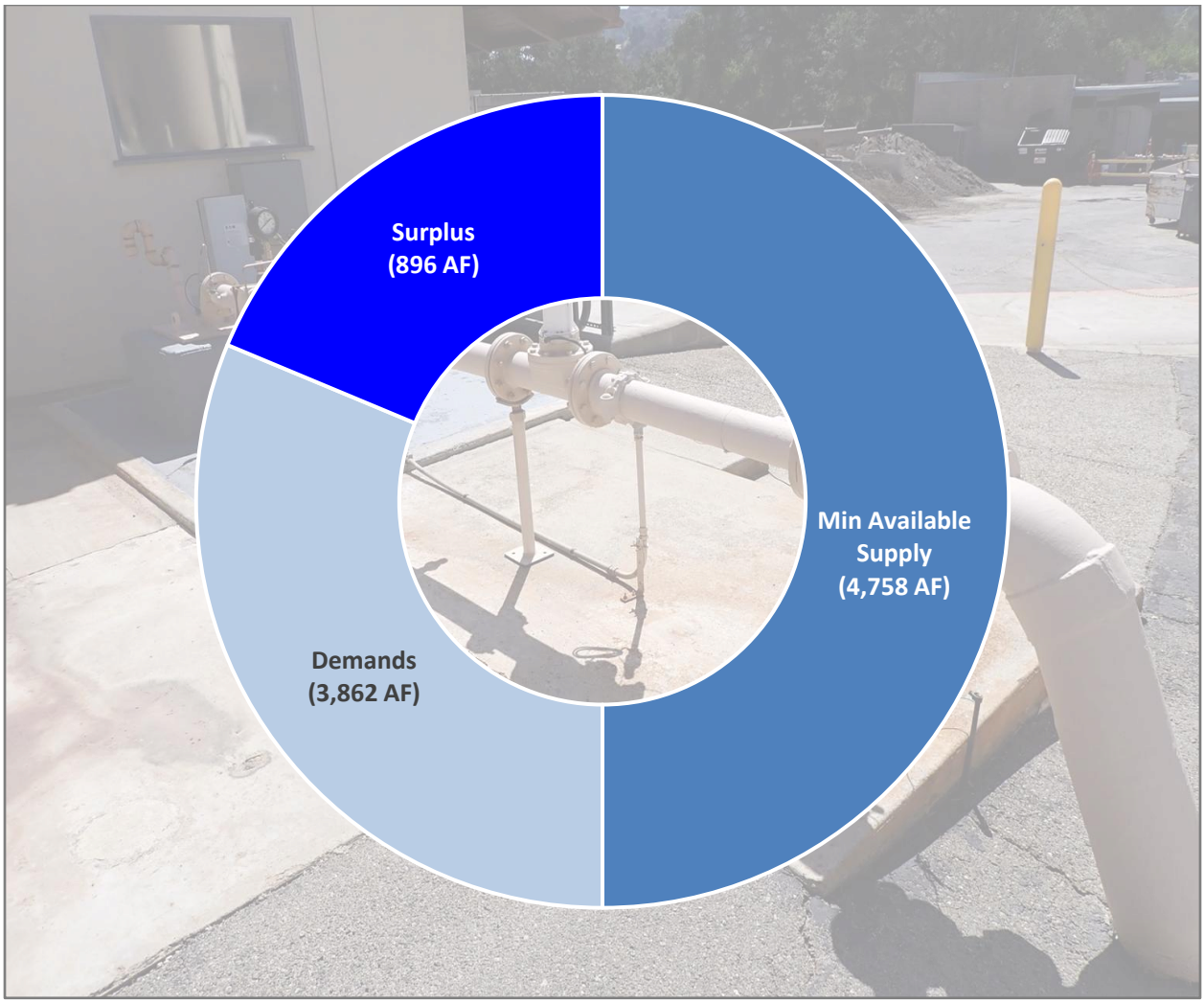

Figure 7.7 Projected Normal Water Supply: Year 2050

Notes:

1. See Notes Under **Table 7.1**.
2. Surplus = Minimum Available Supply – Demands

7.8. ENSURING ADEQUATE SUPPLY

As indicated by **Table 7.1** to **Table 7.7** and **Figure 7.6** to **Figure 7.7**, the District will be able to meet demands through 2050 for all future climatic conditions. If supplies need to be increased in the future, this can most likely be accomplished through re-activation of the District's Water Treatment Plant and expansion to accommodate additional wells, through the drilling of new wells, additional imported water, or through purchasing of recycled water. Besides expanding water supplies, there is also the measure of demand management (water conservation), which has more immediate impacts and helps demands to be met using the supplies that are already at hand.

Finally, droughts will be addressed by following the criteria of the District's Water Shortage Contingency Plan (WSCP) along with implementation of the regional contingency plans. These programs are discussed in **Section 8**. For these reasons, the District is confident that an adequate amount of supply can be provided to meet demands for all weather conditions through 2050.

7.9. WSCP SUPPLY AUGMENTATION

Although the District does not expect to have a water supply shortage through 2050, as indicated by **Table 7.1** to **Table 7.7**, severe and extent droughts may cause the WSCP to be enacted. The District will rely on the implementation of the WSCP to augment the District's reduced supply during consecutively dry years. The WSCP supply augmentation benefits during a five-year drought are shown in standard These values are also reflected in **DWR Submittal Table 7-5** in **Appendix E.**

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Section 8: Contingency Planning

Diesel-powered pumps can provide emergency water supplies during sudden catastrophes.

8.1. INTRODUCTION

In addition to prolonged droughts that can gradually decrease water supplies, water supplies may be interrupted in a number of sudden, catastrophic ways. Sudden catastrophes may include earthquakes, power outages, pumping equipment failures, or spikes in groundwater contaminants that cannot be remedied quickly. Water shortages can also be a result of intentional or accidental manmade catastrophes, such as acts of terrorism or chemical spills into nearby canals or groundwater spreading grounds. It is important that the Crescenta Valley Water District (District or CVWD) has a plan in place to manage its water system during short or long-term water shortages. Long term, water shortages can be addressed through conservation and supply augmentation. Short-term water shortages are best handled though a "Contingency Plan." A Water Shortage Contingency Plan (WSCP) is a required component of the District's UWMP, which provides guidance on stages of action to be undertaken by the District in response to water supply shortages. A WSCP is an independent document that is incorporated into the District's UWMP.

This Section serves as the District's WSCP. The District's response to water shortages will be a coordinated effort between District staff and other local and regional water agencies, including MWD and FMWD. During a water shortage emergency, the District will activate this WSCP. The intent of the plan is to reduce the effect of shortages on the District's

customers. In compliance with the Water Code requirements, this plan has six water shortage levels (up to 10-, 20-, 30-, 40-, 50-percent, and greater than fifty percent (50%) shortage compared to the normal reliability condition).

8.2. NEED FOR CONTINGENCY PLANS

The recent drought of 2020-2022 significantly depleted the State's supply of water and posed a challenge to many agencies throughout the State. Following the drought, the State experienced a wet winter in 2022. Climate-driven weather extremes, long-term water supply uncertainty, and aging infrastructure are stressing a system built for a different era. The modernized California Water Plan 2028 is allowing the state's opportunity to respond with a clear, actionable, and durable approach to statewide water planning.

The WSCP is the District's operational plan in the event of a water shortage. Water shortages would occur when available water supplies are insufficient to meet normal customer water demands. Various causes can bring about a water shortage, including population growth, climate change, drought, natural disasters, and other catastrophic events.

The WSCP shall address the following ten elements:

1. Water supply reliability analysis
2. Annual water shortage assessment procedures
3. Six standard water shortage stages
4. Shortage response actions
5. Communication protocols
6. Compliance and enforcement
7. Legal authorities
8. Financial consequences of WSCP implementation
9. Monitoring and reporting
10. WSCP refinement procedures

In addition, the modernization of the California Water Plan 2028 is being directed by Senate Bill 72 (SB 72). This legislation provides a clear directive: move statewide water planning from description to direction. The California Water Plan 2028 will be modernized to:

- Identify and evaluate effective water management strategies, informed by economic considerations
- Quantify beneficial uses of water at a watershed scale throughout California
- Expand engagement across all sectors as DWR develops the Water Plan
- Establish clear water supply targets that help align state, regional, and local actions

8.2.1. Recent California Water Code Amendments

There have been minor changes to the California Water Code (CWC) affecting the 2025 UWMPs, with only some affecting WSCPs. The changes are described in **Section 1.3**. In addition, the following measures were taken in recent years that affect WSCPs:

Starting January 1, 2025, major water suppliers were required to significantly reduce water delivery by 2040 to build drought resilience into everyday life.

The 2025 update to Title 24 (including the forthcoming enforcement beginning January 1, 2026 for many permit-applications) introduces a number of changes targeting reducing water consumption and improving system efficiency. Among the most important provisions:

- Lower maximum flow-rates for toilets, showerheads, and faucets (for example, toilets continue to be capped at approximately 1.28 gallons per flush in many cases).
- Requirements to reduce pipe sizing and hot-water wait times to reflect lower-volume fixtures and shorter delivery distances.
- Enhanced documentation and compliance measures: designers must show that plumbing layouts meet both water efficiency and energy criteria under Title 24 Part 6 and CALGreen (Title 24, Part 11).
- Greater emphasis on seismic bracing of plumbing and efficient plumbing system design, reflecting California's dual challenges of drought and quake-risk.

The SWRCB has adopted emergency regulations to encourage Californians to use water wisely and make conservation a way of life.

8.3. LEGAL AUTHORITY

As indicated by **Sections 8.1** and **8.2**, the District has the legal obligation to prepare and implement a WSCP during times of drought or sudden supply interruptions. This WSCP includes a listing of shortage response actions per CWC § 10632 (a)(3)(A), including the means by which the District will declare a water shortage and authorize response actions. The remaining Sections of this WSCP describe the District's response actions in greater detail.

8.4. WATER SUPPLY RELIABILITY ANALYSIS

Southern California is expected to experience an increase in regional demands in the years 2030 through 2050 as a result of population growth. Although increases in demand are expected, future demands are effectively limited due to the requirements of SBx7-7. It can be reasonably expected that the majority of agencies have met or were near their compliance targets for 2020 and will continue to meet, or will soon meet, their per-capita usage limit in the future.

The data in the MWD 2020 UWMP shows supply reliability projections for average and single dry years and is important to effectively project and analyze supply and demand over the next 25 years for many regional agencies. Projected supplies during single and multiple dry year scenarios indicate MWD's projected supply will exceed its projected single dry year demands in all years. Likewise, for average

years, MWD supply exceeds projected demands for all years.

Due to the semi-arid nature of the District's climate and as a result of past drought conditions, the District is vulnerable to water shortages due to its climatic environment and seasonally hot summer months. **Section 7** describes the water availability during single and multiple dry year scenarios. **Table 7.1 - Table 7.7** provide an analysis of the District's supply and demand projections to the year 2050 during these scenarios. As shown, the District is capable of providing a reliable supply of water to meet the future demands.

8.4.1. WSCP Re-Adoption

Once the WSCP is revised, the District Board will be required to re-adopt the revised WSCP. This will require a public hearing to receive public comments on the WSCP. The revised WSCP will replace the former WSCP, and will then remain effective until the District elects to update the WSCP.

A WSCP previously submitted in 2020 or later may be reused; however, it must first be reviewed, and if no updates are needed, it can be readopted as is. It must be indicated in the UWMP that a review was conducted and that a previous WSCP is being readopted. Even when no changes are made, the WSCP must undergo a new review and adoption process as part of the 2025 UWMP document. **Section 7** of the 2025 UWMP may be used as a reference to the readopted WSCP.

8.5. District Staff Response

The District has completed a planning process to prepare for the impacts of hazards that could impact the District's service area. The District worked with its neighbors and stakeholders to prepare a detailed, multi-hazard plan and to identify steps to be taken in advance to mitigate impacts from those hazards. Through the hazard mitigation planning process, the District engaged its customers to inform them about risk and seek their input on ways that the District can reduce that risk and become more resilient.

The Crescenta Valley Water District Hazard Mitigation Plan (**Appendix L**) is the District's first formal plan pursuant to the Disaster Mitigation Act of 2000 (Public Law 106-109). The plan promotes sound policy to protect the District's critical assets from the impacts of natural hazards. It identifies resources, information, and strategies for reducing risk from those hazards. Elements and strategies in the plan were selected because they meet a program requirement and because they best meet the needs of the District and its community.

All residential and commercial the District customers are the ultimate beneficiaries of this hazard mitigation plan. The plan strives to reduce risk for District assets that are vital for its continuity of operations following hazard

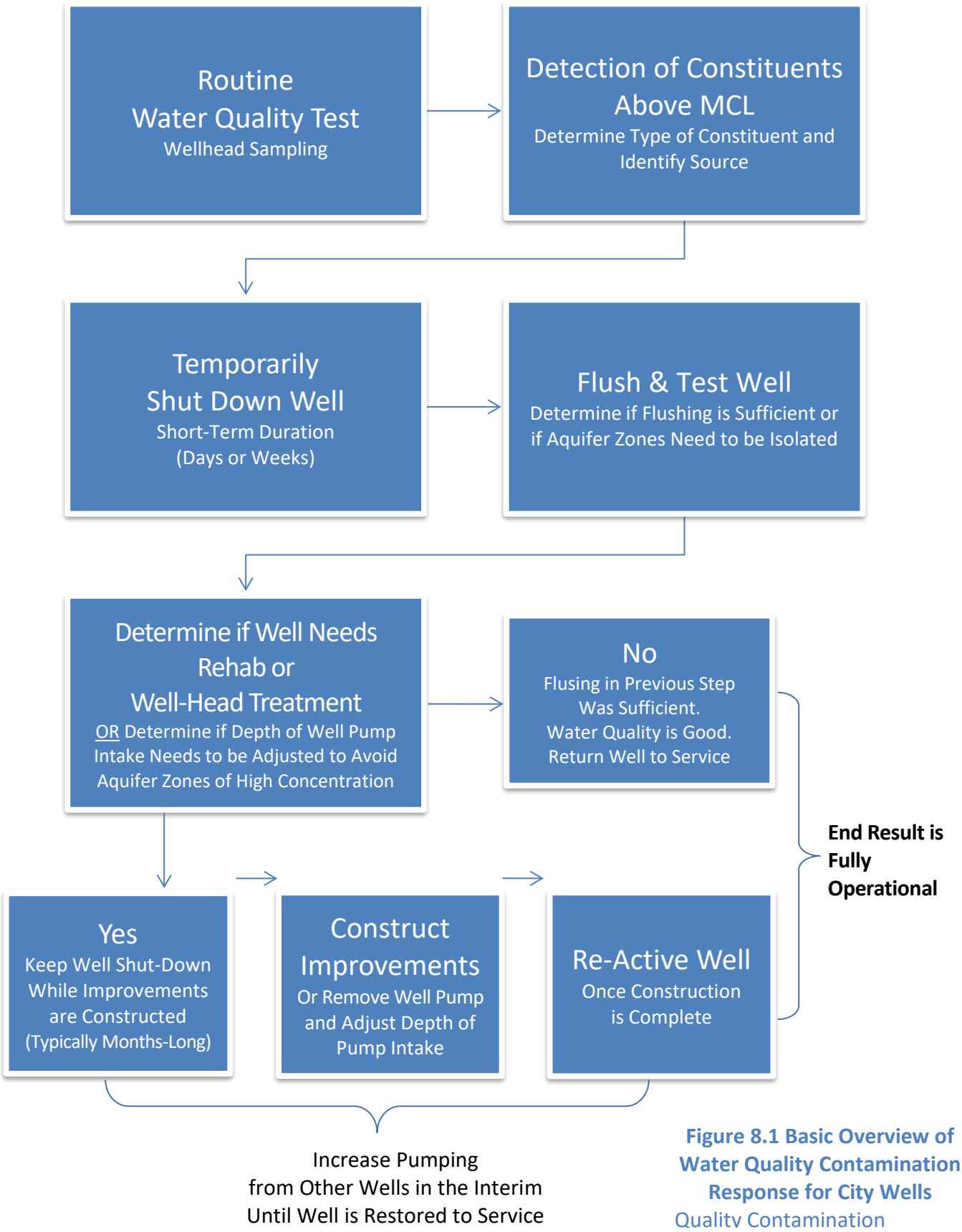


Figure 8.1 Basic Overview of Water Quality Contamination Response for City Wells

Quality Contamination

events. The District provides essential services (water supply and wastewater collection), and its ability to continue to provide these services will be critical to the area's ability to recover from a hazard event. This plan provides a viable planning framework for all hazards that are likely to impact the District. Participation in development of the plan by key stakeholders helped ensure that outcomes will be mutually beneficial. The plan's goals and recommendations lay the groundwork for implementing local mitigation activities and partnerships.

8.6. ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT PROCEDURES

Under CWC Section 10632(a)(2), beginning by July 1, 2022, each urban water supplier is required to prepare their annual water supply and demand assessment (Annual Assessment) and submit an Annual Water Shortage Assessment Report to DWR. The Annual Water Shortage Assessment Report will be due by July 1 of every year, as required by CWC Section 10632.1.

This section outlines CVWD's procedures used in conducting an Annual Assessment, including the following: 1) written decision-making process for determining water supply reliability; and 2) key data inputs and assessment methodology for evaluating the water supply reliability for the current year and one dry year.

8.6.1. DECISION-MAKING PROCESS

CVWD's Annual Assessment will be primarily based on daily recorded water production and supply figures, which are reported to the General Manager on a daily basis throughout the year. Water consumption is monitored regularly through the metering of all CVWD service connections in its distribution system. To determine its water supply reliability and actual reductions in water use during declared water shortages or emergencies, CVWD can rely on its daily records as well as the CVWD Water Production Reports including the monthly totals. These periodical analyses are used by CVWD to manage resources to meet projected demands and adjust to changing conditions (i.e., precipitation) throughout the year.

As of 2022, CVWD staff has reviewed water production data and water consumption data starting in January of that year, with the intent to prepare an Annual Water Shortage Assessment Report to the CVWD Board of Directors by May each year. The Final Report can then be submitted to DWR by July 1 of each year, which are shown on DWR's WUE Portal:

wuedata.water.ca.gov/wsda_plans

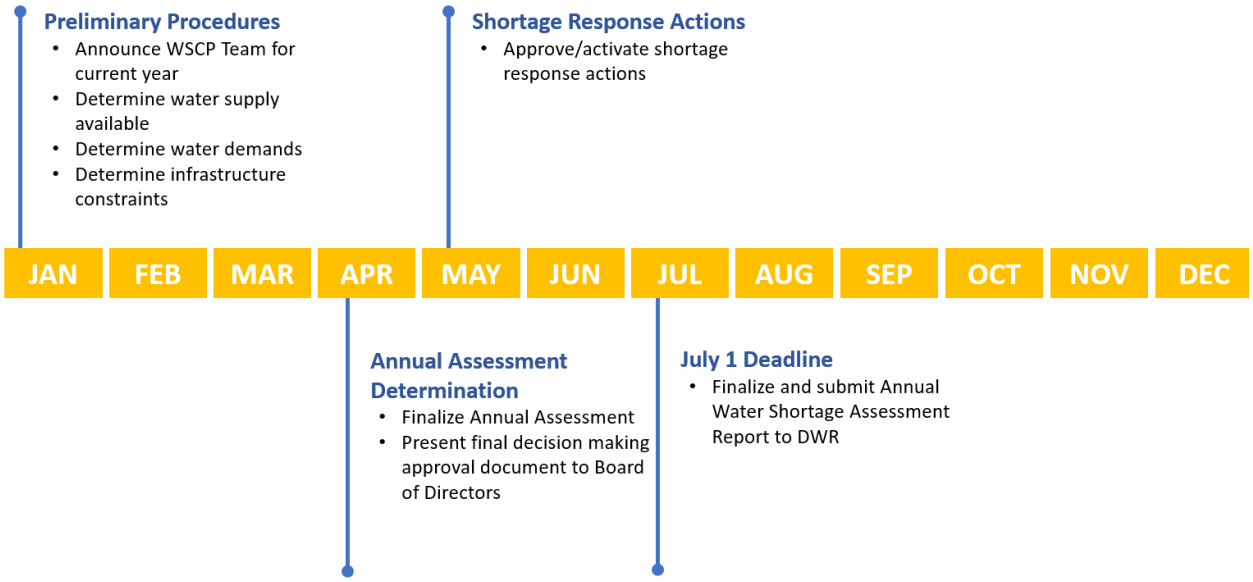


Figure 8.2: Sample Annual Assessment Decision-Making Process Timeline

8.6.2. KEY DATA INPUTS AND ASSESSMENT METHODOLOGY

This section defines the key data inputs and assessment methodology used to evaluate the water supply reliability for the anticipated conditions for the current year and for one dry year that follows. The Annual Assessment determination will focus on the current year unconstrained demand, infrastructure constraints, and total water supply availability. Moreover, the Annual Assessment will consider the current year's weather, population growth, policies in place that will impact demands, and other influencing factors. The current year available supply will incorporate the hydrological regulatory conditions for the current year and following dry year.

8.6.3. LOCALLY APPLICABLE EVALUATION CRITERIA

The locally applicable evaluation criteria that will be consistently relied on for each Annual Assessment include the following:

1) Assumed unconstrained demand (i.e., demand without any conservation measures) for current year and one dry year
2) Assumed total water supply availability for current year and one dry year
3) Existing infrastructure capabilities and plausible constraints
    - Any known issues with the water facilities (including water quality conditions limiting local sources)
    - Planned power outages for operation and maintenance
    - New construction and repairs
    - Environmental mitigation measures

- Other constraints that may affect near-term water supply reliability

8.7. SHORTAGE STAGES AND SHORTAGE RESPONSE ACTIONS

8.7.1. MWD STAGES OF ACTION

CVWD works in conjunction with FMWD and MWD to implement conservation measures within the framework of MWD's Water Shortage and Drought Management (WSDM) Plan. The WSDM Plan was developed in 1999 by MWD with assistance and input from its member agencies. The plan addresses both surplus and shortage contingencies. MWD's WSDM Plan documents the stages of action that it would undertake in response to a water supply shortage. FMWD's water supply shortage stages reflect MWD's WSDM Plan.

The WSDM Plan guiding principle is to minimize adverse impacts of water shortage. The plan guides the operations of water resources (local resources, Colorado River, SWP, and regional storage) to ensure regional reliability. It identifies the expected sequence of resource management actions MWD will take during surpluses and shortages of water to minimize the probability of severe shortages, which require curtailment of full-service demands. Mandatory allocations are avoided to the extent practical; however, in the event of an extreme shortage, an allocation plan will be implemented.

In addition to its WSDM Plan, MWD developed a Water Supply Allocation Plan (WSAP), which provides a standardized methodology for allocation of supplies during times of extreme shortage (Stage 7 in MWD's WSDM Plan). During a shortage, CVWD's imported water supplies will be allocated based on the methodology documented in FMWD's Allocation Plan, which typically mirrors the MWD allocation plan.

The description of shortage stages below is from MWD's 2020 UWMP, page 2-29:

*"**Shortage**: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfers as necessary.*

***Severe Shortage**: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation.*

***Extreme Shortage**: Metropolitan allocates available supply to full-service customers.*

The WSDM Plan also defines six shortage management stages to guide resource management activities. These stages are not defined merely by shortfalls in imported water supply, but also by the water balances in Metropolitan's storage programs. Thus, a 10 percent shortfall in imported supplies could be

a stage one shortage if storage levels are high. If storage levels are already depleted, the same shortfall in imported supplies could potentially be defined as a more severe shortage.

When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, Metropolitan is still able to meet all end-use demands for water. For shortage stages 1 through 3, Metropolitan will meet demands by withdrawing water from storage. At shortage stages 4 and 5, Metropolitan may undertake additional shortage management steps, including issuing public calls for extraordinary conservation and exercising water transfer options, or purchasing water on the open market."

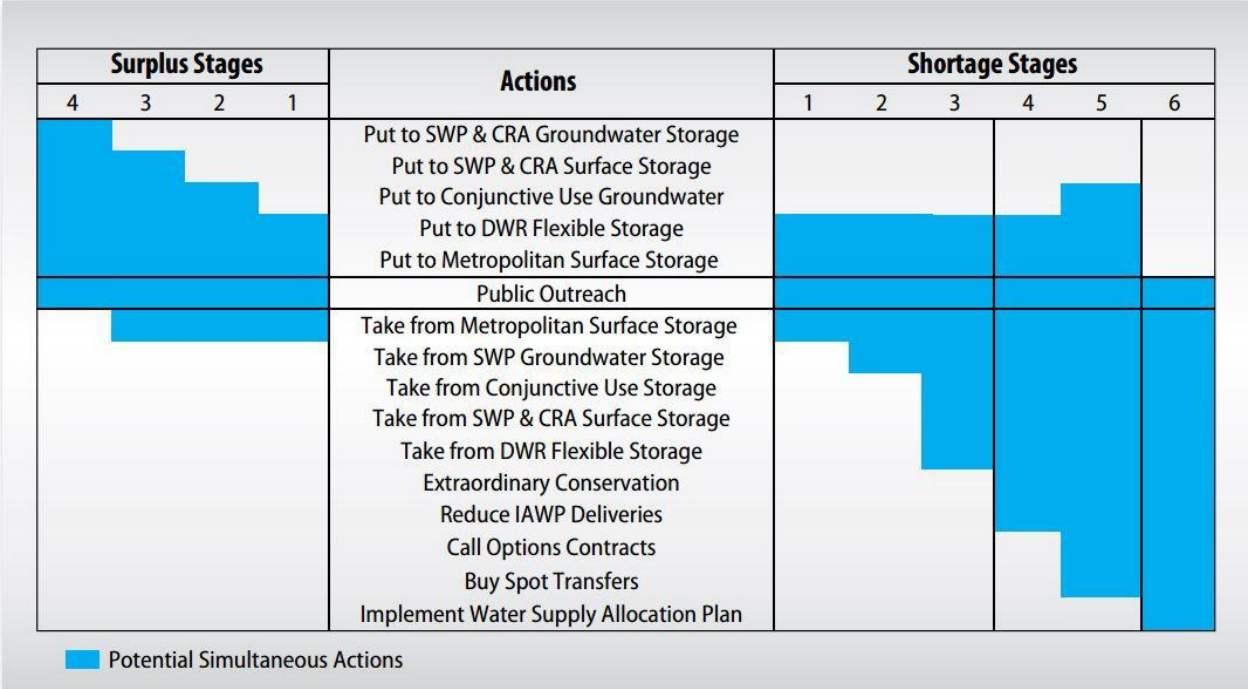


Figure 8.3 MWD WSDM Surplus & Drought Stages

8.7.2. MWD WATER SUPPLY ALLOCATION PLAN (FOR WSDM SHORTAGE STAGE 7)

In February 2008, MWD's Board of Directors adopted a WSAP, which includes a methodology for calculating supply allocations in the event that MWD enters a Shortage Stage 7 and is unable to meet the demands of its member agencies. MWD revised its WSAP in 2014 to include the following updates: new FY 12-13 to FY 13-14 baseline, implement a Conservation Demand Hardening Adjustment, create a separate Groundwater Replenishment Allocation for applicable agencies, and replace WSAP Penalty Rates with Allocation Surcharges based on the marginal costs of turf removal. It should be noted that the WSAP is not a rationing plan. Rather, it is a pricing plan where water is allocated at regular prices and agencies that choose to take more than the allocated water pay surcharges. The surcharge pricing mechanism acts to discourage the use of water above the allocation. The WSAP uses a combination of estimated total retail demands and historical local supply production within the member agency service area to estimate the demands on MWD from each member agency in a given year. Based on a number of factors, including storage and supply conditions, MWD then determines whether it has the ability to meet these demands or will need to allocate its limited supplies among its member agencies. Thus, implicit in MWD's decision not to implement an allocation of its supplies is that, at a minimum, MWD will be able to meet the demands identified for each of the member agencies.

According to MWD's 2015 IRP, the approach seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level and takes into account growth, local investments, changes in supply conditions and the demand hardening aspects of non-potable recycled water use and the implementation of conservation savings programs. The methodology attempts to allocate supplies based on an estimate of an agency's relative need for imported water using the following process:

1) Establish a baseline for total retail demands (and adjust for growth) to determine the allocation year total retail demands. ("What are your total water demands?")
2) Estimate the amount of local supplies to be utilized in the allocation year and subtract from total retail demands. This is the allocation year baseline demand on MWD. ("How much imported water do you need from MWD?")
3) Apply the minimum allocation percentage (per the regional shortage level) to the allocation year baseline demand and provide minor adjustments based on various criteria. ("Restrict normal supply deliveries and provide allocation.")

8.7.3. BASE PERIOD CALCULATIONS (USED TO DETERMINE WSAP REDUCTIONS)

The Base Period is calculated using data from FY 2012-13 and FY 2013-14. Base Period wholesale demands are based on the two-year average of demands on MWD during the Base Period, including full-service, seawater barrier, seasonal shift, and surface storage operating agreement demands.

Local supplies for the base period are calculated using a two-year average of groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface water production, and other imported supplies. Non-potable recycling production is not included in this calculation, which, according to MWD, is intended to address the impact of demand hardening due to recycled water use. Total potable retail demands for the Base Period are then calculated by adding the Base Period wholesale demands on MWD and the Base Period local supplies.

8.7.4. WSAP ALLOCATION YEAR CALCULATIONS

The next step is to estimate water needs in an allocation year by (1) adjusting the Base Period total retail demands for population or economic growth, and (2) accounting for changes in local supplies.

The Base Period retail demands are adjusted for growth using the average annual rate of population growth occurring since the two-year base period based on county-level data generated by the California Department of Finance.

Figure 8.4: MWD's Diamond Valley Lake (Potential Reserves for WSAP Allocations)

Next, these growth-adjusted demands are adjusted again to account for (1) gains and losses of local supply, and (2) extraordinary increases in production during the base year. According to MWD, these adjustments are made to give a more accurate estimate of actual supplies in the allocation year, and, in turn, more accurately reflect an agency's demand for MWD supplies.

The adjustment for gains in local supplies is intended to account for planned or scheduled gains in local supply production above the Base Period, which are not due to extraordinary actions to increase water supply in the allocation year. These previously scheduled increases in supply programs (i.e., San Diego County Water Authority/Imperial Irrigation District) or local production are added to the base period local supplies. Again, new supplies from non-potable recycling projects are not counted as local supplies.

While the local agency does become more reliable with the addition of the new supplies, assuming that the new supplies are available during an allocation, the benefits of these programs are partially offset because the impact of adding the new supplies to the Base Period local supplies is to reduce an agency's dependence on MWD and thus their allocation under the WSAP.

Alternatively, only a portion of the additional supplies from what are termed "extraordinary increases in production" are added back to Allocation Year local supplies depending on the retail shortage level. Extraordinary increases in production include such efforts as purchasing transfers or mining of groundwater basins. By adding only a percentage of the yield from these supplies to Allocation Year local supplies, it has the effect of "setting aside" the majority of yield for the agency who procured the supply.

Table 8.1 reflects the set of percentages used in the WSAP to establish water allocations for each agency.

Table 8.1: Water Allocation Percentages

Regional Shortage Level	Regional Shortage Percentage	Wholesale Minimum Percentage	Maximum Retail Impact Adjustment Maximum
1	5%	92.5%	2.5%
2	10%	85.0%	5.0%
3	15%	77.5%	7.5%
4	20%	70.0%	10.0%
5	25%	62.5%	12.5%
6	30%	55.0%	15.0%
7	35%	47.5%	17.5%
8	40%	40.0%	20.0%
9	45%	32.5%	22.5%
10	50%	25.0%	25.0%

8.7.5. FMWD SHORTAGE STAGES OF ACTION

FMWD's plan mirrors MWD's plan with two exceptions. The first exception is that since FMWD does not take delivery of any Seawater Barrier water and FMWD is considered ineligible for the Replenishment Allocation, reference to those deliveries has been deleted.

The second exception is because of the way the water is allocated, without a further adjustment, total water allocated to FMWD's member agencies will never match the total water allocated to FMWD. Thus, an adjustment has been added to prorate the difference between the amount allocated to FMWD by MWD and the initial allocation by FMWD.

Additionally, FMWD will reconcile overuse and underuse of member agency allocations at the same time that MWD does, typically at the end of every 12 months. Any allocation under used by agencies will be pooled together in one pot to be distributed to those agencies who overuse their allocation. Any agency using that pooled water will be charged the regular FMWD Tier 1 or Tier 2 rate for having taken the water plus fifty percent (50%) of MWD's penalty rate. Any penalties assessed would go into the Water Resource and Conservation Fund.

FMWD only assesses fifty percent (50%) of the surcharge against its retail agencies in situations where FMWD is not subject to the Allocation Surcharge from MWD. In cases where FMWD as a whole is subject to the Allocation Surcharge from MWD, member retail agencies that have overused their allocation will take on the obligation proportionally and be subject to one hundred percent (100%) of the surcharge.

8.7.6. Supply Allocation Formula Elements

The following are the elements of the allocation formula:

Base Period Demands – A two-year average of historical water use utilizing data from FY 2012-13 and FY 2013-14. Water use is divided into three components: total retail demand, locally produced water, and imported water.

Growth Adjustment – Retail demands are adjusted for growth between the base period and the time of allocation based on county level estimates of average annual growth in population. Growth for Los Angeles County is 0.46%. Agencies have an option to use weighted average population and job growth instead based on an appeal process to MWD.

Local Supplies – The amount of local supplies that are planned to be utilized in an allocation year.

Extraordinary Allocation Year Local Supplies – These are previously unscheduled local water supplies to be utilized in an allocation year, including transfers, recycled water,

desalination, and recovery of groundwater. This amount is credited without reduction in the Wholesale Minimum Allocation. In addition, it decreases both the Retail Impact Adjustment and the reliance on MWD.

Conservation Demand Hardening Adjustment – An adjustment is made for demand hardening due to active conservation based on GPCD. Calculation considers conservation savings, dependence on MWD and the associated Regional Shortage Level percentage.

Regional Shortage Percentage – This is the percentage of shortage between supplies and demands and will be declared by MWD's Board. **Table 8.1** contains the percentages used to establish water allocations for agencies.

Wholesale Minimum Allocation – This is the first step in the formula and provides the minimum imported water allocation from MWD. It is calculated as an allocation baseline demand on MWD (Base Period Demands minus Local Supplies) multiplied by the Wholesale Minimum Percentage of the associated Regional Shortage Level.

Retail Impact Adjustment – This is the maximum additional allocation an agency may receive based on impacts to retail customers. Those agencies with less local supplies would receive a higher adjustment than those agencies with more local supplies. This adjustment is calculated as a percent dependence on MWD times the allocation baseline demand on MWD multiplied by the Retail Impact Adjustment factor of the associated Regional Shortage Level.

Minimum Per-Capita Adjustment – An adjustment made should gallons per capita per day for an agency drop to 100 GPCD or lower.

Total FMWD Allocation – A preliminary allocation is provided to agencies based on calculations, which mirror MWD's WSAP. Without a further adjustment, total water allocated to FMWD's member agencies will never match the total water allocated to FMWD. Thus, an adjustment has been added to prorate the difference between the amount allocated to FMWD by MWD and the initial allocation by FMWD.

Allocation Surcharge – Previously known as WSAP Penalty Rates, an Allocation Surcharge will be in effect based on the costs to implement outdoor water use reductions through turf removal programs. The Allocation Surcharge would provide a price signal based on the marginal conservation costs incurred to reduce water use in dry and shortage years.

8.7.7. Conservation Plan Ordinance

FMWD's Conservation Plan (adopted April 2009; revised plan adopted June 2021) establishes a comprehensive staged water

conservation program, which will encourage reduced water consumption within FMWD through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within FMWD. In June 2021, FMWD amended its Conservation Plan to conform to six standard water shortage levels as required by CWC Section 10632(a)(3)(A) and to better align with long-term water use goals. Along with permanent water conservation requirements, FMWD's Water Conservation Plan consists of six stages, which are described in **Table 8.2**, to respond to a reduction in potable water available to FMWD for distribution to its customers. Stage 1 conservation requirements are in effect at all times unless a mandatory conservation stage has been implemented by the Board of Directors.

8.7.8. CVWD STAGES OF ACTION

CVWD has adopted a Water Conservation Program. The purpose of this program is to provide water conservation regulations, in a phased approach, to minimize the effect of a shortage of water supplies on the customers of CVWD during various critical stages of a water shortage. Along with permanent water conservation requirements, CVWD's Water Conservation Program consists of six stages, as shown in **Table 8.2** and **Appendix N**, to respond to a reduction in potable water available to CVWD for distribution to its customers with Phase 1 conservation requirements in effect at all times unless a mandatory conservation stage has been implemented by CVWD Board of Directors.

8.7.9. PROHIBITIONS

CVWD's Water Conservation Plan promotes the efficient use of water, reduce or eliminate water waste, complement CVWD's Water Quality regulations and urban runoff reduction efforts, and enable implementation of CVWD's Water Shortage Contingency Measures. Prohibitions include, but are not limited to: restrictions on outdoor watering, washing of vehicles, food preparation establishments, repairing of leaks and other malfunctions, swimming pools, decorative water features, construction activities, and water service provisions, which can be found in **Table 8.3**.

Table 8.2: Water Supply Shortage Stages and Conditions – Rationing Stages

Stage No.	Water Supply Conditions	% Shortage
Phase 1 - Color Code "Blue"	Standard Water Conservation. FMWD can meet all Member Agency demands. Voluntary water conservation applies.	Up to 10%
Phase 2 - Color Code "Green"	Increased Water Conservation. Some supplies have been impacted, and consumers should increase efforts to conserve.	10% to 20%
Phase 3 - Color Code "Yellow"	Extraordinary Water Conservation. MWD is withdrawing water from most of its storage programs to meet demands. Extraordinary conservation is called for from consumers.	20% to 30%
Phase 4 - Color Code "Orange"	Allocation. MWD has implemented its allocation plan to its member agencies. Thus, supplies are limited.	30% to 40%
Phase 5 - Color Code "Red"	Critical. Water supplies are reduced drastically.	40% to 50%
Phase 6 - Color Code "Purple"	Emergency. Water supplies are only available for health and safety needs.	Greater than 50%

Table 8.3: Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.	Phase 1 - Color Code "Blue"
Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, streets, adjacent lands or into gutters shall not be permitted.	
Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.	
Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.	
No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, but not limited to, golf courses, parks, cemeteries and	

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings. With the exception of drip irrigation systems or weather based irrigation controllers, residential timers shall not run for more than a total of 10 minutes per station.	Phase 1 - Color Code "Blue"
Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.	
No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.	
The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.	
Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.	
Water for construction purposes including but not limited to de- brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.	
The use of potable water from fire hydrants shall be limited to firefighting related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.	
No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.	
Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about CVWD's water conservation policy and urging guests to conserve water. Water	

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
conservation notices will be provided by CVWD.	Phase 1 - Color Code "Blue"
Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.	
Where applicable, restaurants must utilize water conserving nozzles.	
Watering Days: Odd/Even assigned days	Phase 2 - Color Code "Green"
Watering Days: Tuesday, Thursday, Saturday	Phase 3 - Color Code "Yellow"
Residential and commercial landscape irrigation is limited to no more than two (2) days per week on Tuesday and Saturday. Exempt are public areas owned or operated by School Districts or public use areas greater than 4,000 square feet.	Phase 4 - Color Code "Orange"
The filling, refilling or adding of water to indoor and outdoor pools, wading pools, or spas is prohibited. Exemptions: Commercial Repairs mandated by the Federal Virginia Graeme Baker Act, or adding water for the prevention of equipment failure is permissible, however, the District strongly urges that a cover be used to prevent evaporation and thereby reducing the frequency of refilling.	Phase 4 - Color Code "Orange"
The use of water to clean, maintain, fill, or refill decorative fountains or similar structures is prohibited. Exemptions: Adding water for the prevention of equipment failure is permissible.	Phase 4 - Color Code "Orange"
Vehicle washing is restricted to the use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle.	Phase 4 - Color Code "Orange"
Fix leaks within 48 hours.	Phase 4 - Color Code "Orange"
1 day limit per week year-round irrigation.	Phase 5 - Color Code "Red"
All outdoor water use is prohibited.	Phase 6 - Color Code "Purple"
Fix any leaks within 24 hours.	Phase 6 - Color Code "Purple"

Table 8.4: Consumption Reduction Methods

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Phase 1 Conservation Measures	"Blue"	Up to 10%
Phase 2 Conservation Measures	"Green"	10% to 20%
Phase 3 Conservation Measures	"Yellow"	20% to 30%
Phase 4 Conservation Measures	"Orange"	30% to 40%
Phase 5 Conservation Measures	"Red"	40% to 50%
Phase 6 Conservation Measures	"Purple"	>50%

8.7.10. CONSUMPTION REDUCTION METHODS

Methods to reduce the use of potable water exist in all Water Shortage Levels are listed in **Table 8.4**.

8.8. CATASTROPHIC SUPPLY INTERRUPTION

Given the great distances imported water supplies travel to reach the FMWD service area, the region is vulnerable to interruptions along hundreds of miles of aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, this water is distributed to customers through an intricate network of pipes and water mains that are susceptible to damage from earthquakes and other disasters, natural or otherwise.

8.8.1. MWD Response

MWD has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM and WSAP Plans. MWD also developed an Emergency Storage Objective to mitigate potential interruption in water supplies resulting from catastrophic occurrences within the Southern California region, including seismic events along the San Andreas Fault. In addition, MWD is working with the state to implement a comprehensive improvement plan to address catastrophic occurrences that could occur outside of the Southern California region, such as a probable maximum seismic event in the Delta, which could cause levee failure and disruption of SWP deliveries.

In July 2019, MWD's Board adopted amendments to their Administrative Code allowing deliveries of member agency water supplies in MWD's system during an emergency. With these enabled deliveries, MWD's member agencies will be able to deliver their water through MWD's system under specific emergency conditions. Emergency deliveries using a portion of MWD's system can only be made if MWD is

unable to make deliveries to a member agency due to physical damage to its system resulting from a natural disaster or other emergency, and there are no alternatives.

8.8.2. CVWD Response

For a sudden or catastrophic water supply interruption, CVWD has developed an Emergency Preparedness and Disaster Response Plan, as required by the State Water Resource Control Board, and a Hazard Mitigation Plan to ensure the most effective use of its resources for the benefit and protection of facilities and employees, in addition to the preservation of a reliable water supply for its customers.

Power Outage – In the event of a power outage, CVWD maintains five emergency standby power generators. One of the emergency generators is stationary and dedicated to power water supply wells and the auxiliary equipment at the Glenwood Nitrate Operations Center. Four emergency generators are portable and are mounted on trailers. They can be mobilized to any pump station for movement of water out of a reservoir into a higher pressure zone. Each pump station site is equipped with emergency power receptacles and transfer switches, which allow personnel to hook up the portable generators. The fourth generator is located at CVWD's Administrative Office. CVWD also has Universal Power Supply systems on the computer systems at the Administrative Office, the Supervisory Control and Data Acquisition (SCADA) systems at the Glenwood Nitrate Operations Facility and at booster station at well sites. In addition, FMWD operates standby emergency generators, which could be used by CVWD.

Water Outage – In the event of a water outage, CVWD has the ability to receive water from the City of Glendale, La Cañada Irrigation District, and Los Angeles Department of Water and Power (LADWP) through emergency water supply interconnections.

City of Glendale Emergency Interconnection:

- Glendale/CVWD emergency interconnection was installed in 2004 and allows for CVWD to receive up to 5.0 cubic feet per second (cfs) from Glendale.
- Glendale and CVWD also have an agreement for emergency hydrant-to-hydrant interconnections that allows CVWD to take water from Glendale or for Glendale to take water from CVWD.

La Cañada Irrigation District (LCID) Interconnection:

- CVWD has an interconnection with LCID that allows CVWD to take water from LCID into CVWD's Zone 3.
- LCID has two interconnections with CVWD that allows LCID to take water from CVWD into LCID westerly zones.

LADWP Interconnection:

- CVWD to receive up to 2.2 cfs or 1.9 MGD from LADWP, which will provide an emergency water supply to FMWD through a metered connection.
- LADWP to receive up to 2.2 cfs from CVWD through a booster pump system that will provide LADWP water in emergency situations.

CVWD is an active member of the southern region of the statewide Water Agency Response Network (WARN), a mutual aid coalition of water departments and agencies which allows for coordination of resources during disasters or catastrophic events.

Supplemental Water Supplies - Supplemental water supplies to help offset future shortages due to drought would be available through FMWD via MWD and their WSDM. The WSDM is referenced in FMWD's 2020 UWMP and described in detail in MWD's 2020 UWMP.

Preparation actions for possible catastrophes are summarized in **Table 8.5**.

Table 8.5: Preparation Actions for Catastrophe

Possible Catastrophe	Preparation Actions
Regional Power Outage	• Emergency Preparedness and Disaster Response Plan • Standby Emergency Power Generators • Interconnections with nearby agencies • Water Agency Response Network Membership • Supplemental Water Supplies
Earthquake	
Supply Contamination	
Terrorist Act which Interrupts Service	
Other(s)	

8.8.3. SEISMIC RISK ASSESSMENT AND MITIGATION PLAN INTRODUCTION

Earthquakes can vary significantly in magnitude and the amount of damage caused. Major earthquakes can cause loss of electrical power, damage to CVWD's structures and equipment, disruption of service, and injuries to staff. This section provides a description of CVWD's procedures (i.e., response and mitigation) after an earthquake event.

As mandated in CWC Section 10632.5, beginning January 1, 2020, water suppliers are required to include a seismic risk assessment and mitigation plan as part of their WSCP to assess the vulnerability of each of the various facilities of their water system and mitigate those vulnerabilities. If an urban water supplier does not have a seismic risk assessment and mitigation plan, the urban water supplier may instead, per CWC Section 10632.5(c), include a local hazard mitigation plan (LHMP) or a multi-hazard mitigation plan. This requirement is satisfied by the incorporation of elements and analyses from CVWD's Hazard Mitigation Plan (**Appendix L**). The complete RRA documents are not presented within this plan due to the highly confidential nature of the reports. CVWD applied for a planning grant in March 2019 and was awarded funding by the Federal Emergency Management Agency in April 2020 to complete a LHMP.

8.8.4. CVWD LHMP

During the LHMP process, residents and officials from neighboring agencies were asked to contribute by sharing local knowledge of the area's vulnerability to hazards and by suggesting ways CVWD can mitigate disasters. CVWD also formed a Steering Committee made up of local stakeholders, who oversaw the plan's development and outreach. The committee met on a monthly basis for approximately seven months and meetings were open to the public. The LHMP process was started in late 2020, with a seismic evaluation, and is was completed in the Fall of 2021.

Figure 8.5: The Five Phases of Emergency Management

8.8.5. LHMP Goals and Objectives

The six goals of CVWD's LHMP are listed below:

1) Protect life and property
2) Maintain continuity of essential water and sewer services
3) Increase public awareness of the risk of loss of water/sewer service

4) Facilitate partnerships with recognized stakeholders within the Crescenta Valley and implement a coordination plan between the stakeholders
5) Protect local water supply sources
6) Protect against environmental consequences caused by water and sewer system failure initiated by natural hazards

The CVWD Steering Committee members identified the following plan objectives:

- Implement activities that assist in protecting lives by making CVWD's infrastructure, critical facilities, and other properties more resistant to natural hazards
- Protect water quality and supply
- Properly address aging infrastructure issues to reduce/minimize future hazards and disasters
- Raise awareness and communicate to the Crescenta Valley Community about the risks to CVWD assets
- Leverage grant funding and low interest loan programs to implement hazard mitigation capital projects
- Establish policies to ensure mitigation projects are prioritized for critical facilities, services, and infrastructure
- Create, rehabilitate, enhance, and preserve local ecosystems to serve as natural hazard mitigation functions

8.8.6. SEISMOLOGY OF WATER FACILITIES & VULNERABILITY

According to the maps provided on the California Office of Emergency Services' online planning tool (My Plan) and the California Geological Survey's online earthquake hazards zone application (EQ Zapp), no portion of the CVWD system is crossed by a known fault line as shown in **Figure 8.6**. Furthermore, based on the CVWD seismic evaluation, none of CVWD's pipelines, wells, booster pump stations, reservoirs, or other water facilities are located in areas containing soft, fine grained soils, which amplify the earthquake energy during an earthquake. All water facilities are located in areas of very dense and stiff soil. Therefore, there are no CVWD potable water structures with an extremely high risk of earthquake damage. There are, however, areas with increased risk due to landslides, liquefaction, and some CVWD facilities that are more susceptible to earthquake damage than other facilities.

An earthquake is caused by the shifting of tectonic plates beneath the Earth's surface. Ground shaking from moving geologic plates collapses buildings and bridges, and sometimes triggers landslides, avalanches, flash floods, fires and tsunamis.

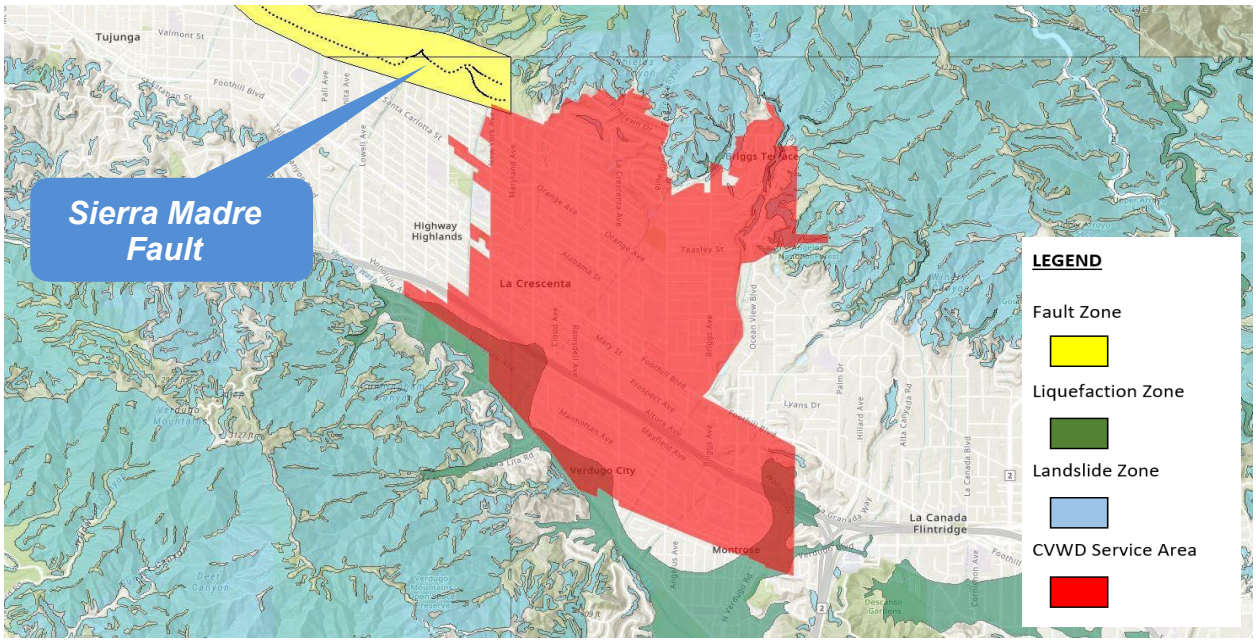


Figure 8.6: Seismic Hazards within CVWD Service Area (California Geological Survey)

The strong ground motion of earthquakes has the potential to cause a great deal of damage to drinking water and wastewater utilities, particularly since most utility components are constructed from inflexible materials (i.e., concrete, metal pipes). Earthquakes create many cascading and secondary impacts that may include, but are not limited to:

- Structural damage to facility infrastructure and equipment
- Water tank damage or collapse
- Water source transmission line realignment or damage
- Damage to distribution lines due to shifting ground and soil liquefaction, resulting in potential water loss, water service interruptions, low pressure, contamination and sinkholes and/or large pools of water throughout the service area
- Loss of power and communication infrastructure
- Restricted access to facilities due to debris and damage to roadways Additional seismic risks will be further described in the CVWD LHMP.

8.8.7. Hazard Mitigation Plan

CVWD published its Hazard Mitigation Plan (**Appendix L**) to replace its existing ERP in order to meet the requirements of America's Water Infrastructure Act of 2018 (AWIA).

The Hazard Mitigation Plan provides CVWD staff with the necessary information, strategies, procedures, and mitigation actions to address earthquake emergencies. CVWD's Hazard Mitigation Plan policies are intended

to guide disaster management planners and emergency responders, and to provide a consistently high level of preparedness at all the facilities.

Per the Hazard Mitigation Plan, after a major earthquake, the Emergency Operations Center (EOC) will be activated if potential or significant damage has occurred in CVWD's service area, and the situation cannot be handled by routine public safety response or immediate mutual aid assistance. The General Manager shall assess the situation and establish the incident command post as necessary. In the event of an emergency, CVWD personnel will be required to inspect all water facilities for apparent signs of damage or abnormal conditions and conserve the existing water supply in the reservoirs from loss through water line breaks in the distribution system.

8.8.8. CVWD SEISMIC EVALUATION

As part of the LHMP preparation process, CVWD performed a seismic evaluation in 2020 involving seismological and geological investigations of the CVWD service area that was used to evaluate the susceptibility of the water system to damage following an earthquake. The purposes of the seismic evaluation were as follows:

- Determine the probability of damage to potable water structures and identify the expected functionality of essential features of the system after a major earthquake in the service area.
- Identify the amount of potable water structures located in high hazard areas (i.e., liquefaction zones, soft soils, landslide risk zones).
- Protect human life against earthquake hazard as it affects the existing water system.

Figure 8.8 and **Figure 8.7** show some of the results of the seismic evaluation regarding the potential for damage due to the impacts of a major earthquake event. The evaluation used the aftermath of the 1994 Northridge earthquake as a basis.

8.8.9. MITIGATION ACTIONS

Hazard mitigation may occur during any phase of a threat, emergency, or disaster. Mitigation can and may take place during the preparedness (before), response (during), and recovery (after) phases. The process of hazard mitigation involves evaluating a hazard's impact and identifying and implementing actions to minimize or eliminate the impact.

As part of the LHMP planning process and risk assessment, CVWD's Core Planning Team developed a mitigation action plan, consisting of pre-mitigation projects, to present how CVWD can reduce the risk and vulnerability of people, property, infrastructure, natural and cultural resources, and economic impacts to future disaster losses, including earthquake

events. Emphasis was placed on both existing and future development.

Pre-mitigation projects to mitigate earthquake events may include, but are not limited to, the following:

- New Portable Emergency Electrical Generators – four (4) new portable generators to be staged at Booster Pump Station sites to move water to higher elevations.
- New Seismic Sensors & Valve Actuators on Reservoir Inlet/Outlet Valves (4 sites) to close valve and save water.
- Emergency Preparedness Education Site and Water Refilling Station at Rosemont Reservoir.

Specific seismic mitigation actions/measures will be further described in the CVWD LHMP.

8.9. COMMUNICATION PROTOCOLS

CVWD's communication protocol includes the various channels that CVWD will utilize to convey critical messages regarding water shortage allocations and voluntary and mandatory actions. The goal of CVWD is to provide more public outreach to help increase awareness of water shortages. A strong communication strategy and a common understanding on the water supply situation and necessary actions between CVWD and its customers, the public, elected officials, and other key stakeholders are essential should the WSCP need to be activated. How the water shortage messages are addressed to the public are described in this communication protocol. The communication protocol will be in place prior to a water supply shortage and be initiated in Stage 2 Increased Voluntary Conservation. Activation of the communication protocol will continue through all subsequent water shortage stages. CVWD will ensure outreach efforts are reaching key audiences as needed.

It is important to communicate to its customers the following when urgent conservation is needed:

- Which shortage stage is being implemented;
- What response actions are triggered to save water;
- Why water needs to be saved; and
- What actions CVWD is taking to respond to the water supply situation.

8.9.1. COORDINATION

The goal of CVWD's outreach plans during dry periods and water shortages is to maintain effective coordination with key audiences. In order to maintain reliability in this communication, CVWD will work closely with the Board of Directors. During dry periods or other times of limited supply, the frequency and extent of coordination will increase to

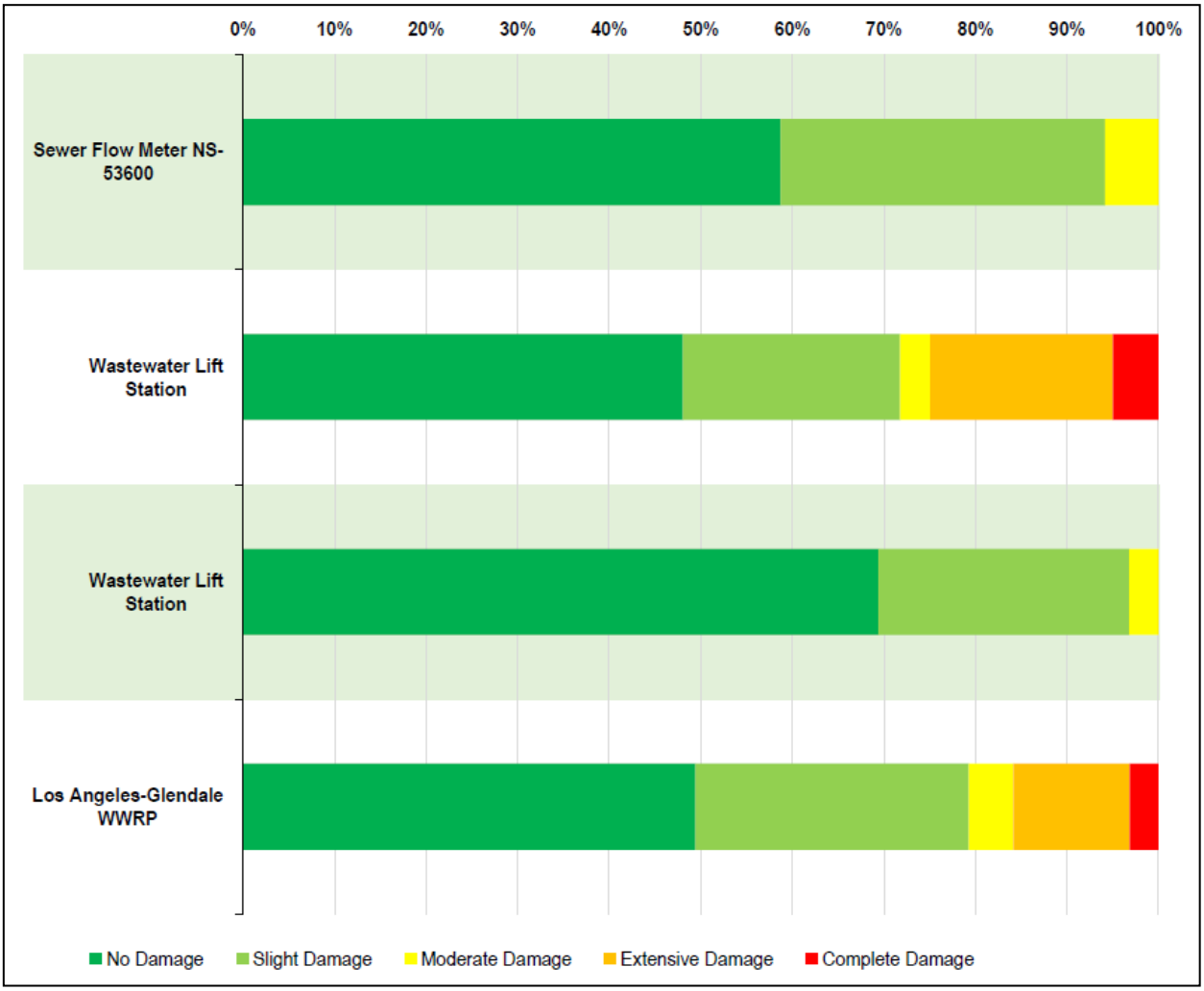


Figure 8.8: Probability of Damage to Facilities from a Magnitude 6.9 Event (2020 Seismic Evaluation)

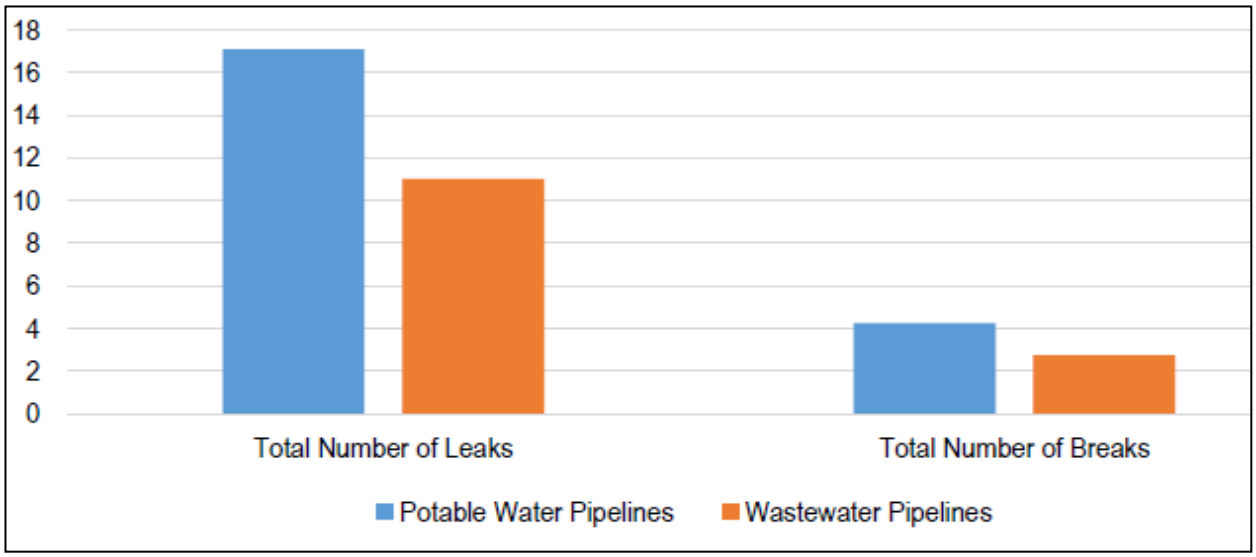


Figure 8.7: Pipeline Repairs Required after a Magnitude 6.9 Event (2020 Seismic Evaluation)

8.9.2. COMMUNICATION GOALS

Communication objectives during an existing or anticipated water shortage condition include the following:

- Motivate key audiences (i.e., customers) to increase conservation in following any voluntary or mandatory actions called for at the current stage of the WSCP.
- Raise awareness of the drought, regulations, or other conditions affecting water sources and supplies.
- Educate customers, key stakeholders, elected officials, and the general public about water supply reliability, water quality, and water delivery.
- Prepare customers for any potential escalation of the supply shortage stages.

8.9.3. COMMUNICATION PROTOCOL FOR CURRENT OR PREDICTED SHORTAGE

A current or predicted shortage, as determined by CVWD's Annual Assessment, will be addressed to the public and its customers upon submittal of the Annual Water Shortage Assessment Report to DWR by July 1 of every year. This notice may be conducted by CVWD's website, signage in front of the CVWD office, and wholesale agency coordination.

8.9.4. COMMUNICATION PROTOCOL FOR SHORTAGE RESPONSE ACTIONS TRIGGERED OR ANTICIPATED TO BE TRIGGERED

CVWD's customers and public will be notified about any triggered or anticipated to be triggered shortage response actions. CVWD monitors and measures the projected supply and demand for water by its customers monthly and recommends the stage of conservation required to the Board of Directors. After Stage 3, 4, 5 or 6 is declared, and at each regular board meeting, the Board of Directors will consider a report by the General Manager concerning the then current water supply status. The Board will change the stage designation as appropriate; however, unless it is an emergency, the Board will not impose mandatory measures without first conducting a duly-noticed public hearing pursuant to Water Code Sections 350 et seq., or 375 et seq. The appropriate stage of water conservation and the shortage response action triggered by the stage is then declared in a public notification posted on CVWD's website and published in a daily newspaper.

8.9.5. OTHER RELEVANT COMMUNICATION PROTOCOLS

To reduce water use consumption during any water shortage stage, CVWD will increase its public education and outreach efforts to build awareness of needed actions from the public. Moreover, CVWD will regularly revise its outreach campaign to reflect current supply conditions. Key communication strategies and

associated water shortage stage implementation are listed below:

- Promote available water assistance resources for vulnerable populations; specialized outreach for impacted industries (Stages 3 and 4).
- Keep stakeholders aware of conditions (all Stages).
- Proclaim stage change to key stakeholders and the general public (all Stages).
- Conduct meetings with elected officials and other key civic and business leaders (Stage 2).
- Encourage reduced optional outdoor use through outreach (Stages 3 and 4).

CVWD may implement these communication strategies through its newsletters, website, and social media platforms to reflect supply conditions. In addition, CVWD may conduct news briefings or other media outlets (i.e., TV, radio, newspapers) to announce changes in supply conditions.

8.9.6. CRISIS COMMUNICATION PROTOCOL

In the event of a catastrophic supply interruption due to a natural disaster or damage to CVWD's facilities, CVWD will implement communication procedures in accordance with local, regional, state, and federal emergency response guidelines as outlined in its Hazard Mitigation Plan. Depending upon the severity of the emergency and potential damage to CVWD's facilities, CVWD may determine that it is necessary to utilize the Standardized Emergency Management System (SEMS) response and the Incident Command System (ICS). Public information and crisis communication are an integral part of the ICS structure. National Incident Management System (NIMS), SEMS, and ICS have been integrated into the Hazard Mitigation Plan. It provides for a strategic response by all employees and assigns specific responsibilities in the event the plan is activated.

When an incident occurs, the General Manager (Emergency Response Manager), District Engineer (Emergency Operations Center Manager) and the Operations Manager (Field Crew Supervisor) will go to the designated EOC and begin implementation of CVWD procedures and employ appropriate strategies from the shortage stages in **Table 8.2.**

Crisis communication efforts will concentrate on providing information to the public and external audiences. Furthermore, outreach messaging will reflect emergency conditions and the need to focus on health and public safety. CVWD will keep the Board of Directors informed of incident status and coordinate with public health officials.

CVWD will maintain communication with FMWD and its customers. Situation status reporting will be conducted during each operational shift during an event. In addition, CVWD may also authorize release of public information to news media to announce conditions and explain needed action. Finally, CVWD will ensure ongoing coordination with emergency response services with daily advisories or alerts as needed.

8.10. COMPLIANCE AND ENFORCEMENT

The District will use all means at its disposal to communicate compliance with its WSCP, including, but not limited to:

- Direct mailings
- Billing messages
- Website posts
- Press releases
- Social media posts
- Newspaper advertisements
- Speaker groups
- Waste of water reporting

8.10.1. PENALTIES OR CHARGES

Any customer who violates provisions of CVWD's Water Conservation Plan Ordinance by either excess use of water or by specific violation of one or more of the applicable water use restrictions for a particular mandatory conservation stage may be cited by CVWD and may be subject to written notices, surcharges, fines, flow restrictions, service disconnection, and/or service termination, which are detailed in **Table 8.6**.

Table 8.6: Penalties and Charges

Penalties or Charges	Stage When Penalty Takes Effect
Written Notice (Warning)	First Violation (Any Phase)
Written Notice with Description of Penalties	Second Violation (Any Phase)
Flow restrictors (installation: $150, removal: $100) for a period of not less than 48 hours	Third Violation (Any Phase)
Flow restrictors (installation: $200, removal: $150) for a period of not less than one week OR Discontinuation of water service	Flagrant Disregard of ordinance or Multiple Violations (Any Phase)

For any violations subsequent to the second violation, if the penalty assessed is, or includes the installation of a flow-restrictor or the discontinuance of water service to the customer for any period of time, notice of the fact of the violation will be delivered 15 working days before the penalty is to be enacted, in the following manner:

- Personal delivery of written notice to the customer at their residence or place of business and obtain their signature of delivery.
- Return receipt delivery to customer at their residence or place of business.

All notices will contain, in addition to the facts of the violation, a statement of the possible penalties for the present violation for which the notice was written and each subsequent violation, a statement of the anticipated date of the penalty, if any, will be enacted for the present violation, and a statement informing the customer of the customer's right to a hearing on the violation.

8.10.2. APPEAL REGARDING VIOLATIONS

Any customer against whom a restriction or limitation is levied has the right to a hearing and a right to appeal to the Board of Directors. Written request from customer to the District must be received within 15 working days of the date of notification of the violation. Before the hearing can be scheduled, all existing plumbing fixtures in the structure must be retrofitted exclusively with water-conserving plumbing fixtures including low flush or high efficiency toilets, low flow showerheads, and aerators. A water audit will be used to verify installation.

Enactments of the appropriate penalty will be deferred until the appeal is resolved.

If the appeal decision is not in favor of the customer, the determined penalty will be enacted within 10 days after the customer is advised of the decision in writing through certified mail, return receipt requested.

8.11. LEGAL AUTHORITIES

Under California law, including CWC Chapter 3 (commencing with Section 350) of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the CVWD Board is authorized to implement the water shortage response actions outlined in this section. In all water shortage cases, shortage response actions to be implemented will be at the discretion of the CVWD Board and will be based on an assessment of the supply shortage, customer response, and need for demand reductions.

It is noted that upon proclamation by the Governor of a state of emergency under the California Emergency Services Act, Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code, based on drought conditions, the state will defer to implementation of locally adopted water shortage contingency plans to the extent practicable. CVWD will coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

8.11.1. FINANCIAL CONSEQUENCES OF WSCP IMPLEMENTATION

CVWD has established a target reserve of funds within its annual budget to address the issue of lost revenue during a water shortage or drought situation. CVWD has an established reserve level that includes a 25

percent rate stabilization fund, which can offset short-term loss of revenue. The total target reserve level consists of $1,000,000, 3 months of operations and maintenance costs (less the cost of imported water) and twenty-five percent (25%) of expected rate revenue.

In the case of a long-term water shortage or drought situation, CVWD has instituted a tiered rate structure on its customers to offset the loss of revenue that will occur. Such measures are listed in **Table 8.7** and **Table 8.8**.

Table 8.7: Proposed Measures to Overcome Revenue Impacts

Name of Measures
Reserve Funds
Rate Stabilization Fund
Rate Structure Adjustment

Table 8.8: Proposed Measures to Overcome Expenditure Impacts

Name of Measures
Obtain Alternative Sources of Funding
Defer Certain Expenditures

8.12. MONITORING AND REPORTING

Under normal water supply conditions, potable water production figures are recorded daily. Water Production totals are reported to the General Manager and the Management staff on a daily basis and monthly totals are incorporated into CVWD's Water Production Report.

During any declared water shortage emergency, the General Manager and the Management staff will compare the daily water production to a maximum water supply capacity and a targeted daily production to see if the reduction goals are being met. Those daily updates will be forwarded to CVWD's Board of Directors semi-monthly. Corrective action may be taken by the CVWD Board of Directors if reduction goals are not met.

During local water shortage emergencies due to a natural disaster, production figures will be monitored daily by the General Manager and the Management staff. Reports will be provided to the CVWD Board of Directors as necessary. Water use Monitoring Mechanisms are listed in **Table 8.9**.

Table 8.9: Water Use Monitoring Mechanisms

Mechanisms for Determining Actual Reductions	Type of Data Expected
Daily Records	Potable water production figures

8.12.1. SPECIAL WATER FEATURE DISTINCTION

As required under CWC 10632(b), water features that are not pools or spas must be analyzed and defined separately from pools and spas in the WSCP. Non-pool or non-spa water features may use recycled water, whereas, for health and safety considerations, pools and spas must use potable water. Although CVWD does not currently use recycled water and does not have the ability to use recycled water due to a lack of infrastructure, CVWD would use non-potable water for non-pool water features if and when recycled water supply ever becomes available to CVWD. Furthermore, the WSCP requires potable water recirculation for fountains and decorative water features.

8.13. WSCP ADOPTION AND REFINEMENT PROCEDURES

To encourage broad community participation in the WSCP preparation process, CVWD provided 60-day notification letters to agencies within CVWD's service area. Copies of the draft WSCP were made available for public review at the CVWD office prior to the public hearing. Shortly before the public hearing, a two-week and a one-week notice was published in the local press alerting the public of the public hearing. At a subsequent board meeting following the public hearing, CVWD's final WSCP was approved and adopted by its Board of Directors on May 26, 2026. **Appendix B** contains the Board resolution adopting the WSCP. The final plan was submitted to DWR within 30 days of Board adoption and includes all information necessary to meet the requirements of CWC Section 10632.

By July 1, 2026, CVWD's approved WSCP was filed with DWR. Also by July 1, 2026, CVWD's plan was submitted to the California State Library, County of Los Angeles, and cities within its service area. CVWD will make the plan available for public review no later than 30 days after filing with DWR.

8.13.1. WSCP REFINEMENT PROCEDURES

This section discusses the process for reviewing and updating the WSCP to ensure it remains actively used, relevant and appropriate to the community, and consistent with applicable state and local requirements. It is vital that CVWD's WSCP

remain up to date so as to best ensure shortage risk tolerance is adequate, appropriate water shortage mitigation strategies are implemented as needed, proper procedures for water efficient practices are in place for the community, and better alignment with long-term water use goals.

The CVWD Core Planning Team is responsible for maintaining this plan and updating it as needed. The Director of Engineering and the Regulatory and Public Affairs Manager are the primary CVWD staff members who will carry out this process, under the direction of the General Manager or other appropriate staff member.

The General Manager, or their designee, will serve as the WSCP project manager and will coordinate maintenance of the plan, conduct the formal review process, and direct the plan updates. The project manager will assign tasks, which may include collecting data, developing new or updated water shortage mitigation measures, updating sections of the plan, and presenting the plan to others.

9

Section 9: Conservation Measures

Conservation measures are an essential part of the District's policies.

9.1. OVERVIEW

As a result of diminished existing supplies and difficulty in developing new supplies, water conservation is important to Southern California's sustainability. In Water Year 2018- 2019, Governor Brown signed SB 606 and AB 1668 into law. The legislation required DWR, the State Water Resources Control Board (SWRCB), and three other state agencies to develop a long-term water conservation framework to "make conservation a California way of life." In order to conform to the Water Action Plan, including meeting the SBx7-7 target (20 percent by 2020), many water agencies had to re-examine traditional conservation programs.

The District acknowledges that efficient water use is the foundation of its current and future water planning and operations policies. The District implements water conservation through a combination of programs, resources, and policies, and prioritizes efforts and programs that are cost-effective for its operation. To assist the District with updating its water conservation policies to State standards, in 2012 the District became a signatory to the California Urban Water Conservation Council (CUWCC) by signing the Memorandum of Understanding Regarding Urban Water Conservation (MOU), originally drafted in 1991. In January 2018, the CUWCC became the California Water Efficiency Partnership (CalWEP). CalWEP is a quasi-governmental

agency that works in conjunction with the Department of Water Resources (DWR) to promote water conservation through "Best Management Practices" (BMPs), which were defined roughly as policies, programs, practices, rules, regulations, or ordinances that resulted in a more efficient use or conservation of water.

The main purpose of CalWEP is to assist its member agencies with public policy, research, and education tools. Regarding the UWMPs, CalWEP works with DWR to help form conservation policies contained in the UWMPs. In previous UWMPs, BMPs were equivalent to the fourteen (14) Demand Management Measures (DMMs) defined in the UWMP Act. As of the 2015 UWMPs, DWR streamlined the fourteen (14) DMMs into six (6) generalized categories, with an additional seventh (7^{th}) optional category.

9.2. DWR DMMs FOR 2025 UWMPs

The 2025 UWMP Guidebook contains the same DMM categories for the 2025 UWMPs. The DMMs are intended to reduce long-term urban demands from what they would have been without their implementation. The DMMs are in addition to programs which may be instituted during occasional water supply shortages.

i. Water Waste Prevention Ordinances

ii. Metering

iii. Conservation Pricing

iv. Public Education & Outreach

v. Programs to Assess and Manage Distribution System Real Loss

vi. Water Conservation Program Coordination and Staffing Support

vii. Other Demand Management Measures that have a significant impact on water use

As with previous UWMPs, agencies that are members of CalWEP can submit the BMP annual reports in lieu of providing a description of each DMM in the UWMP.

9.3. CalWEP BMPs

An active member of the CalWEP is one that signs the MOU and implements the water conservation measures stipulated by the CalWEP. According to CalWEP, an agency "implements" a conservation measure by achieving *and* maintaining the level of

CALIFORNIA WATER EFFICIENCY PARTNERSHIP
A Chapter of the Alliance *for* Water Efficiency

Figure 9.1 CUWCC became CalWEP in January 2018

Figure 9.2 Agricultural Fallowing Helps Conserve Water in the Palo Verde Valley

activity called for in each BMP's definition as described in the MOU. This requires a minimum level of staffing and funding efforts. To document the implementation, an agency is required to submit annual BMP reports to CalWEP that document the implementation of each BMP.

The District is currently a member of CalWEP and is currently implementing BMP reporting and implementation requirements as described in this Section.

9.3.1. 2025 Updates to CalWEP BMPs

The CalWEP BMPs remain the same for the 2025 UWMPs. The CalWEP BMPs are broad measures aimed at reducing water use either directly or indirectly. **Figure 9.3** provides a comparison of the DWR and CalWEP conservation measures. As shown in the figure, there are two (2) distinct categories of conservation measures (rebates & services). The services category (highlighted in blue and green in **Figure 9.3**), includes conservation measures that are currently active in the District.

9.4. DISTRICT CONSERVATION MEASURES

Water conservation is an integral part of the District's water policies. The District, in conjunction with FMWD and MWD, plays an active role in promoting water use efficiency

in its service area. To this end, the District established Water Conservation Program (Phase I), which was adopted by the Board of Directors in April 2015 as Resolution No. 682, originally adopted in 2009. On May 2017, the District amended Resolution No. 681, which adopted a water conservation alert system. To this day, the District is continuously working with FMWD and MWD towards implementing the BMPs through means of various conservation measures. **Table 9.1** provides a status overview of the District's Conservation Measures.

Table 9.1: Conservation Measures

BMP	Description
BMP 1: Utility Operations	*Deals with water waste prohibitions, water efficiency ordinances, metering, conservation pricing, and other items related to managing water use.*
BMP 2: Public Education & Outreach	*Deals with outreach efforts including emails, newsletters, advertisements, presentations, promotions, etc. related to outreach & education.*
BMP 3: Residential Programs	*Deals with showerheads, faucets, toilets, turf removal, and leak detection surveys related to residential water use.*
BMP 4: Landscape Programs	*Deals with toilets, urinals, steamers, cooling towers, food/restaurant equipment, medical equipment, and items related to commercial, institutional, and industrial water use.*
BMP 5: Commercial, Industrial, & Institutional Programs	*Deals with establishing parameters for large landscapes, including measurements, budgets, audits, prohibitions, incentives, etc., related to large landscapes.*
Other	Any additional BMPs supported by District are listed on the following pages.

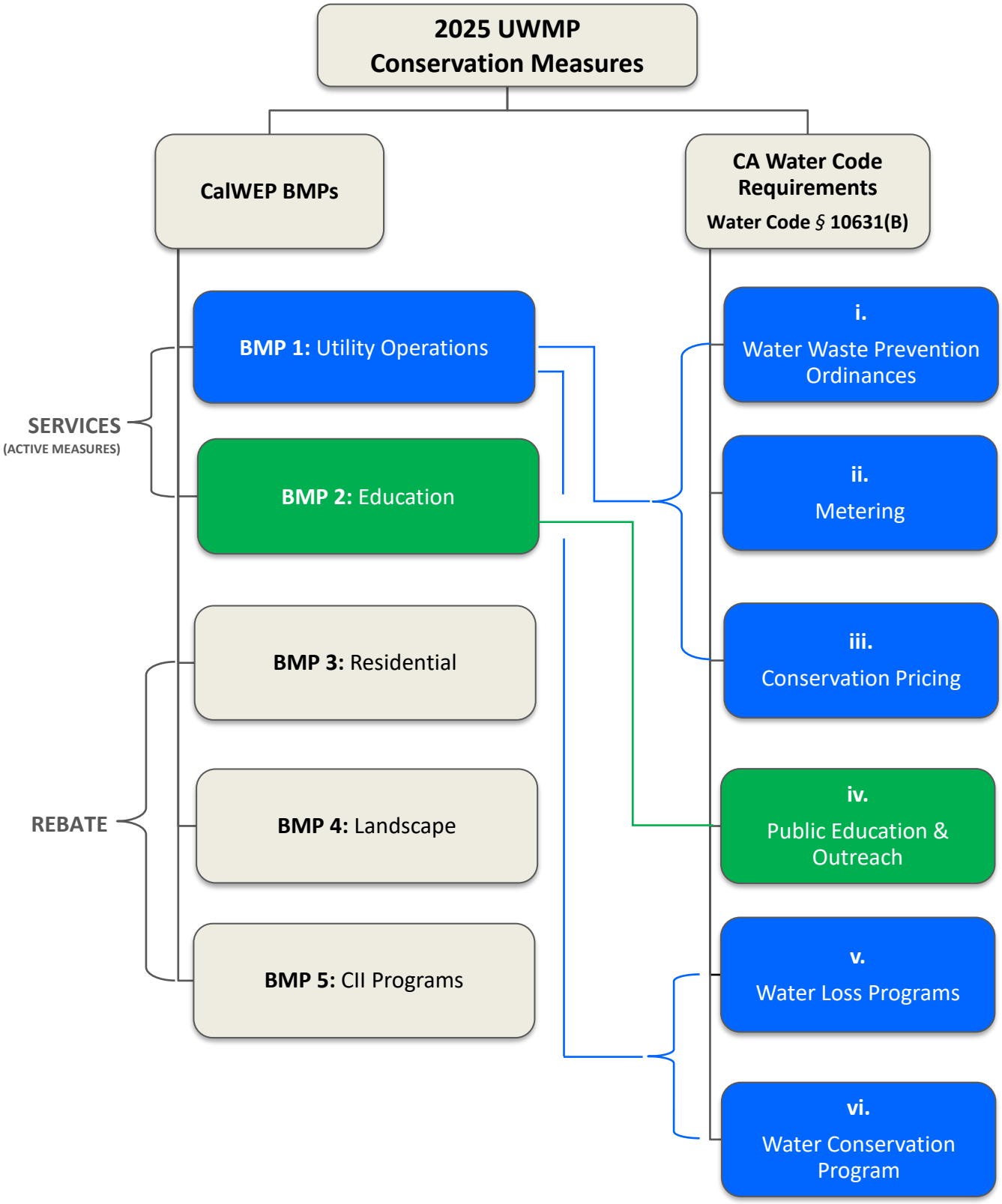


Figure 9.3 Conservation Measures for 2025 UWMPs: CalWEP and DWR Compared

9.4.1. DMM No. 1: Water Waste Prevention

This BMP deals with water waste prohibitions, water efficiency ordinances, metering, conservation pricing, and other items related to managing water use.

The District adopted Water Conservation Alert System (Resolution No. 681) and Water Conservation Program (Phase I) (Resolution No. 682) as water conservation ordinances.

Figure 9.4 Water Waste is Prohibited by District Ordinance

Water Conservation Alert System – The Water Conservation Alert System has been amended as a Phase II of the goal to reduce the risk and severity of water shortages and to notify its customers of the current conservation stage. The stages are color coded and described in **Table 9.2**.

Link to the District's ordinances found here:

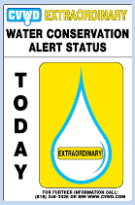
www.cvwd.com/ordinances

Water Conservation Program (Phase I) – The Water Conservation Program (Phase I) was amended in April 2015 stating waste water prohibitions to its customers. The prohibitions apply to the following:

- Water hose usage
- Leaks
- Windy and rainy days
- Construction water restrictions
- Hotels/Motels
- Prohibiting outdoor watering during or 48 hours following a rain event
- Overspray and Runoff
- Irrigation Times
- Vehicle Washing
- Fire hydrants
- Reporting of waste water
- New Development
- Fountains
- Hand Watering
- Swimming pools
- Drinking water
- Pre-rinse spray valve

The District Rules and Regulations contain a Water Waste Prohibition Policy allowing termination of water service to customers who do not comply with a notice to remedy their wasteful practice. Additionally, the Rules and Regulations contain a leak repair policy whereby a financial incentive (one-time bill adjustment) is provided for customers who promptly fix internal/external plumbing leaks. The aforementioned sections of the Rules & Regulations are included in **Appendix N**.

Table 9.2: Water Conservation Alert System Codes

Alert Sign	Code	Description (as mentioned in Res. No. 681)
	Blue	Color Code "Blue" is defined as the Standard Water Conservation Alert, FMWD can meet all Member Agency demands. Standard water conservation applies as defined in **Appendix N**: CVWD Water Conservation Program. **Currently, the District has issued this alert as its current conservation status.**
	Green	Color Code "Green" is defined as an Increased Water Conservation Alert, some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.
	Yellow	Color Code "Yellow" is defined as an Extraordinary Water Conservation Alert, when MWD is pulling water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three (3) days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday.
	Orange	Color Code "Orange" is defined as an Allocation Water Conservation Alert, when MWD has implemented its allocation plan to its member agencies. Customers are requested to minimize indoor water use and severely limit outdoor water use as further detailed in **Appendix N**: CVWD Water Conservation Program.
	Red	Color Code "Red" is defined as a Critical Water Conservation Alert, when water supplies are drastically reduced. Customers are requested to minimize indoor water use and water outdoors no more than one (1) day per week.
	Purple	Color Code "Purple" is defined as an Emergency Water Conservation Alert, when water supplies are only available for health and safety needs. Customers are requested to minimize indoor water use and curtail all outdoor water use.

The District staff works cooperatively with property owners to reduce water waste. The District's billing software automatically flags high usage thresholds from meter reading data for additional staff follow-up. Also, the District's field staff reports all visible water waste situations observed to Customer Service for additional follow-up by the District's staff.

The District has an ongoing leak detection program with a database of all recent leaks within the distribution system. The location, size, length, installation date, material, and pressure are recorded and continuously accessible to District staff.. The District has not conducted an evaluation of the water savings attributable to this BMP.

9.4.2. DMM No. 2: Metering

As of July 1, 2025, all District water accounts are metered and billed monthly based on commodity rates. The District has a commodity rate structure based upon a billing unit of 1,000 gallons, commonly stated as a unit. The water rate structure is a three-tier increasing block rate. A summary of the water rates is shown in **Table 9.3** and on the District's website:

www.cvwd.com/water-rates

The District began working on the Water Meter Replacement Program in 2012 to replace 3/4" & 1" water meters that were beyond their useful life with new "Smart Meters". The plan was to replace 4,000 meters from FY 12/13 to FY 15/16. The District's field crews completed this task and continue to replace meters. To date, approximately 7,000 meters have been replaced.

The District is currently applying for grants to fund replacement of the lager sized water meters.

The "Smart Meter" that the District chose to replace the older meters with was the Sensus iPERL meter. The iPERL meter offers low flow accuracy with high flow durability. The innovative magnetic technology allows for the capture of previously unmeasured low flow and drives additional revenue for the utility. The meter is one hundred percent (100%) lead-free with no moving parts and maintains its accuracy over a 20-year lifetime. The iPERL has Advance Metering Infrastructure (AMI) connectivity and 14 conditions. Diagnostic and lifetime alarms allow for quick resolution to issues experienced in the field.

Figure 9.5 Water Meter with AMI Technology

In August 2020, the District awarded a consulting contract to UtiliWorks Consulting, Inc. (UtiliWorks) to provide professional services in assisting the District for the procurement and installation of the AMI Communications Network as the next phase towards District having a fully function AMI system.

The District used in-house crews from October 2024 to May 2025 to connect 90%+ of meters to AMI.

9.4.3. DMM No. 3: Conservation Pricing

All of the District's utility water accounts are metered and billed monthly based on commodity rates. The District has a commodity rate structure based upon a billing unit of 1,000 gallons, commonly abbreviated as a unit.

The District does not have a way of measuring wastewater directly from a residential unit to the sewer, so to get a reasonable estimate of the amount of flow for wastewater, the District bases it on a customer's average water use during the winter months (December through March). Most water during the winter is used indoors and goes into the sewer system. Typically, outdoor irrigation is minimal during the winter months.

The District calculates customer monthly wastewater charges based on the previous year average winter-time water use (i.e., 2021 wastewater charge will be based on December 2019 to March 2020 average winter-time water use) and it will remain in effect for a full year (from July 2021 to June 2022). In July of each year, customer monthly wastewater charges will be recalculated based on the previous year average winter water use.

The previous rate structure was implemented in the 2016/2017 fiscal year and was developed as part of a cost-of-service study and reflects the cost of providing wastewater service to individual residences. Effective July 1, 2025, wastewater is now charged per person, as shown in **Table 9.3.**

The District offers a Low-Income Program to qualifying residents where a twenty-five percent (25%) discount on a combined bill for water (up to 26 units), wastewater and/or wastewater standby charges. This program may be modified or terminated

without prior notice and is provided to qualified customers on a first-come, first-served basis until the program funds are no longer available.

The District has not conducted an evaluation of the water savings attributable to this BMP; however, the District will continue to make customers aware of the rate structure and use it as a tool to affect water conservation.

Since the 2020 UWMP, the District has increased its rates towards efforts of water conservation. **Table 9.3** provides a summary of the District's current water and sewer rate structures. **Table 9.4** provides a summary of the rates stated in the 2020 UWMP for comparison.

Table 9.3 Current Water & Sewer Rates (as of 7/1/2024)

Sector	Water		Sewer	
	Rate Structure	Rate	Rate Structure	Rate
Single-Family	Tier 1: 0 – 10 Units	$5.96/Unit	--	Bi-Monthly: $47.79 $1.93/Unit
	Tier 2: 11 – 26 Units	$11.09/Unit		
	Tier 3: 27+ Units	$15.63/Unit		
Multi-Family	>0 Units	$9.45/Unit	--	Bi-Monthly: $31.25 $2.15/Unit
Commercial / Institutional	>0 Units	$9.45/Unit	Customer Charge	Bi-Monthly: $0
			Quantity Charge per 1,000 gal of water use	Bi-Monthly: $5.10
			Minimum Charge for Each User	Bi-Monthly: $31.25
Schools	Elementary Schools	$9.45/Unit	Elementary Schools	$84.86 per 100 ADA[1]
	Middle Schools	$9.45/Unit	Middle Schools	$169.73 per 100 ADA
	High Schools	$9.45/Unit	High Schools	$254.59 per 100 ADA Customer Charge: $31.25
Irrigation	Tier 1: 0 – 80 Units	$6.30/Unit	Not Applicable	Not Applicable
	Tier 2: 81+ Units	$11.88/Unit		

[1] ADA = Average Daily Attendance
[2] Unit = 1,000 gallons (1 kGal)

Table 9.4 Past Water & Sewer Rates in 2020 UWMP (as of 09/01/2019)

Sector	Water		Sewer	
	Rate Structure	Rate	Rate Structure	Rate
Single-Family	Tier 1: 0 – 10 Units	$5.17/Unit	--	Bi-Monthly: $47.79 $1.93/Unit
	Tier 2: 11 – 26 Units	$8.14/Unit		
	Tier 3: 27+ Units	$12.27/Unit		
Multi-Family	>0 Units	$7.33/Unit	--	Bi-Monthly: $31.25 $2.15/Unit
Commercial / Institutional	>0 Units	$7.33/Unit	Customer Charge	Bi-Monthly: $0
			Quantity Charge per 1,000 gal of water use	Bi-Monthly: $5.10
			Minimum Charge for Each User	Bi-Monthly: $31.25
Schools	Elementary Schools	7.33	Elementary Schools	$84.86 per 100 ADA[1]
	Middle Schools	7.33	Middle Schools	$169.73 per 100 ADA
	High Schools	7.33	High Schools	$254.59 per 100 ADA Customer Charge: $31.25
Irrigation	Tier 1: 0 – 80 Units	$5.66/Unit	Not Applicable	Not Applicable
	Tier 2: 81+ Units	$10.89/Unit		

[1] ADA = Average Daily Attendance
[2] Unit = 1,000 gallons (1 kGal)

9.4.4. DMM No. 4: Public Education & Outreach

This BMP deals with outreach efforts including emails, newsletters, advertisements, presentations, promotions, etc., related to outreach & education.

- **School Programs -** All of the District's public schools within the District's service area fall under the Glendale Unified School District (GUSD). The District has been working with GWP to maintain a strong commitment to support educational excellence in the GUSD. With this in mind, GWP provides "LivingWise," a water and energy classroom program to sixth grade students in both public and private schools.

The program was created by a group of teachers for the National Energy Foundation. It is a comprehensive set of 17 hands-on learning activities that use science and other core subjects so that "LivingWise" means being "water wise," "energy wise", and making "wise decisions" to protect the environment.

Each teacher and student receives a LivingWise 86-page workbook and a kit filled with such items as low-flow showerheads, kitchen faucet aerators and toilet leak

detection tablets as well as an energy efficient nightlight, a fluorescent light bulb and a CD-Rom computer disk with a "conservation entertainment experience." Because many of the lessons require the students to complete an activity at home, parents and other family members learn conservation practices right along with their students. At the end of the program, the students practice what they have learned by installing the water and energy saving kit items in their homes.

In addition to Glendale's program, the District had previously sponsored school assemblies from "Shows that Teach" and "Mad Science" for both public and private schools. Both assemblies offered different interactive lessons that always included water conservation and were geared towards the water cycle, water runoff, water quality, and water supplies and distribution systems. Each elementary school in the District's service area was invited to participate every year. However, these assemblies have not taken place in the past 2-3 years.

FMWD also offers volunteering opportunities, called Foothill Water Conservation Corps, to assist in water conservation and education outreach. These volunteers participate in presentations for water conservation at clubs or events, setting up and manning booths at fairs and other community functions. Not only does this aid in spreading awareness but provides incentives for students to earn community service hours at a professional setting.

The District provides water conservation literature, brochures, posters, landscape advice and tips, home water conservation devices etc., directly to the public and its customers. These materials are available at the district's Administrative Office and during special events. In addition, the District posts online classes and other information on its social media platforms. The District also maintains a library of water resource education conservation films and videos for loan to local organizations. MWD will also provide speakers to various groups upon request.

Currently, the District does not directly measure the effectiveness of this conservation measure. In general, however, more public awareness and education programs give customers increased knowledge of water conservation opportunities. Implementation of this conservation measure is expected to help the District achieve its water use targets by educating water users about the importance of improving water use efficiency and avoiding water waste.

9.4.6. DMM No. 5: Programs to Assess and Manage Distribution System Real Loss

The District monitors water loss in its distribution system on an annual basis. It is the District's highest priority to repair all known distribution system and service connection leaks immediately. In the past five years, non-revenue water averaged 8.5 percent.

A significant portion of non-revenue water could be attributed to meter inaccuracy. As previously mentioned, the District embarked on a meter replacement program from mid-June 2012 through the end of 2021 to replace its meters installed with AMIs. The District was under contract with Aqua-Metric for the procurement and installation of the AMI Communication Network.

Distribution system leaks are the most-likely culprit for loss of water. The District has and will be continuing on its water main replacement program and is planning on a 20-year schedule to replace its deficient pipelines. The District prioritized its pipe replacement program by leak history, pipe size, fire-flow rates, and age. The District will be working on an updated water master plan, which will further address deficiencies in the system within the next few years.

The District has not developed a formal methodology to estimate the water savings attributable to this BMP. There are, however, real water savings as a result of the proactive pre- screening leak detection and repair programs, and the completion of the AMI program, which maintain an acceptable non-revenue water loss of 8 percent.

9.4.7. DMM No. 6: Water Conservation Program Coordination and Staffing Support

As a small District, conservation activities are typically a part-time effort. While the District Water Resources & External Affairs Specialist and the Regulatory Program Manager take the lead on conservation activities, District water staff assists with conservation efforts. Typical water conservation coordination duties include answering questions of the public, coordinating with State and local agencies, and providing information to customers on water conservation. Collectively, the District water staff provides the following services:

- Planning conservation policy
- Implementing conservation policy
- Interaction with the District Manager, Board, and State agencies

The District keeps up-to-date on Federal and State to requirements to develop new conservation policies for its service area. New conservation policies are enacted only if required or if they result in a substantial benefit to the District. The associated costs are approximately $1,000 per month.

9.4.8. DMM No. 7: Other Conservation Measures

In addition to the six (6) DMMs described, the District participates in programs that assist residential buildings, commercial, industrial, and institutional buildings (also known as CII properties), and large landscapes. These three (3) programs are described in the following Sections:

9.4.9. DMM No. 7a: Residential Programs

Water Survey Assistance – the District offers formal water audits for qualified residents (those using over 22 units of water per billing period). There is a budget limit of $6,000 per year which covers 35 audits. The service is performed by a contractor, WaterWise Consulting.

Figure 9.6 Residential Water Survey

In addition to water audits, customers now get AMI leak notifications directly via email and the District's customer service staff respond to residential and commercial requests for investigation of high-water bills. The investigation consists of meter leak tests, meter accuracy testing, property leak checks, irrigation system analysis, or a complete "on-premises" water audit. A water bill adjustment is given to all customers who demonstrate that they have repaired an on-site leak along with proof of the repair. This appears to be an effective water conservation measure which potential savings are outlined on the audit forms.

In addition, the District's utility billing software identifies customers who exceed a higher-than- normal usage threshold in a given billing period, which prompts staff to further investigate as described. Staff costs for this included measure are part of customer service duties.

The District also participates in various FMWD/MWD programs aimed at increasing landscape water use efficiency for residential customers, including rebate programs that provide financial incentives. SoCal Water$mart, formerly Save Water Save A Buck, is the conservation rebate program offered through MWD. The program offers rebates for high- efficiency clothes washers (HEWC), premium high-efficiency toilets (PHET), weather- based irrigation controllers (WBIC), soil moisture sensor system (SMSS), rotating sprinkler nozzles, rain barrels/cisterns, and turf removal, as described.

- **Weather-Based Irrigation Controllers Program** – This program, previously called the "Smart Timer Rebate Program," started in FY 2004/05. Under this regional program, residential and small commercial properties are eligible for a rebate when they purchase and install a weather-based irrigation controller, which has the potential to save 13,500 gallons a year per residence. Rebates start at $80 per controller for landscapes less than 1 acre in area and $35 per station for more than 1 acre.

- **Rotating Nozzle Rebate Program** – This rebate program started in 2007 and is offered to both residential and commercial customers. Through this program, site owners will purchase and install rotary nozzles, which can use up to twenty percent (20%) less water than conventional fan spray nozzles, in existing irrigation systems. These sprinklers reduce runoff onto sidewalks and into local storm drain system and provide uniform water distribution onto the landscape. MWD offers $2 per nozzle with a minimum of 30 nozzles.

- **Rain Barrels & Cisterns Program** – Residential and commercial customers can receive rebates for installing rain barrels and/or cisterns to collect rainwater for re-use for watering their landscapes. Customers may receive rebates starting at $35 per barrel or $250-$350 per cistern. The barrels and cisterns must adhere to specified design guidelines. For the past seven years, the District participated in a Rain Barrel and Drought-Tolerant Landscape Event that took place at Descanso Gardens (La Cañada Flintridge, CA). the District co-sponsored the event along with FMWD and the Cities of Burbank, Glendale, Pasadena, and South Pasadena. As a result of the event, over 1,000 rain barrels were purchased by local residents.

- **Soil Moisture Sensor System Program**. For large residential sites, a soil moisture sensor, which measures soil moisture content in the active root zone, can be installed to receive rebates starting at $80 or $35 per SMSS. The sensor must be connected to a compatible irrigation system controller.

- **Turf Removal Program** – Through this program, residential and small commercial customers of participating retail water agencies are eligible to receive a minimum of $2 per square foot of turf removed for qualifying projects.

- **Residential Plumbing Retrofit** -The District participates in the distribution of low-flow showerheads, aerators, hose shut-off nozzles, water buckets, and toilet-tank leak detection kits at its customer service counter and various local outdoor events. Assuming each device saves 3 gallons per day, approximately 3.4 AF are saved annually.

The District also works with the local

building/planning departments of the City of La Cañada- Flintridge, City of Glendale, and County of Los Angeles to assure enforcement of the ultra- low-flush toilet (ULFT) installation requirements for new construction, and supports the prohibition of the sale of toilets using more than 1.1 gallons per flush (gpf). Developers' needs for fire-flow certificates, "will-serve" certificates, and ultimately water service connections are used as ways to ensure compliance.

Another program offered by MWD offered rebates for HETs (1.28 gpf) for both residential and CII customers. Starting November 11, 2015, rebates are only eligible for Premium HETs (1.1 gpf or less) and no longer available for HETs at 1.28 gpf.

- **High-Efficiency Washing Machine Rebates -** Starting in 2002, the District passed along MWD's high efficiency washing machine rebate. The District promotes the program on its website and with flyers posted at the administration office and distributed at local events.

Residents in the District's service area are eligible to receive a $85 rebate when they purchase a new HEWC as the District supplements MWD's rebate. Rebates are available on a first-come, first- served basis, while funds last. To qualify for a rebate, the HECW must have a water factor of 4.0 or less. An HECW with a water factor of 4.0 will use approximately 14 gallons of water per load compared to a conventional top-loading clothes washer which can use 40 gallons or more per load. Depending on use, these machines can save 10,000 gallons of water per year. Participants are encouraged to contact their local gas and/or electric utility as additional rebates may be available.

Figure 9.7 High-Efficient Washing Machines

9.4.10. DMM No. 7b: Programs for CII Properties

The District has a relatively small number of commercial accounts and no industrial accounts. The vast majority of businesses within the District do serve as small mom and pop shops or local restaurants. The District currently offers financial incentives under MWD's SoCal Water$mart Program, which offers rebates for various water efficient devices to some CII customers.

SoCal Water$mart – MWD launched this program on July 1, 2008 and offers rebates to assist CII customers in replacing high-flow

plumbing fixtures with low-flow fixtures. Rebates are available only on those devices listed in **Table 9.5** and must replace higher water use devices. Installation of devices is the responsibility of each participant. Participants may purchase and install as many of the water saving devices as are applicable to their site.

The District also provided a list of restaurants to MWD for retrofit of a pre-rinse spray valve. Due to very limited number of CII customers, the District has no formal plans to initiate an active CII replacement program beyond the programs offered by MWD.

Table 9.5: CII Retrofit Devices & Rebate Amounts under SoCal Water$mart Program

Retrofit Device	Rebate Amount
High Efficiency Toilet	$40
Ultra-Low & Zero Water Urinal	$200
Connectionless Food Steamers	$485 per compartment
Air-Cooled Ice Machines	$1,000
Cooling Tower Conductivity Controller	$625
pH / Conductivity Controller	$1,750
Dry Vacuum Pumps	$125 per 0.5 HP
Weather Based Irrigation Controller and Computer Irrigation Controller	$35 per station and $80 per controller
Rotating Nozzles for Pop-up Spray Head Retrofits	$2 (minimum of 30 per rebate)

9.4.11. DMM No. 7c: Large Landscape Programs

The District supports large landscape conservation through FMWD/MWD's regional programs including:

SoCal Water$mart Program – The District, through FMWD/MWD, offered rebates through SoCal Water$mart program for landscape plumbing retrofitting. Landscape rebates are available for WBIC, SMSS, rotating sprinkler nozzles, and turf removal. The available landscape programs are listed:

- Weather-Based Irrigation Controllers Program (WBIC)
- Rotating Nozzle Rebate Program
- Rain Barrels & Cisterns Program
- Soil Moisture Sensor System Program (SMSS)
- Turf Removal Program

California Friendly Landscape Training – On behalf of its member agencies, FMWD supports MWD's California Friendly Landscape and Gardening Training, which provides education to residential homeowners and professional landscape contractors on a variety of landscape water use efficiency practices. These classes are hosted by MWD's member agencies to encourage participation across the county. The Professional Training Program course consists of four consecutive classes in landscape water management, each building upon principles presented in the preceding class. Each participant receives a bound handbook containing educational materials for each class. These classes are offered throughout the year and taught in both English and Spanish languages.

In addition, the District takes advantage of regional and local efforts which target and market to large landscape properties using bill inserts and direct marketing efforts. The District also sponsors three or more independent water efficient gardening classes per year. Topics include turf removal, design, placement, irrigation, plant selection, composting, gardening with worms, and efficient watering practices.

The California Irrigation Management Information System (CIMIS) provides real time weather information to assist in irrigation scheduling (including ETo). Although CIMIS was initially designed to help agricultural growers and turf managers develop water budgets for determining when to irrigate and how much water to apply, the user base has expanded over the years.

Figure 9.8 CIMIS Stations Measure Rainfall and ETo

In addition to those mentioned, current CIMIS data users include local water agencies, fire fighters, air control board, pest control managers, etc. These stations can provide evapotranspiration (ETo) information for the purpose of developing landscape water budgets and irrigation scheduling.

9.5. CONTINUED IMPLEMENTATION

As described in **Section 6.8.4**, the District's per capita water use in 2025 was 116.1 GPCD, which demonstrates that the **District continues to meet its 2020 urban water use target** of 142 GPCD. Although the District has met its target year water use, the District plans to continue its conservation efforts described herein for at least the next five (5) years. The District will continue to track all

program activities. Program effectiveness and per capita water use will be monitored through the billing system. For example, the District can measure impacts of infrastructure, repairs, and replacements, including leaking mains, by comparing apparent water losses from the previous month. For this reason, the District will continue to develop its AMI system as a tool to measure effectiveness of all the DMMs.

WEST&ASSOCIATES
ENGINEERING, INC.

APPENDICES A – M

WEST&ASSOCIATES
ENGINEERING, INC.

Appendix A: Board Resolution Adopting 2025 UWMP

Crescenta Valley Water District 2025 Urban Water Management Plan

RESOLUTION NO. 804

A RESOLUTION OF THE CRESCENTA VALLEY WATER DISTRICT TO ADOPT THE URBAN WATER MANAGEMENT PLAN

The Board of Directors of the Crescenta Valley Water District does hereby resolve as follows:

WHEREAS, the California Legislature enacted Assembly Bill 797 (Water Code Section 10610 et seq,, known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended, subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

WHEREAS, the District is an urban supplier of water providing water to over 3,000 customers; and

WHEREAS, the Plan shall be periodically reviewed at least once every five years, and that the District shall make any amendments or changes to its plan which are indicated by the review; and

WHEREAS, the Plan must be adopted by July 1, 2026, after public review and hearing, and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS, in accordance with applicable law, including Water Code section 10642, and Government Code section 6066, a Notice of a Public Hearing regarding the District's Plan was published within the jurisdiction of the District on May 7, 2026 and May 14, 2026; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on May 26, 2026 at 7:00 PM, or soon thereafter, at the CVWD Administration Office, 2700 Foothill Blvd, La Crescenta, CA 91214 in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the Plan and issues related thereto; and

WHEREAS, pursuant to said public hearing on the District's Plan, the District, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within the District's service area with regard to the Plan, and encouraged community input regarding the District's Plan; and

WHEREAS, the Crescenta Valley Water District did prepare and shall file said Plan with the California Department of Water Resources following its adoption.

RESOLVED, the District hereby adopts said Urban Water Management Plan.

PASSED AND ADOPTED at a Regular Meeting of the Board of Directors of Crescenta Valley Water District held on May 26, 2026. Resolution No. 804 was adopted by the following vote:

AYES:	**Director Bodnar** **Director Erickson** **Director Johnson** **Director Valdez**
NOES:	
ABSENT:	**Director Raghavachary**

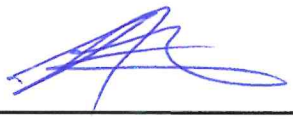
ATTEST:

President, Board of Directors
Crescenta Valley Water District

Secretary of the Board of Directors

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, Arturo Montes, Secretary of the Crescenta Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 804 of the Board of Directors of Crescenta Valley Water District adopted at a Regular Meeting held on May 26, 2026 and that the same has not been amended or repealed.



Secretary of the Board of Directors of
Crescenta Valley Water District

DATED: May 26, 2026

(S E A L)

Appendix B: Board Resolution Adopting 2025 WSCP

Crescenta Valley Water District 2025 Urban Water Management Plan

RESOLUTION NO. 803

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESCENTA VALLEY WATER DISTRICT ADOPTING A WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the Crescenta Valley Water District was established for the purpose of providing adequate and reliable potable water to its inhabitants at a reasonable cost; and

WHEREAS, the groundwater supply in the Verdugo Basin is utilized as the primary source of water for District customers; and

WHEREAS, consecutive years of below normal precipitation in the watersheds of the Verdugo Basin can severely reduce the groundwater production capacity in the Verdugo Basin and hence the water supply available to the District; and

WHEREAS, the District's imported water supply connections with the Foothill Municipal Water District, which provides a supplemental source of water for District customers, are limited in size and capacity and are being subjected to increased demands; and

WHEREAS, the District's imported water supply may be subject to a reduced water allotment from the Foothill Municipal Water District should the Metropolitan Water District of Southern California put into effect their approved allocation plan; and

WHEREAS, conservation of water by District customers will help relieve the problems caused by the shortage in supply and the increase in energy costs; and

WHEREAS, the District, through its public information program, should advise and alert its customers to the serious nature of any drought situation and the need for a reduction in demand by customers; and

WHEREAS, the Water Shortage Contingency Plan which is required for inclusion in a Department of Water Resources (DWR) compliant 2025 UWMP; and

WHEREAS, based on the DWR requirements included in the DWR 2025 UWMP Guidebook, describes water supply shortage condition caused by drought or loss of water supply wells, the Board of Directors of the Crescenta Valley Water District hereby approves a six (6) level WSCP that enables the Board of Directors to declare that a water shortage condition or emergency prevails within the water service area of the Crescenta Valley Water District should be reduced by up to 50% or more with effective response measures; and

WHEREAS, in accordance with applicable law, including Water Code section 10642, and Government Code section 6066, a Notice of a Public Hearing regarding the District's WSCP was published within the jurisdiction of the District on May 7, 2026 and May 14, 2026; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on May 26, 2026 at 7:00 PM, or soon thereafter, at the CVWD Administration Office, 2700 Foothill Blvd, La Crescenta, CA 91214 in order to provide

members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the WSCP and issues related thereto; and

WHEREAS, pursuant to said public hearing on the District's WSCP, the District, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within the District's service area with regard to the WSCP, and encouraged community input regarding the District's WSCP; and

WHEREAS, the District has the power and authority, under Section 375 of the California Water Code, to adopt water conservation measures for activities within its service area; and

WHEREAS, given the current conditions, the District finds it necessary and beneficial to undertake a phased water conservation program; and

NOW, THEREFORE, BE IT RESOLVED, that the Crescenta Valley Water District Board of Directors Adopts Resolution 803, Water Shortage Contingency Plan.

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District finds that a program of voluntary measures to reduce consumption will assist in achieving the goal of conserving the water supply without causing unnecessary adverse economic consequences.

PASSED, APPROVED, AND ADOPTED at a Regular Meeting of the Board of Directors of Crescenta Valley Water District held on May 26, 2026, Resolution No. 803 was adopted by the following vote:

AYES:	**Director Bodnar** **Director Erickson** **Director Johnson** **Director Valdez**
NOES:	**None**
ABSENT:	**Director Raghavachary**

President, Board of Directors
Crescenta Valley Water District

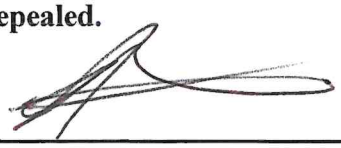
ATTEST:

Secretary of the Board of Directors

STATE OF CALIFORNIA)
)
COUNTY OF LOS ANGELES)

ss.

I, Arturo Montes, Secretary of the Crescenta Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy Resolution No. 803 of the Board of Directors of Crescenta Valley Water District adopted at a Regular Meeting held on May 26, 2026, and that the same has not been amended or repealed.



Secretary of the Board of Directors of
Crescenta Valley Water District

DATED: May 26, 2026

(S E A L)

Appendix C: UWMP Act

Crescenta Valley Water District 2025 Urban Water Management Plan

Appendix A
California Water Code—Urban Water Management Planning

This material is for informational purposes only and is not to be used in place of official California Water Code.

This appendix presents updated sections of California Water Code (Water Code) as of the publication of this Guidebook and as compiled by California Department of Water Resources (DWR) staff. The selection here focuses on the portions of Water Code directly relevant to preparation of an Urban Water Management Plan (UWMP), and sections of Water Code that are contextually relevant to urban water suppliers and DWR.

Water Code published here also concerns the Urban Water Management Planning Act, the Water Conservation Act of 2009 (SB X7-7), which covers sustainable water use and demand reduction, and more. Further legislative information is available on the California Legislative Information website.

Contents

Water Conservation Act of 2009 (SB X7-7) **A-3**

- Chapter 1. General Declarations and Policy, Sections 10608–10608.8 ..... A-3
- Chapter 2. Definitions, Section 10608.12 ..... A-5
- Chapter 2.5. Nonfunctional Turf A-9
- Chapter 3. Urban Retail Water Suppliers, Sections 10608.16–10608.44 ..... A-11
- Chapter 5. Sustainable Water Management, Section 10608.50 ..... A-21
- Chapter 6. Standardized Data Collection, Section 10608.52 ..... A-22
- Chapter 7. Funding Provisions, Sections 10608.56–10608.60 ..... A-23
- Chapter 9. Urban Water Use Objectives and Water Use Reporting, Sections 10609–10609.38 ..... A-24

Urban Water Management Planning Act **A-39**

- Chapter 1. General Declaration and Policy, Sections 10610–10610.4 ..... A-39
- Chapter 2. Definitions, Sections 10611–10618 ..... A-40
- Chapter 3. Urban Water Management Plans A-42
  - Article 1. General Provisions, Sections 10620–10621 ..... A-42
  - Article 2. Contents of Plans, Sections 10630–10634 ..... A-44

Article 2.5. Water Service Reliability, Section 10635 ..... A-54
Article 3. Adoption and Implementation of Plans, Sections 10640–10645 ..... A-55
Chapter 4. Miscellaneous Provisions, Sections 10650–10657 ..... A-58

Water Conservation Act of 2009 (SB X7-7)

This section contains information extracted from Water Code Division 6, *Conservation, Development, and Utilization of State Water Resources*, Part 2.55, *Sustainable Water Use And Demand Reduction*. Click on any section header below to read Water Code directly at the California Legislative Information website.

Chapter 1. General Declarations and Policy, Sections 10608–10608.8

Section 10608.

The Legislature finds and declares all of the following:

(a) Water is a public resource that the California Constitution protects against waste and unreasonable use.

(b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.

(c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.

(d) Reduced water use through conservation provides significant energy and environmental benefits, and can help protect water quality, improve streamflows, and reduce greenhouse gas emissions.

(e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.

(f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.

(g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.

(h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.

(i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less

useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

Section 10608.4.

It is the intent of the Legislature, by the enactment of this part, to do all of the following:

(a) Require all water suppliers to increase the efficiency of use of this essential resource.

(b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.

(c) Measure increased efficiency of urban water use on a per capita basis.

(d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20- percent reduction.

(e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.

(f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.

(g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.

(h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.

(i) Require implementation of specified efficient water management practices for agricultural water suppliers.

(k) Support the economic productivity of California's agricultural, commercial, and industrial sectors.

(l) Advance regional water resources management.

Section 10608.8.

(a)

(1) Water use efficiency measures adopted and implemented pursuant to this part or Part 2.8 (commencing with Section 10800) are water conservation measures subject to the protections provided under Section 1011.

(2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision (b) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021. Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.

(3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.

(b) This part does not limit or otherwise affect the application of Chapter 3.5 commencing with Section 11340), Chapter 4 (commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

(c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.

(d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

Chapter 2. Definitions, Section 10608.12

Section 10608.12.

Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Affordable housing" has the same meaning as defined in Section 34191.30 of the Health and Safety Code.

(b) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor

for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(c) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the

(3) calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(4) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(d) Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(e) "CII water use" means water used by commercial water users, industrial water users, institutional water users, and large landscape water users.

(f) "Commercial water user" means a water user that provides or distributes a product or service.

(g) "Common area" means that portion of a common interest development or of a property owned or managed by a homeowners' association or a community service organization or similar entity that is not assigned or allocated to the exclusive use of the occupants of an individual dwelling unit within the property.

(h) "Common interest development" has the same meaning as in Section 4100 of the Civil Code.

(i) "Community service organization or similar entity" has the same meaning as in Section 4110 of the Civil Code.

(j) "Community space" means an area designated by a property owner or a governmental agency to accommodate human foot traffic for civic, ceremonial, or other community events or social gatherings

(k) Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(l) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(m) "Functional turf" means a ground cover surface of turf located in a recreational use area or community space. Turf enclosed by fencing or other barriers to permanently preclude human access for recreation or assembly is not functional turf.

(n) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(o) "Homeowners' association" means an "association" as defined in Section 4080 of the Civil Code.

(p) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(q) "Institutional water user" means a water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.

(r) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

(s) "Large landscape" means a nonresidential landscape as described in the performance measures for CII water use adopted pursuant to Section 10609.10.

(t) "Locally cost effective" means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater

than or equal to the present value of the local cost of implementing that measure.

(u) "Nonfunctional turf" means any turf that is not functional turf, and includes turf located within street rights-of-way and parking lots.

(v) "Performance measures" means actions to be taken by urban retail water suppliers that will result in increased water use efficiency by CII water users. Performance measures may include, but are not limited to, educating CII water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not include process water.

(w) "Potable reuse" means direct potable reuse, indirect potable reuse for groundwater recharge, and reservoir water augmentation as those terms are defined in Section 13561.

(x) "Potable water" means water that is suitable for human consumption.

(y) "Process water" means water used by industrial water users for producing a product or product content or water used for research and development. Process water includes, but is not limited to, continuous manufacturing processes, and water used for testing, cleaning, and maintaining equipment. Water used to cool machinery or buildings used in the manufacturing process or necessary to maintain product quality or chemical characteristics for product manufacturing or control rooms, data centers, laboratories, clean rooms, and other industrial facility units that are integral to the manufacturing or research and development process is process water. Water used in the manufacturing process that is necessary for complying with local, state, and federal health and safety laws, and is not incidental water, is process water. Process water does not mean incidental water uses.

(z) "Public water system" has the same meaning as defined in Section 116275 of the Health and Safety Code.

(aa) "Recreational use area" means an area designated by a property owner or a governmental agency to accommodate human foot traffic for recreation, including, but not limited to, sports fields, golf courses, playgrounds, picnic grounds, or pet exercise areas. This recreation may be either formal or informal.

(ab) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050.

(ac) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(ad) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(ae) "Turf" has the same meaning as defined in Section 491 of Title 23 of the California Code of Regulations

(af) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(ag) "Urban water supplier" has the same meaning as defined in Section 10617.

(ah) "Urban water use objective" means an estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in Section 10609.20.

(ai) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(aj) "Urban wholesale water supplier" means a water supplier, either publicly or privately owned, that provides more than 3,000 acre- feet of water annually at wholesale for potable municipal purposes.

Chapter 2.5. Nonfunctional Turf

Section 10608.14.

(a) The use of potable water for the irrigation of nonfunctional turf located on commercial, industrial, and institutional properties, other than a cemetery, and on properties of homeowners' associations, common interest developments, and community service organizations or similar entities is prohibited as of the following dates:

(1) All properties owned by the Department of General Services, beginning January 1, 2027.

(2) All properties owned by local governments, local or regional public agencies, and public water systems, except those specified in paragraph (5), beginning January 1, 2027.

(3) All other institutional properties and all commercial and industrial properties, beginning January 1, 2028.

(4) All common areas of properties of homeowners' associations, common interest developments, and community service organizations or similar entities, beginning January 1, 2029.

(5) All properties owned by local governments, local public agencies, and public water systems in a disadvantaged community, beginning January 1, 2031, or the date upon which a state funding source is made available to fund conversion of nonfunctional turf on these properties to climate-appropriate landscapes, whichever is later.

(b) Notwithstanding subdivision (a), the use of potable water is not prohibited by this section to the extent necessary to ensure the health of trees and other perennial nonturf plantings, or to the extent necessary to address an immediate health and safety need.

(c) The board may, upon a showing of good cause for reasons including economic hardship, critical business need, and potential impacts to human health or safety, postpone a compliance deadline in subdivision (a) by up to three years for certain persons, institutions, and businesses, and may create a form to be used for compliance certification to the board by property owners.

(d) Public water systems shall, by no later than January 1, 2027, revise their regulations, ordinances, or policies governing water service to include the requirements of subdivisions (a) and (b), as revised by the board pursuant to subdivision (c), and shall communicate the requirements to their customers on or before that date.

(e)

(1) An owner of commercial, industrial, or institutional property with more than 5,000 square feet of irrigated area other than a cemetery shall certify to the board, commencing June 30, 2030, and every three years thereafter through 2039, that their property is in compliance with the requirements of this chapter.

(2) An owner of a property with more than 5,000 square feet of irrigated common area that is a homeowners' association, common interest development, or community service organization or similar entity shall certify to the board, commencing June 30, 2031, and every three years thereafter through 2040, that their property is in compliance with the requirements of this chapter.

(f) Noncompliance by a person or entity with this chapter or regulations adopted thereunder shall be subject to civil liability and penalties set forth in Section 1846, or to civil liability and penalties imposed by an urban retail water supplier pursuant to a locally adopted ordinance or policy.

(g)

(1) A public water system, city, county, or city and county may enforce the provisions of this chapter.

(2) To avoid duplication of enforcement, any entity identified in paragraph (1) that is not a retail public water system shall notify the retail public water system 30 days prior to enforcement of the provisions of this chapter against a property served by such system.

(3) Nothing in paragraph (2) shall preclude enforcement by any entity identified in paragraph (1) once adequate notice is given.

(h) The department shall, when using funds appropriated for water conservation for turf replacement, prioritize financial assistance for nonfunctional turf replacement to public water systems serving disadvantaged communities and to owners of affordable housing.

(i) The department shall utilize the saveourwater.com internet website and outreach campaign to provide information and resources on converting nonfunctional turf to native vegetation.

(j) The Governor's Office of Business and Economic Development shall support small and minority-owned businesses that provide services that advance compliance with this chapter.

Chapter 3. Urban Retail Water Suppliers, Sections 10608.16–10608.44

Section 10608.16.

(a) The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.

(1) The state shall make incremental progress towards the state target specified in subdivision (a) by reducing urban per capita water use by at least 10 percent on or before December 31, 2015.

Section 10608.20.

(a)

(1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2017 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10- percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

(c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h)

(1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area

population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its internet website, and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(h)

(1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j)

(1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

(2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water supplier and urban retail water suppliers.

Section 10608.22.

Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (c) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

Section 10608.24.

(a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

(b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

(c) An urban retail water supplier's compliance daily per capita water use shall be the measure of progress toward achievement of its urban water use target.

(d)

(1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

(e) When developing the urban water use target pursuant to Section 10608.20, an urban retail water supplier that has a substantial percentage of industrial water use in its service area may exclude process water from the calculation of gross water use to avoid a disproportionate burden on another customer sector.

(f)

(1) An urban retail water supplier that includes agricultural water use in an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) may include the agricultural water use in determining

gross water use. An urban retail water supplier that includes agricultural water use in determining gross water use and develops its urban water use target pursuant to paragraph (2) of subdivision (b) of Section 10608.20 shall use a water efficient standard for agricultural irrigation of 100 percent of reference evapotranspiration multiplied by the crop coefficient for irrigated acres.

(2) An urban retail water supplier, that is also an agricultural water supplier, is not subject to the requirements of Chapter 4 (commencing with Section 10608.48), if the agricultural water use is incorporated into its urban water use target pursuant to paragraph (1).

Section 10608.26.

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

(b) In complying with this part, an urban retail water supplier may meet its urban water use target through efficiency improvements in any combination among its customer sectors. An urban retail water supplier shall avoid placing a disproportionate burden on any customer sector.

(c) For an urban retail water supplier that supplies water to a United States Department of Defense military installation, the urban retail water supplier's implementation plan for complying with this part shall consider the conservation of that military installation under federal Executive Order 13514.

(d)

(1) Any ordinance or resolution adopted by an urban retail water supplier after the effective date of this section shall not require existing customers as of the effective date of this section, to undertake changes in product formulation, operations, or equipment that would reduce process water use, but may provide technical assistance and financial incentives to those customers to implement efficiency measures for process water. This section shall not limit an ordinance or resolution adopted pursuant to a declaration of drought emergency by an urban retail water supplier.

(2) This part shall not be construed or enforced so as to interfere with the requirements of Chapter 4 (commencing with Section 113980) to Chapter 13 (commencing with Section 114380), inclusive, of Part 7 of

Division 104 of the Health and Safety Code, or any requirement or standard for the protection of public health, public safety, or worker safety established by federal, state, or local government or recommended by recognized standard setting organizations or trade associations.

Section 10608.28.

(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

Section 10608.32.

All costs incurred pursuant to this part by a water utility regulated by the Public Utilities Commission may be recoverable in rates subject to review and approval by the Public Utilities Commission, and may be recorded in a memorandum account and reviewed for reasonableness by the Public Utilities Commission.

Section 10608.34.

(a)

(1) On or before January 1, 2017, the department shall adopt rules for all of the following:

(A) The conduct of standardized water loss audits by urban retail water suppliers in accordance with the method adopted by the American Water Works Association in the third edition of Water Audits and Loss

Control Programs, Manual M36 and in the Free Water Audit Software, version 5.0.

(B) The process for validating a water loss audit report prior to submitting the report to the department. For the purposes of this section, "validating" is a process whereby an urban retail water supplier uses a technical expert to confirm the basis of all data entries in the urban retail water supplier's water loss audit report and to appropriately characterize the quality of the reported data. The validation process shall follow the principles and terminology laid out by the American Water Works Association in the third edition of Water Audits and Loss Control Programs, Manual M36 and in the Free Water Audit Software, version 5.0. A validated water loss audit report shall include the name and technical qualifications of the person engaged for validation.

(C) The technical qualifications required of a person to engage in validation, as described in subparagraph (B).

(D) The certification requirements for a person selected by an urban retail water supplier to provide validation of its own water loss audit report.

(E) The method of submitting a water loss audit report to the department.

(2) The department shall update rules adopted pursuant to paragraph (1) no later than six months after the release of subsequent editions of the American Water Works Association's Water Audits and Loss Control Programs, Manual M36. Except as provided by the department, until the department adopts updated rules pursuant to this paragraph, an urban retail water supplier may rely upon a subsequent edition of the American Water Works Association's Water Audits and Loss Control Programs, Manual M36 or the Free Water Audit Software.

(b)

(1) On or before October 1 of each year until October 1, 2023, each urban retail water supplier reporting on a calendar year basis shall submit a completed and validated water loss audit report for the previous calendar year or the previous fiscal year as prescribed by the department pursuant to subdivision (a).

(2) On or before January 1 of each year until January 1, 2024, each urban retail water supplier reporting on a fiscal year basis shall submit a completed and validated water loss audit report for the previous fiscal year as prescribed by the department pursuant to subdivision (a).

(3) On or before January 1, 2024, and on or before January 1 of each year thereafter, each urban retail water supplier shall submit a completed and

validated water loss audit report for the previous calendar year or previous fiscal year as part of the report submitted to the department pursuant to subdivision (a) of Section 10609.24 and as prescribed by the department pursuant to subdivision (a).

(4) Water loss audit reports submitted on or before October 1, 2017, may be completed and validated with assistance as described in subdivision (c).

(c) Using funds available for the 2016–17 fiscal year, the board shall contribute up to four hundred thousand dollars ($400,000) towards procuring water loss audit report validation assistance for urban retail water suppliers.

(d) Each water loss audit report submitted to the department shall be accompanied by information, in a form specified by the department, identifying steps taken in the preceding year to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses.

(e) At least one of the following employees of an urban retail water supplier shall attest to each water loss audit report submitted to the department:

(1) The chief financial officer.

(2) The chief engineer.

(3) The general manager.

(f) The department shall deem incomplete and return to the urban retail water supplier any final water loss audit report found by the department to be incomplete, not validated, unattested, or incongruent with known characteristics of water system operations. A water supplier shall resubmit a completed water loss audit report within 90 days of an audit being returned by the department.

(g) The department shall post all validated water loss audit reports on its internet website in a manner that allows for comparisons across water suppliers. The department shall make the validated water loss audit reports available for public viewing in a timely manner after their receipt.

(h) Using available funds, the department shall provide technical assistance to guide urban retail water suppliers' water loss detection programs, including, but not limited to, metering techniques, pressure management techniques, condition-based assessment techniques for transmission and distribution pipelines, and utilization of portable and permanent water loss detection devices.

(i) No earlier than January 1, 2019, and no later than July 1, 2020, the board shall adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses. In adopting these rules, the board shall employ full life-cycle cost accounting to evaluate the costs of meeting the performance standards. The board may consider establishing a minimum

allowable water loss threshold that, if reached and maintained by an urban water supplier, would exempt the urban water supplier from further water loss reduction requirements.

Section 10608.35.

(a) The department, in coordination with the board, shall conduct necessary studies and investigations and make a recommendation to the Legislature, by January 1, 2020, on the feasibility of developing and enacting water loss reporting requirements for urban wholesale water suppliers.

(b) The studies and investigations shall include an evaluation of the suitability of applying the processes and requirements of Section 10608.34 to urban wholesale water suppliers.

(c) In conducting necessary studies and investigations and developing its recommendation, the department shall solicit broad public participation from stakeholders and other interested persons.

Section 10608.36.

Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

Section 10608.40.

Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

Section 10608.42.

(a) The department shall review the 2015 urban water management plans and report to the Legislature by July 1, 2017, on progress towards achieving a 20-percent reduction in urban water use by December 31, 2020. The report shall include recommendations on changes to water efficiency standards or urban water use targets to achieve the 20- percent reduction and to reflect updated efficiency information and technology changes.

(b) A report to be submitted pursuant to subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

Section 10608.43.

The department, in conjunction with the California Urban Water Conservation Council, by April 1, 2010, shall convene a representative task force consisting of academic experts, urban retail water suppliers, environmental organizations, commercial water users, industrial water users, and institutional water users to develop alternative best management practices for commercial, industrial, and institutional users and an assessment of the potential statewide water use efficiency improvement in the commercial, industrial, and institutional sectors that would result from implementation of these best management practices. The taskforce, in conjunction with the department, shall submit a report to the Legislature by April 1, 2012, that shall include a review of multiple sectors within commercial, industrial, and institutional users and that shall recommend water use efficiency standards for commercial, industrial, and institutional users among various sectors of water use. The report shall include, but not be limited to, the following:

(a) Appropriate metrics for evaluating commercial, industrial, and institutional water use.

(b) Evaluation of water demands for manufacturing processes, goods, and cooling.

(c) Evaluation of public infrastructure necessary for delivery of recycled water to the commercial, industrial, and institutional sectors.

(d) Evaluation of institutional and economic barriers to increased recycled water use within the commercial, industrial, and institutional sectors.

(e) Identification of technical feasibility and cost of the best management practices to achieve more efficient water use statewide in the commercial, industrial, and institutional sectors that is consistent with the public interest and reflects past investments in water use efficiency.

Section 10608.44.

Each state agency shall reduce water use at facilities it operates to support urban retail water suppliers in meeting the target identified in Section 10608.16.

Chapter 5. Sustainable Water Management, Section 10608.50

Section 10608.50.

(a) The department, in consultation with the board, shall promote implementation of regional water resources management practices through increased incentives and removal of barriers consistent with state and federal law. Potential changes may include, but are not limited to, all of the following:

(1) Revisions to the requirements for urban and agricultural water management plans.

(2) Revisions to the requirements for integrated regional water management plans.

(3) Revisions to the eligibility for state water management grants and loans.

(4) Revisions to state or local permitting requirements that increase water supply opportunities, but do not weaken water quality protection under state and federal law.

(5) Increased funding for research, feasibility studies, and project construction.

(6) Expanding technical and educational support for local land use and water management agencies.

(b) No later than January 1, 2011, and updated as part of the California Water Plan, the department, in consultation with the board, and with public input, shall propose new statewide targets, or review and update existing statewide targets, for regional water resources management practices, including, but not limited to, recycled water, brackish groundwater desalination, and infiltration and direct use of urban stormwater runoff.

Chapter 6. Standardized Data Collection, Section 10608.52

Section 10608.52.

(a) The department, in consultation with the board, the California Bay-Delta Authority or its successor agency, the State Department of Public Health, and the Public Utilities Commission, shall develop a single standardized water use reporting form to meet the water use information needs of each agency, including the needs of urban water suppliers that elect to determine and report progress toward achieving targets on a regional basis as provided in subdivision (a) of Section 10608.28.

(b) At a minimum, the form shall be developed to accommodate information sufficient to assess an urban water supplier's compliance with conservation targets pursuant to Section 10608.24 and an agricultural water supplier's compliance with implementation of efficient water management practices pursuant to subdivision (a) of Section 10608.48. The form shall accommodate reporting by urban water suppliers on an individual or regional basis as provided in subdivision (a) of Section 10608.28.

Chapter 7. Funding Provisions, Sections 10608.56–10608.60

Section 10608.56.

(a) On and after July 1, 2016, an urban retail water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(b) On and after July 1, 2013, an agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(c) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for achieving the per capita reductions. The supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(d) Notwithstanding subdivision (b), the department shall determine that an agricultural water supplier is eligible for a water grant or loan even though the supplier is not implementing all of the efficient water management practices described in Section 10608.48, if the agricultural water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the efficient water management practices. The supplier may request grant or loan funds to implement the efficient water management practices to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(e) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.

(f) The department shall not deny eligibility to an urban retail water supplier or agricultural water supplier in compliance with the requirements of this part and Part 2.8 (commencing with Section 10800), that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan

is not implementing all of the requirements of this part or Part 2.8 (commencing with Section 10800).

Section 10608.60.

(a) It is the intent of the Legislature that funds made available by Section 75026 of the Public Resources Code should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for grants to implement this part. In the allocation of funding, it is the intent of the Legislature that the department give consideration to disadvantaged communities to assist in implementing the requirements of this part.

(b) It is the intent of the Legislature that funds made available by Section 75041 of the Public Resources Code, should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for direct expenditures to implement this part.

Chapter 9. Urban Water Use Objectives and Water Use Reporting, Sections 10609–10609.38

Section 10609.

(a) The Legislature finds and declares that this chapter establishes a method to estimate the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently. This estimated aggregate water use is the urban retail water supplier's urban water use objective. The method is based on water use efficiency standards and local service area characteristics for that year. By comparing the amount of water actually used in the previous year with the urban water use objective, local urban water suppliers will be in a better position to help eliminate unnecessary use of water; that is, water used in excess of that needed to accomplish the intended beneficial use.

(b) The Legislature further finds and declares all of the following:

(1) This chapter establishes standards and practices for the following water uses:

(A) Indoor residential use.

(B) Outdoor residential use.

(C) CII water use.

(D) Water losses.

(E) Other unique local uses and situations that can have a material effect on an urban water supplier's total water use.

(2) This chapter further does all of the following:

(A) Establishes a method to calculate each urban water use objective.

(B) Considers recycled water quality in establishing efficient irrigation standards.

(C) Requires the department to provide or otherwise identify data regarding the unique local conditions to support the calculation of an urban water use objective.

(D) Provides for the use of alternative sources of data if alternative sources are shown to be as accurate as, or more accurate than, the data provided by the department.

(E) Requires annual reporting of the previous year's water use with the urban water use objective.

(F) Provides a bonus incentive for the amount of potable recycled water used the previous year when comparing the previous year's water use with the urban water use objective, of up to 10 percent of the urban water use objective.

(3) This chapter requires the department and the board to solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter.

(4) This chapter preserves the Legislature's authority over long- term water use efficiency target setting and ensures appropriate legislative oversight of the implementation of this chapter by doing all of the following:

(A) Requiring the Legislative Analyst to conduct a review of the implementation of this chapter, including compliance with the adopted standards and regulations, accuracy of the data, use of alternate data, and other issues the Legislative Analyst deems appropriate.

(B) Stating legislative intent that the director of the department and the chairperson of the board appear before the appropriate Senate and Assembly policy committees to report on progress in implementing this chapter.

(C) Providing one-time-only authority to the department and board to adopt water use efficiency standards, except as explicitly provided in this chapter. Authorization to update the standards shall require separate legislation.

(c) It is the intent of the Legislature that the following principles apply to the development and implementation of long-term standards and urban water use objectives:

(1) Local urban retail water suppliers should have primary responsibility for meeting standards-based water use targets, and they shall retain the flexibility to develop their water supply portfolios, design and implement water conservation strategies, educate their customers, and enforce their rules.

(2) Long-term standards and urban water use objectives should advance the state's goals to mitigate and adapt to climate change.

(3) Long-term standards and urban water use objectives should acknowledge the shade, air quality, and heat-island reduction benefits provided to communities by trees through the support of water-efficient irrigation practices that keep trees healthy.

(4) The state should identify opportunities for streamlined reporting, eliminate redundant data submissions, and incentivize open access to data collected by urban and agricultural water suppliers.

Section 10609.2.

(a) The board, in coordination with the department, shall adopt long-term standards for the efficient use of water pursuant to this chapter on or before June 30, 2022.

(b) Standards shall be adopted for all of the following:

(1) Outdoor residential water use.

(2) Outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.

(3) A volume for water loss.

(c) When adopting the standards under this section, the board shall consider the policies of this chapter and the proposed efficiency standards' effects on local wastewater management, developed and natural parklands, and urban tree health. The standards and potential effects shall be identified by May 30, 2022. The board shall allow for public comment on potential effects identified by the board under this subdivision.

(d) The long-term standards shall be set at a level designed so that the water use objectives, together with other demands excluded from the long-term standards such as CII indoor water use and CII outdoor water use not connected to a dedicated landscape meter, would exceed the statewide conservation targets required pursuant to Chapter 3 (commencing with Section 10608.16).

(e) The board, in coordination with the department, shall adopt by regulation variances recommended by the department pursuant to Section 10609.14 and guidelines and methodologies pertaining to the calculation of an urban retail water supplier's urban water use objective recommended by the department pursuant to Section 10609.16.

Section 10609.4.

(a)

(1) Until January 1, 2025, the standard for indoor residential water use shall be 55 gallons per capita daily.

(2) Beginning January 1, 2025, and until January 1, 2030, the standard for indoor residential water use shall be 47 gallons per capita daily.

(3) Beginning January 1, 2030, the standard for indoor residential water use shall be 42 gallons per capita daily.

(b)

(1) The department, in coordination with the board, shall conduct necessary studies and investigations to assess and quantify the economic benefits and impacts of the 2030 indoor residential use standard on water, wastewater, and recycled water systems and shall include saturation end-use studies. The studies and investigations shall build on the standards and potential effects identified pursuant to subdivision (c) of Section 10609.2 and shall also consider, and as appropriate incorporate, other regional and statewide studies that quantify the impacts on water, wastewater, and recycled water systems, and evaluate the long-term effects of telework. To facilitate these studies and investigations, the board may request necessary and relevant information from wastewater agencies, including monthly influent flow, actions taken to reassess treatment processes, and the impact of the implementation of this chapter on wastewater operations, maintenance, and capital investment. The department, in coordination with the board, shall summarize the findings of these studies and investigations in a report to the Legislature on or before October 1, 2028. The report shall be submitted in compliance with Section 9795 of the Government Code.

(2) If the department, in coordination with the board, determines that the 2030 indoor residential use standard is likely to unduly impact affordability of water and wastewater services, the department and the board may jointly recommend to the Legislature an alternate date on which the 2030 indoor residential use standard shall take effect. This determination shall be made using at least two years of data reflecting application of the 2025 indoor residential use standard.

(3) Based upon the studies and investigations conducted pursuant to paragraph (1), the department shall consider whether to recommend, for adoption by the board, additional variances to accommodate unique challenges related to residential indoor water use pursuant to Section 10609.2. Variance options may include, but are not limited to, stranded assets, impacts on disadvantaged communities, impacts to environmental flows, or adverse impacts to wastewater or recycled water operations.

(4) The studies, investigations, and report described in paragraph (1) shall include timely and inclusive collaboration with, and input from, a broad group of stakeholders, including, but not limited to, environmental groups, experts in indoor plumbing, water, wastewater, and recycled water agencies.

(c) An urban retail water supplier shall not be subject to enforcement pursuant to this chapter solely for failing to meet the indoor residential use standard.

Section 10609.6.

(a)

(1) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor residential use for adoption by the board in accordance with this chapter.

(2)

(A) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(B) The standards shall apply to irrigable lands.

(C) The standards shall include provisions for swimming pools, spas, and other water features. Ornamental water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, shall be analyzed separately from swimming pools and spas.

(b) The department shall, by January 1, 2021, provide each urban retail water supplier with data regarding the area of residential irrigable lands in a manner that can reasonably be applied to the standards adopted pursuant to this section.

(c) The department shall not recommend standards pursuant to this section until it has conducted pilot projects or studies, or some combination of the two, to ensure that the data provided to local agencies are reasonably accurate for the

data's intended uses, taking into consideration California's diverse landscapes and community characteristics.

Section 10609.8.

(a) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor irrigation of landscape areas with dedicated irrigation meters or other means of calculating outdoor irrigation use in connection with CII water use for adoption by the board in accordance with this chapter.

(b) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(c) The standards shall include an exclusion for water for commercial agricultural use meeting the definition of subdivision (b) of Section 51201 of the Government Code.

Section 10609.9.

For purposes of Sections 10609.6 and 10609.8, "principles of the model water efficient landscape ordinance" means those provisions of the model water efficient landscape ordinance applicable to the establishment or determination of the amount of water necessary to efficiently irrigate both new and existing landscapes. These provisions include, but are not limited to, all of the following:

(a) Evapotranspiration adjustment factors, as applicable.

(b) Landscape area.

(c) Maximum applied water allowance.

(d) Reference evapotranspiration.

(e) Special landscape areas, including provisions governing evapotranspiration adjustment factors for different types of water used for irrigating the landscape.

Section 10609.10.

(a) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, performance measures for CII water use for adoption by the board in accordance with this chapter.

(b) Prior to recommending performance measures for CII water use, the department shall solicit broad public participation from stakeholders and other interested persons relating to all of the following:

(1) Recommendations for a CII water use classification system for California that address significant uses of water.

(2) Recommendations for setting minimum size thresholds for converting mixed CII meters to dedicated irrigation meters, and evaluation of, and recommendations for, technologies that could be used in lieu of requiring dedicated irrigation meters.

(3) Recommendations for CII water use best management practices, which may include, but are not limited to, water audits and water management plans for those CII customers that exceed a recommended size, volume of water use, or other threshold.

(c) Recommendations of appropriate performance measures for CII water use shall be consistent with the October 21, 2013, report to the Legislature by the Commercial, Industrial, and Institutional Task Force entitled "Water Use Best Management Practices," including the technical and financial feasibility recommendations provided in that report, and shall support the economic productivity of California's commercial, industrial, and institutional sectors.

(b)

(1) The board, in coordination with the department, shall adopt performance measures for CII water use on or before June 30, 2022.

(2) Each urban retail water supplier shall implement the performance measures adopted by the board pursuant to paragraph (1).

Section 10609.12.

The standards for water loss for urban retail water suppliers shall be the standards adopted by the board pursuant to subdivision (i) of Section 10608.34.

Section 10609.14.

(a) The department, in coordination with the board, shall conduct necessary studies and investigations and, no later than October 1, 2021, recommend for adoption by the board in accordance with this chapter appropriate variances for unique uses that can have a material effect on an urban retail water supplier's urban water use objective.

(b) Appropriate variances may include, but are not limited to, allowances for the following:

(1) Significant use of evaporative coolers.

(2) Significant populations of horses and other livestock.

(3) Significant fluctuations in seasonal populations.

(4) Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.

(5) Significant use of water for soil compaction and dust control.

(6) Significant use of water to supplement ponds and lakes to sustain wildlife.

(7) Significant use of water to irrigate vegetation for fire protection.

(8) Significant use of water for commercial or noncommercial agricultural use.

(d) The department, in recommending variances for adoption by the board, shall also recommend a threshold of significance for each recommended variance.

(e) Before including any specific variance in calculating an urban retail water supplier's water use objective, the urban retail water supplier shall request and receive approval by the board for the inclusion of that variance.

(f) The board shall post on its Internet Web site all of the following:

(1) A list of all urban retail water suppliers with approved variances.

(2) The specific variance or variances approved for each urban retail water supplier.

(3) The data supporting approval of each variance.

Section 10609.15.

To help streamline water data reporting, the department and the board shall do all of the following:

(a) Identify urban water reporting requirements shared by both agencies, and post on each agency's Internet Web site how the data is used for planning, regulatory, or other purposes.

(b) Analyze opportunities for more efficient publication of urban water reporting requirements within each agency, and analyze how each agency can integrate various data sets in a publicly accessible location, identify priority actions, and implement priority actions identified in the analysis.

(c) Make appropriate data pertaining to the urban water reporting requirements that are collected by either agency available to the public according to the principles and requirements of the Open and Transparent Water Data Act (Part 4.9 (commencing with Section 12400)).

Section 10609.16.

The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, guidelines and methodologies for the board to adopt that identify how an urban retail water supplier calculates its urban water use objective. The guidelines and methodologies shall address, as necessary, all of the following:

(a) Determining the irrigable lands within the urban retail water supplier's service area.

(b) Updating and revising methodologies described pursuant to subparagraph (A) of paragraph (1) of subdivision (h) of Section 10608.20, as appropriate, including methodologies for calculating the population in an urban retail water supplier's service area.

(c) Using landscape area data provided by the department or alternative data.

(d) Incorporating precipitation data and climate data into estimates of a urban retail water supplier's outdoor irrigation budget for its urban water use objective.

(e) Estimating changes in outdoor landscape area and population, and calculating the urban water use objective, for years when updated landscape imagery is not available from the department.

(f) Determining acceptable levels of accuracy for the supporting data, the urban water use objective, and compliance with the urban water use objective.

Section 10609.18.

The department and the board shall solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter. The board shall hold at least one public meeting before taking any action on any standard or variance recommended by the department.

Section 10609.20.

(a) Each urban retail water supplier shall calculate its urban water use objective no later than January 1, 2024, and by January 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use conditions for the previous calendar or fiscal year.

(c) Each urban water supplier's urban water use objective shall be composed of the sum of the following:

(1) Aggregate estimated efficient indoor residential water use.

(2) Aggregate estimated efficient outdoor residential water use.

(3) Aggregate estimated efficient outdoor irrigation of landscape areas with dedicated irrigation meters or equivalent technology in connection with CII water use.

(4) Aggregate estimated efficient water losses.

(5) Aggregate estimated water use in accordance with variances, as appropriate.

(d)

(1) An urban retail water supplier that delivers water from a groundwater basin, reservoir, or other source that is augmented by potable reuse water may adjust its urban water use objective by a bonus incentive calculated pursuant to this subdivision.

(2) The water use objective bonus incentive shall be the volume of its potable reuse delivered to residential water users and to landscape areas with dedicated irrigation meters in connection with CII water use, on an acre-foot basis.

(3) The bonus incentive pursuant to paragraph (1) shall be limited in accordance with one of the following:

(A) The bonus incentive shall not exceed 15 percent of the urban water supplier's water use objective for any potable reuse water produced at an existing facility.

(B) The bonus incentive shall not exceed 10 percent of the urban water supplier's water use objective for any potable reuse water produced at any facility that is not an existing facility.

(4) For purposes of this subdivision, "existing facility" means a facility that meets all of the following:

(A) The facility has a certified environmental impact report, mitigated negative declaration, or negative declaration on or before January 1, 2019.

(B) The facility begins producing and delivering potable reuse water on or before January 1, 2022.

(C) The facility uses microfiltration and reverse osmosis technologies to produce the potable reuse water.

(e)

(1) The calculation of the urban water use objective shall be made using landscape area and other data provided by the department and pursuant to the standards, guidelines, and methodologies adopted by the board. The department shall provide data to the urban water supplier at a level of detail sufficient to allow the urban water supplier to verify its accuracy at the parcel level.

(2) Notwithstanding paragraph (1), an urban retail water supplier may use alternative data in calculating the urban water use objective if the supplier demonstrates to the department that the alternative data are equivalent, or superior, in quality and accuracy to the data provided by the department. The department may provide technical assistance to an

urban retail water supplier in evaluating whether the alternative data are appropriate for use in calculating the supplier's urban water use objective.

Section 10609.21.

(a) For purposes of Section 10609.20, and notwithstanding paragraph (4) of subdivision (d) of Section 10609.20, "existing facility" also includes the North City Project, phase one of the Pure Water San Diego Program, for which an environmental impact report was certified on April 10, 2018.

(b) This section shall become operative on January 1, 2019.

Section 10609.22.

(a) An urban retail water supplier shall calculate its actual urban water use no later than January 1, 2024, and by January 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use for the previous calendar or fiscal year.

(c) Each urban water supplier's urban water use shall be composed of the sum of the following:

(1) Aggregate residential water use.

(2) Aggregate outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.

(3) Aggregate water losses.

Section 10609.24.

(a) An urban retail water supplier shall submit a report to the department no later than January 1, 2024, and by January 1 every year thereafter. The report shall include all of the following:

(1) The urban water use objective calculated pursuant to Section 10609.20 along with relevant supporting data.

(2) The actual urban water use calculated pursuant to Section 10609.22 along with relevant supporting data.

(3) Documentation of the implementation of the performance measures for CII water use.

(4) A description of the progress made towards meeting the urban water use objective.

(5) The validated water loss audit report conducted pursuant to Section 10608.34.

(b) The department shall post the reports and information on its internet website.

(c) The board may issue an information order or conservation order to, or impose civil liability on, an entity or individual for failure to submit a report required by this section.

Section 10609.25.

As part of the first report submitted to the department by an urban retail water supplier no later than January 1, 2024, pursuant to subdivision (a) of Section 10609.24, each urban retail water supplier shall provide a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027.

Section 10609.26.

(a)

(1) On and after January 1, 2024, the board may issue informational orders pertaining to water production, water use, and water conservation to an urban retail water supplier that does not meet its urban water use objective required by this chapter. Informational orders are intended to obtain information on supplier activities, water production, and conservation efforts in order to identify technical assistance needs and assist urban water suppliers in meeting their urban water use objectives.

(2) In determining whether to issue an informational order, the board shall consider the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet the urban water use objective.

(3) The board shall share information received pursuant to this subdivision with the department.

(4) An urban water supplier may request technical assistance from the department. The technical assistance may, to the extent available, include guidance documents, tools, and data.

(b) On and after January 1, 2025, the board may issue a written notice to an urban retail water supplier that does not meet its urban water use objective required by this chapter. The written notice may warn the urban retail water supplier that it is not meeting its urban water use objective described in Section 10609.20 and is not making adequate progress in meeting the urban water use objective, and may request that the urban retail water supplier address areas of concern in its next annual report required by Section 10609.24. In deciding whether to issue a written notice, the board may consider whether the urban retail water supplier has received an informational order, the degree to which the urban retail water supplier is not

meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet its urban water use objective.

(1) On and after January 1, 2026, the board may issue a conservation order to an urban retail water supplier that does not meet its urban water use objective. A conservation order may consist of, but is not limited to, referral to the department for technical assistance, requirements for education and outreach, requirements for local enforcement, and other efforts to assist urban retail water suppliers in meeting their urban water use objective.

(2) In issuing a conservation order, the board shall identify specific deficiencies in an urban retail water supplier's progress towards meeting its urban water use objective, and identify specific actions to address the deficiencies.

(3) The board may request that the department provide an urban retail water supplier with technical assistance to support the urban retail water supplier's actions to remedy the deficiencies.

(c) A conservation order issued in accordance with this chapter may include requiring actions intended to increase water-use efficiency, but shall not curtail or otherwise limit the exercise of a water right, nor shall it require the imposition of civil liability pursuant to Section 377.

Section 10609.27.

Notwithstanding Section 10609.26, the board shall not issue an information order, written notice, or conservation order pursuant to Section 10609.26 if both of the following conditions are met:

(a) The board determines that the urban retail water supplier is not meeting its urban water use objective solely because the volume of water loss exceeds the urban retail water supplier's standard for water loss.

(b) Pursuant to Section 10608.34, the board is taking enforcement action against the urban retail water supplier for not meeting the performance standards for the volume of water losses.

Section 10609.28.

The board may issue a regulation or informational order requiring a wholesale water supplier, an urban retail water supplier, or a distributor of a public water supply, as that term is used in Section 350, to provide a monthly report relating to water production, water use, or water conservation.

Section 10609.30.

On or before January 10, 2024, the Legislative Analyst shall provide to the appropriate policy committees of both houses of the Legislature and the public a report evaluating the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. The board and the department shall provide the Legislative Analyst with the available data to complete this report.

(a) The report shall describe all of the following:

(1) The rate at which urban retail water users are complying with the standards, and factors that might facilitate or impede their compliance.

(2) The accuracy of the data and estimates being used to calculate urban water use objectives.

(3) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.

(4) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.

(5) The early indications of how implementing this chapter might impact the efficiency of statewide urban water use.

6) Recommendations, if any, for improving statewide urban water use efficiency and the standards and practices described in this chapter.

(7) Any other issues the Legislative Analyst deems appropriate.

Section 10609.32.

It is the intent of the Legislature that the chairperson of the board and the director of the department appear before the appropriate policy committees of both houses of the Legislature on or around January 1, 2026, and report on the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. It is the intent of the Legislature that the topics to be covered include all of the following:

(a) The rate at which urban retail water suppliers are complying with the standards, and factors that might facilitate or impede their compliance.

(b) What enforcement actions have been taken, if any.

(c) The accuracy of the data and estimates being used to calculate urban water use objectives.

(d) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.

(e) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.

(f) An assessment of how implementing this chapter is affecting the efficiency of statewide urban water use.

Section 10609.34.

Notwithstanding Section 15300.2 of Title 14 of the California Code of Regulations, an action of the board taken under this chapter shall be deemed to be a Class 8 action, within the meaning of Section 15308 of Title 14 of the California Code of Regulations, provided that the action does not involve relaxation of existing water conservation or water use standards.

Section 10609.36.

(a) Nothing in this chapter shall be construed to determine or alter water rights. Sections 1010 and 1011 apply to water conserved through implementation of this chapter.

(b) Nothing in this chapter shall be construed to authorize the board to update or revise water use efficiency standards authorized by this chapter except as explicitly provided in this chapter. Authorization to update the standards beyond that explicitly provided in this chapter shall require separate legislation.

(c) Nothing in this chapter shall be construed to limit or otherwise affect the use of recycled water as seawater barriers for groundwater salinity management.

Section 10609.38.

The board may waive the requirements of this chapter for a period of up to five years for any urban retail water supplier whose water deliveries are significantly affected by changes in water use as a result of damage from a disaster such as an earthquake or fire. In establishing the period of a waiver, the board shall take into consideration the breadth of the damage and the time necessary for the damaged areas to recover from the disaster.

Urban Water Management Planning Act

This section contains information extracted from Water Code Division 6, *Conservation, Development, and Utilization of State Water Resources*, Part 2.6, *Urban Water Management Planning*. Click on any section header below to read Water Code directly at the California Legislative Information website.

Chapter 1. General Declaration and Policy, Sections 10610–10610.4

Section 10610.

This part shall be known and may be cited as the "Urban Water Management Planning Act."

Section 10610.2.

(a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate, and increasing long-term water conservation among Californians, improving water use efficiency within the state's communities and agricultural production, and strengthening local and regional drought planning are critical to California's resilience to drought and climate change.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years now and into the foreseeable future, and every urban water supplier should collaborate closely with local land-use authorities to ensure water demand forecasts are consistent with current land-use planning.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require

specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

Section 10610.4.

The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to achieve the efficient use of available supplies and strengthen local drought planning.

Chapter 2. Definitions, Sections 10611–10618

Section 10611.

Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

Section 10611.3.

"Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

Section 10611.5.

"Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

Section 10612.

"Drought risk assessment" means a method that examines water shortage risks based on the driest five-year historic sequence for the agency's water supply, as described in subdivision (b) of Section 10635.

Section 10613.

"Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

Section 10614.

"Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

Section 10615.

"Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

Section 10616.

"Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

Section 10616.5.

"Recycled water" means the reclamation and reuse of wastewater for beneficial use.

Section 10617.

"Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

Section 10617.5.

"Water shortage contingency plan" means a document that incorporates the provisions detailed in subdivision (a) of Section 10632 and is subsequently adopted by an urban water supplier pursuant to this article.

Section 10618.

"Water supply and demand assessment" means a method that looks at current year and one or more dry year supplies and demands for determining water shortage risks, as described in Section 10632.1.

Chapter 3. Urban Water Management Plans

Article 1. General Provisions, Sections 10620–10621

Section 10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)

(1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water

management planning where those plans will reduce preparation costs and contribute to the achievement of conservation, efficient water use, and improved local drought resilience.

(2) Notwithstanding paragraph (1), each urban water supplier shall develop its own water shortage contingency plan, but an urban water supplier may incorporate, collaborate, and otherwise share information with other urban water suppliers or other governing entities participating in an areawide, regional, watershed, or basinwide urban water management plan, an agricultural management plan, or groundwater sustainability plan development.

(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

Section 10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

(d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

(e) Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.

(f) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

Article 2. Contents of Plans, Sections 10630–10634

Section 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

Section 10630.5.

Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.

Section 10631.

A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the

drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater.

(C) For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(D) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(E) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water

supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(d)

(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(3)

(A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met

the distribution loss standards enacted by the board pursuant to Section 10608.34.

(4)

(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

(a) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)

(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five- year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

Section 10631.1.

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under

Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

Section 10631.2.

(a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

(b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.

(c) The Legislature finds and declares that energy use is only one factor in water supply planning and shall not be considered independently of other factors.

Section 10632.

(a) Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements:

(1) The analysis of water supply reliability conducted pursuant to Section 10635.

(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decision making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

(3)

(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross- reference relating its existing categories to the six standard water shortage levels.

(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state- mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

(7)

(A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

Section 10632.1.

An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

Section 10632.2.

An urban water supplier shall follow, where feasible and appropriate, the prescribed procedures and implement determined shortage response actions in its water shortage contingency plan, as identified in subdivision (a) of Section 10632, or reasonable alternative actions, provided that descriptions of the alternative actions are submitted with the annual water shortage assessment report pursuant to Section 10632.1. Nothing in this section prohibits an urban water supplier from

taking actions not specified in its water shortage contingency plan, if needed, without having to formally amend its urban water management plan or water shortage contingency plan.

Section 10632.3.

It is the intent of the Legislature that, upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the board defer to implementation of locally adopted water shortage contingency plans to the extent practicable.

Section 10632.5.

(a) In addition to the requirements of paragraph (3) of subdivision of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106- 390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

Section 10633.

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

Section 10634.

The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5. Water Service Reliability, Section 10635

Section 10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included

in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(d) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(e) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Article 3. Adoption and Implementation of Plans, Sections 10640–10645

Section 10640.

(a) Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

(b) Every urban water supplier required to prepare a water shortage contingency plan shall prepare a water shortage contingency plan pursuant to Section 10632. The supplier shall likewise periodically review the water shortage contingency plan as required by paragraph (10) of subdivision (a) of

Section 10632 and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

Section 10641.

An urban water supplier required to prepare a plan or a water shortage contingency plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

Section 10642.

Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan and the water shortage contingency plan. Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

Section 10643.

An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

Section 10644.

(a)

(1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall

include any standardized forms, tables, or displays specified by the department.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

(c)

(1)

(A) Notwithstanding Section 10231.5 of the Government Code, the department shall prepare and submit to the Legislature, on or before July 1, in the years ending in seven and two, a report summarizing the status of the plans and water shortage contingency plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans and water shortage contingency plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan and water shortage contingency plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans and water shortage contingency plans submitted pursuant to this part.

(B) The department shall prepare and submit to the board, on or before September 30 of each year, a report summarizing the submitted water supply and demand assessment results along with appropriate reported water shortage conditions and the regional and statewide analysis of water supply conditions developed by the department. As part of the report, the department shall provide a summary and, as appropriate, urban water supplier specific information regarding various shortage response actions implemented as a result of annual supplier-specific water supply and demand assessments performed pursuant to Section 10632.1.

(C) The department shall submit the report to the Legislature for the 2015 plans by July 1, 2017, and the report to the Legislature for the 2020 plans and water shortage contingency plans by July 1, 2022.

(2) A report to be submitted pursuant to subparagraph (A) of paragraph (1) shall be submitted in compliance with Section 9795 of the Government Code.

(d) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

Section 10645.

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Chapter 4. Miscellaneous Provisions, Sections 10650–10657

Section 10650.

Any actions or proceedings, other than actions by the board, to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan or a water shortage contingency plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan or water shortage contingency plan, or action taken pursuant to either, does not comply with this part shall be commenced within 90 days after filing of the plan or water shortage contingency plan or an amendment to either pursuant to Section 10644 or the taking of that action.

Section 10651.

In any action or proceeding to attack, review, set aside, void, or annul a plan or a water shortage contingency plan, or an action taken pursuant to either by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

Section 10652.

The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the

plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

Section 10653.

The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the board and the Public Utilities Commission, for the preparation of water management plans, water shortage contingency plans, or conservation plans; provided, that if the board or the Public Utilities Commission requires additional information concerning water conservation, drought response measures, or financial conditions to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan that complies with analogous federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

Section 10654.

An urban water supplier may recover in its rates the costs incurred in preparing its urban water management plan, its drought risk assessment, its water supply and demand assessment, and its water shortage contingency plan and implementing the reasonable water conservation measures included in either of the plans.

Section 10655.

If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

Section 10656.

An urban water supplier is not eligible for a water grant or loan awarded or administered by the state unless the urban water supplier complies with this part.

Section 10657.

The department may adopt regulations regarding the definitions of water, water use, and reporting periods, and may adopt any other regulations deemed necessary or desirable to implement this part. In developing regulations pursuant to this section, the department shall solicit broad public participation from stakeholders and other interested persons.

Appendix D: Dept. of Water Resources UWMP Checklist

Crescenta Valley Water District 2025 Urban Water Management Plan

Retail (x = required)	Wholesale (x = required)	Order	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
x	x	1	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and overview	n/a	Executive Summary
x	x	1	Chapter 1	10630.5	Each plan shall include a simple description of the Supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a Supplier may also choose to include a simple description at the beginning of each chapter.	Plan preparation	n/a	Executive Summary
x	x	2.1	Section 2.1	10620(b)	Every person that becomes a Supplier shall adopt UWMP within one year after it has become a Supplier.	Plan preparation	n/a	Section 1.2 / Appendix A
x	n/a	2.5	Section 2.5	10644	Supplier shall report the Public Water Systems number, volume of delivered water, and number of connections that are included in this UWMP.	Plan preparation	2-1	Section 2.6.2 & 6.5 / Appendix E
x	x	2.5	Section 2.5	10644	Supplier shall report if this UWMP is an individual UWMP and whether the Supplier belongs to a regional UWMP or regional alliance.	Plan preparation	2-2	Appendix E
x	x	2.5	Section 2.5	10644	Supplier shall report whether the data is in fiscal or calendar years and the units of measure used for reporting water volumes.	Plan preparation	2-3	Appendix E
x	x	2.4	Section 2.4	10642	Provide supporting documentation that the Supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan preparation	n/a	Section 1.2 / Section 8.9
x	x	2.4	Section 2.4.2	10620(d)(3)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other Suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan preparation	n/a	Section 1.2
x	n/a	2.4	Section 2.4.1	10631(h)	Retail Suppliers will include documentation that they have provided their Wholesale Supplier(s)—if any—with water use projections from that source.	Plan preparation	2-4 R	Section 3.7
n/a	x	2.4	Section 2.4.1	10631(h)	Wholesale Suppliers will provide their Suppliers with identification and quantification of the existing and planned sources of water available from the Wholesale Supplier to the Supplier during various water year types.	Plan preparation	2-4 W	N/A
x	x	3	Chapter 3.0	10631(a)	Describe the Supplier service area.	System description	n/a	Section 2.2
x	x	3.3	Section 3.3	10631(a)	Describe the climate of the Supplier's service area.	System description	n/a	Section 2.4
x	x	3.4	Section 3.4.1	10631(a)	Provide the current and projected service area populations for 2030, 2035, 2040, 2045 and optionally 2050.	System description	3-1	Section 2.5 / Table 2.4 & 2.5
x	x	3.4	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the Supplier's water management planning.	System description	n/a	N/A
x	x	3.5	Section 3.5	10631(a)	Describe the land uses within the service area… include the current and projected land uses within the existing or anticipated service area affecting the Supplier's water management planning. Describe the land uses within the service area.	System description and baselines	n/a	Section 2.3
x	Optional	4.2	Sections 4.2.3 and 4.2.4	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System water use	4-1 and 4-2	Sections 6.5 & 6.6 / Section 6.9.3 Table 6.1 - 6.4 / Table 6.8
x	Optional	4.3	Section 4.3.1	10631(d)(3)(A)	Report the distribution system water loss for each of the five years preceding the plan update.	System water use	4-5	Sections 6.6.2 & 6.6.3 / Table 6.4
x	n/a	4.3	Section 4.3.2	10631(d)(3)(C)	Retail Suppliers shall provide data to show the distribution loss standards were met.	System water use	4-6	Sections 6.6 & 6.8 / Section 9.4.5
x	n/a	4.2	Section 4.2.5.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the Supplier.	System water use	4-3	Sections 6.9.2
x	n/a	4.2	Section 4.2.5.3	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System water use	4-3	Sections 6.9.1 & 6.9.3 / Section 9.4
x	n/a	4.2	Section 4.2.5.3	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System water use	4-3	Sections 6.8 & 6.9
x	n/a	4.2	Section 4.2.5.3	10631(d)(4)(B)(ii)	To the extent that a Supplier reports the information described in subparagraph (A), an urban water Supplier shall… Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.	System water use	4-3	
x	x	4.2	Section 4.2.5.6	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System water use	n/a	Sections 7.1 - 7.3
n/a	x	5.1	Section 5.1	10608.36	Wholesale Suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their Retail Suppliers achieve targeted water use reductions.	Baselines and targets	n/a	N/A
x	n/a	5.2	Section 5.2	10608.4	Retail Suppliers shall report on their compliance in meeting their water use targets. Reporting requirements will vary depending on whether the Supplier: - Was considered an urban retail water supplier in 2020, - Met its 2020 target in 2020, or - Was part of a merger or consolidation since 2020. Chapter 5 Subsections 5.2.1, 5.2.2, and 5.2.3 address each of these situations.	Baselines and targets	5-1	Sections 6.8 & 6.9
x	x	6.1	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System supplies	n/a	Section 3 / Sections 7.6 & 7.8
x	x	6.1	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, including changes in supply due to climate change.	System supplies	n/a	Sections 7.6 & 7.7
x	x	6.2	Section 6.2.2	10631(b)(4)(C)	Indicate whether groundwater is an existing or planned source of water available to the Supplier. If groundwater is identified as an existing or planned source of water… (include) a detailed description and analysis of the location, amount and sufficiency of groundwater pumped by the Supplier for the past five years.	Water supplies and recycled water	6-1	Sections 3.4 & 3.5
x	x	6.2	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the Supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System supplies	n/a	Sections 3.4 & 3.5
x	x	6.2	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System supplies	n/a	Section 3.4.1
x	x	6.2	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the Supplier has the legal right to pump.	System supplies	n/a	Section 3.4.1
x	x	6.2	Section 6.2.2	10631(b)(4)(B)	For unadjudicated basins… (include) information as to whether DWR has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin…	Water supplies and recycled water	n/a	N/A
x	x	6.2	Section 6.2.2	10631(b)(4)(B)	For unadjudicated basins… describe efforts by the Supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	Water supplies and recycled water	n/a	N/A
x	x	6.2	Section 6.2.2.	10631(b)(4)(C)	If groundwater is identified as an existing or planned source of water… (include) a detailed description and analysis of the location, amount and sufficiency of groundwater pumped by the Supplier for the past five years.	System supplies	n/a	Sections 3.4 & 3.5
x	x	6.2	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System supplies	6-9	Sections 3.7 & 3.8
x	x	6.1	Section 6.1	10631(b)	Identify and quantify the existing and planned sources of water available for 2025, 2030, 2035, 2040, 2045 and optionally 2050.	System supplies	6-8 and 6-9	Sections 2.6 & 7.7 / Table 7.1 - 7.7
x	x	6.2	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System supplies	n/a	Section 3.8

x	n/a	6.2	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the Supplier's service area with quantified amount of collection and treatment and the disposal methods.	System supplies (recycled water)	6-2	Section 4.2
x	x	6.2	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System supplies (recycled water)	6-3	Section 4.2.1
x	x	6.2	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the Supplier's service area.	System supplies (recycled water)	6-4	Section 4.3
x	x	6.2	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System supplies (recycled water)	6-4	Section 4.3.1
x	x	6.2	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the Supplier's service area at the end of 5, 10, 15, and 20 years, and describe the actual use of recycled water in comparison to uses previously projected.	System supplies (recycled water)	6-4 and 6-5	Section 4.3
x	x	6.2	Section 6.2.5	10633(f)	Describe the actions that may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System supplies (recycled water)	6-6	Section 8.12.1
x	x	6.2	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the Supplier's service area.	System supplies (recycled water)	n/a	Section 4.3
x	x	6.2	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System supplies	6-7	N/A
x	x	6.2	Section 6.2.10	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water Supplier to address water supply reliability in average, single-dry, and for a period of drought lasting five consecutive water years.	System supplies	6-7	Sections 7.6 & 7.7
x	x	6.3	Section 6.3 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a Supplier can readily obtain.	System suppliers, energy intensity	O-1A, O-1B, O-1C, and O-2	
x		7.1	Section 7.1	10634	Provide information on the quality of existing sources of water available to the Supplier and the manner in which water quality affects water management strategies and supply reliability.	Water supply reliability assessment	n/a	Section 5
x	x	7.2	Section 7.2	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the Supplier with the total projected water use over the next 20 years.	Water supply reliability assessment	7-2, 7-3, and 7-4	Sections 7.6 & 7.7
x	x	7.2	Section 7.2.3	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water supply reliability assessment	n/a	Sections 8 & 9
x	x	7.3	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water supply reliability assessment	n/a	Section 7.7
x	x	7.3	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive years.	Water supply reliability assessment	n/a	Sections 7.6 & 7.7
x	x	7.3	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water supply reliability assessment	n/a	Section 8.4
x	x	7.3	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the Supplier with the total projected water use for the drought period.	Water supply reliability assessment	7-5	Section 7.7 / Table 7.1 - 7.7
x	x	7.3	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water supply reliability assessment	n/a	Sections 7.1 - 7.3
x	x	8	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water shortage contingency planning	n/a	Section 8
x	x	8	Chapter 8	10632(a)(1)	Provide an analysis of water supply reliability (from Guidebook Chapter 7) in the WSCP.	Water shortage contingency planning	n/a	Sections 8.4
x	x	8.2	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the Supplier will use each year to determine its water reliability.	Water shortage contingency planning	n/a	Sections 8.6.1
x	x	8.2	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the Supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water shortage contingency planning	n/a	Sections 8.6.2
x	x	8.3	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10%, 20%, 30%, 40%, 50% shortage, and greater than 50% shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water shortage contingency planning	n/a	Section 8.7
x	x	8.3	Section 8.3	10632(a)(3)(B)	Suppliers with an existing WSCP that uses different water shortage levels must cross reference their categories with the six standard categories.	Water shortage contingency planning	8-1	N/A
x	x	8.4	Section 8.4	10632(a)(4)(A)	Suppliers with WSCPs that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water shortage contingency planning	8-2	Section 8.7.8
x	x	8.4	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water shortage contingency planning	8-3	Section 8.7.10
x	x	8.4	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water shortage contingency planning	8-2	Sections 8.2 & 8.6.3
x	x	8.4	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to State-mandated prohibitions are appropriate to local conditions.	Water shortage contingency planning	Table 8-3	Section 8.7.9
x	x	8.4	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water shortage contingency planning	8-2 and 8-3	Section 8.7
x	x	8.4	Section 8.4.6	10632.5	The UWMP shall include a seismic risk assessment and mitigation plan.	Water shortage contingency plan	n/a	Section 8.8.3
x	x	8.5	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water shortage contingency planning	n/a	Section 8.9
x	x	8.5	Section 8.5	10632(a)(5)(B), 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water shortage contingency planning	n/a	Section 8.9.4
x	n/a	8.6	Section 8.6	10632(a)(6)	Retail Supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water shortage contingency planning	n/a	Section 8.10
x	x	8.7	Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the Supplier to enforce shortage response actions.	Water shortage contingency planning	n/a	Section 8.11
x	x	8.7	Section 8.7	10632(a)(7)(B)	Provide a statement that the Supplier will declare a water shortage emergency per Water Code Chapter 3, *Water Shortage Emergencies* .	Water shortage contingency planning	n/a	Section 8.3 & 8.11
x	x	8.7	Section 8.7	10632(a)(7)(C)	Provide a statement that the Supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water shortage contingency planning	n/a	Section 8.11
x	x	8.8	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water shortage contingency planning	n/a	Section 8.11.1
x	x	8.8	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water shortage contingency planning	n/a	Section 8.11.1
x	n/a	8.8	Section 8.8	10632(a)(8)(C)	Retail Suppliers must describe the cost of compliance with Water Code Chapter 3.3, *Excessive Residential Water Use During Drought* .	Water shortage contingency planning	n/a	Section 8.11.1
x	n/a	8.9	Section 8.9	10632(a)(9)	Retail Suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data are collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water shortage contingency planning	n/a	Section 8.12
x	x	8.10	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the WSCP to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water shortage contingency planning	n/a	Section 8.12

x	n/a	8.11	Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water shortage contingency planning	n/a	Section 8.12.1
x	x	8.12	Section 8.12	10632(c)	Make available the WSCP to customers and any city or county where it provides water within 30 days after adoption of the plan.	Water shortage contingency planning	n/a	Section 8.13
x	n/a	9.1	Sections 9.1	10631(e)(1)	Retail Suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand management measures	n/a	Section 9
n/a	x	9.2	Sections 9.2	10631(e)(2)	Wholesale Suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and Supplier assistance program.	Demand management measures	n/a	N/A
x	n/a	10	Chapter 10	10608.26(a)	Retail Suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.2	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the Supplier provides water that the Supplier will be reviewing the UWMP and considering amendments or changes to the plan.	Plan adoption, submittal, and implementation	10-1	Section 1.2
x	x	10.4	Section 10.4	10621(f)	Each urban water Supplier shall update and submit its 2025 plan to DWR by July 1, 2026.	Plan adoption, submittal, and implementation	n/a	Section 1.1
x	x	10.2	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the Supplier made the UWMP and WSCP available for public inspection, published notice of the public hearing, and held a public hearing about the UWMP and WSCP.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.2	Section 10.2.2	10642	The Supplier is to provide the time and place of the hearing to any city or county within which the Supplier provides water.	Plan adoption, submittal, and implementation	10-1	Sections 1.2 & 8.13
x	x	10.3	Section 10.3.2	10642	Provide supporting documentation that the UWMP and WSCP has been adopted as prepared or modified.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.4	Section 10.4	10644(a)	Provide supporting documentation that the Supplier has submitted their UWMP to the California State Library.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.4	Section 10.4	10644(a)(1)	Provide supporting documentation that the Supplier has submitted their UWMP to any city or county within which the Supplier provides water no later than 30 days after adoption.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.4	Sections 10.4.1 and 10.4.2	10644(a)(2)	The UWMP, or amendments to the UWMP, submitted to DWR shall be submitted electronically.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.7	Section 10.7.2	10644(b)	If revised, submit a copy of the WSCP to DWR within 30 days of adoption.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.5	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its UWMP with DWR, the Supplier has or will make the plan available for public review during normal business hours.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.5	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its WSCP with DWR, the Supplier has or will make the plan available for public review during normal business hours.	Plan adoption, submittal, and implementation	n/a	Sections 1.2 & 8.13
x	x	10.6	Section 10.6	10621(c)	If Supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan adoption, submittal, and implementation	n/a	N/A

Appendix E: Dept. of Water Resources UWMP Data Tables

Crescenta Valley Water District 2025 Urban Water Management Plan

Submittal Table 2-1 Retail: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2025	Volume of Water Supplied 2025 (AF)
Add additional rows as needed			
CA1910028	Crescenta Valley Water District	8,257	3,662
	Total	8,257	3,662

DWR NOTES:

Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3

NOTES:

Submittal Table 2-2: Plan Identification		
Select One	**Type of Plan**	**Name of Regional Alliance or RUWMP** (Drop Down List)
☑	**Individual UWMP**	
	If Water Supplier is also a member of a SB X7-7 Regional Alliance, select name from the drop-down.	
☐	**Regional Urban Water Management Plan (RUWMP)**	
	If Supplier selected RUWMP, select name from the drop-down.	
NOTES:		

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesale supplier
☑	Supplier is a retail supplier
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP (Select from the drop down list).	
Unit	AF
DWR NOTES: **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Submittal Table 2-3.	
NOTES:	

Submittal Table 2-4 Retail: Water Supplier Information Exchange Water Code Section 10631(h)
The retail Supplier has informed the following wholesale supplier(s) of projected water use.
Wholesale Water Supplier Name
Add additional rows as needed
Foothill Municipal Water District
NOTES:

Submittal Table 3-1 Retail: Population - Current and Projected
Water Code Section 10631(a)

Population Served	2025	2030	2035	2040	2045	2050(opt)
	28,162	28,649	29,719	30,788	31,857	32,926

NOTES: See Section 2.5

Submittal Table 4-1 Retail: Total Uses for Potable and Non-Potable Water — Actual
Water Code Section 10631(d)(1)

Use Type	Additional Description (as needed)	2025 Actual Water Use	
Drop down list May select each use multiple times These are the only use types that will be recognized by the WUEdata online submittal tool		**Potable or Non-Potable** (OPTIONAL) Drop down list	Volume (AF)
Add additional rows as needed			
Single Family		Potable	2,088
Multi-Family		Potable	856
Commercial		Potable	165
Institutional/Governmental		Potable	157
Landscape		Potable	226
Distribution System Water Loss		Potable	171
		Subtotal Potable	3,662
		Subtotal Non-Potable	0
		Total	3,662

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.

NOTES: See Section 6.6.1

Submittal Table 4-2 Retail: Total Uses for Potable, and Non-Potable Water — Projected
Water Code Section 10631(d)(1)

Use Type	Additional Description (as needed)	Projected Water Use (Report To the Extent that Records are Available)					
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		**Potable or Non-Potable** (OPTIONAL) Drop down list	**2030 (AF)**	**2035 (AF)**	**2040 (AF)**	**2045 (AF)**	**2050 opt (AF)**
Add additional rows as needed.							
Single Family		Potable	2,124	2,149	2,171	2,191	2,208
Multi-Family		Potable	786	795	803	811	817
Commercial		Potable	160	161	163	165	166
Institutional/Governmental		Potable	135	137	138	140	141
Landscape		Potable	176	178	180	182	183
Distribution System Water Loss		Potable	334	338	341	344	347
		Subtotal Potable	3,715	3,758	3,796	3,833	3,862
		Subtotal Non-Potable	0	0	0	0	0
		Total	3,715	3,758	3,796	3,833	3,862

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.

NOTES: See Section 6.9.3

Submittal Table 4-3 Retail: Inclusion in Water Use Projections
Water Code Section 10631 (a), 10631 (d)(4)(A), and 10631 (d)(4)(B)

Are Future Water Savings Included in Projections? **Drop down list (y/n)**	Yes
If "Yes" to above, **state the section or page number**, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found. ***Optional*** Suppliers may complete Optional Submittal Table 4-4 R to quantify the expected savings.	Section 6.9.1
Are Lower Income Residential Demands Included In Projections? **Drop down list (y/n)**	Yes
Optional If the method for accounting Lower Income Residential Demands has been included, provide page number where this accounting can be found.	Section 6.9.2
DWR NOTES: Additional guidance is provided in Appendix K.	
NOTES:	

Submittal Table 4-5 Retail: Water Loss Audit Reporting
Water Code Section 10631(d)(3)(A)

Public Water System ID # Reported in Table 2-1 R	Reporting Period	Submitted to DWR Water Loss Audit Program (yes/no)
Report submittal status for all five years for each Public Water System as available. **Add rows as needed**		
	2020	Yes
	2021	Yes
	2022	Yes
	2023	Yes
	2024	Yes
DWR NOTES: Suppliers will provide a link to the WUEdata submittals of their Water Loss Audit Reports.		
NOTES: See Section 6.6.2		

Submittal Table 4-6 Retail: Progress Towards 2028 Water Loss Standard
Water Code Section 10631(d)(3)(C)

Public Water System ID # Reported in Submittal Table 2-1 R	Did the Water Board Calculate a Water Loss Standard for this Public Water System? (y/n) If no, Supplier will not complete this row.	Real Water Loss					Apparent Water Loss				
		State Water Board Standard		Most Recent AWWA Water Loss Audit			State Water Board Standard		Most Recent AWWA Water Loss Audit		
		2028 Real Water Loss Standard per Unit per day	Units for Real Water Loss Drop down list	Number of Units (Connections or Miles corresponding with units selected)	Volume of Total Real Loss (from AWWA Water Loss Audit) (AF)	Real Water Loss Per Unit per Day	2028 Apparent Water Loss Standard per Unit per Day	Units for Apparent Water Loss	Number of Connections	Volume of Total Apparent Loss (from AWWA Water Loss Audit) (AF)	Apparent Water Loss Per Unit per Day
Add additional rows as needed.											
CA1910028	Yes	24.2	Gallons per Service Connection per Day (GPSCD)	8257	172.1655534	18.6	9.1	Gallons per Service Connection per Day (GPSCD)	8257	93.96530569	10.2
								Gallons per Service Connection per Day (GPSCD)			
								Gallons per Service Connection per Day (GPSCD)			

Water Board's Calculated Water Loss Standards

DWR NOTES: Units of measure (AF, CCF, MG) for Water Loss **MUST** remain consistent with units reported in Submittal Table 2-3. The units reported in Submittal Table 2-3 are used in this table's calculations.

NOTES: Section 6.6.3. Based off 2024 Validated Water Loss Audit.

Submittal Table 5-1 Retail: SB X7-7 2020 Target Progress
Water Code Section 10608.40

☐	**Check the box if the Supplier was not an Urban Water Supplier during or before the 2020 UWMP reporting cycle. Proceed to the next table.**

Was Supplier part of a merger or consolidation since 2020?	Regional Alliance Target or Individual Target? Drop down list	2020 Target	Actual 2020 GPCD	Did Supplier Achieve Targeted Reduction for 2020?	**Only for suppliers that did not meet the Target in 2020** **See DWR NOTES below.**	
					Actual 2025 GPCD (From SB X7-7 Compliance Form)	Did Supplier meet the 2020 Target in 2025?
No	Individual Target	142	127.0	Yes		NA

DWR NOTES:
Suppliers calculating a 2025 GPCD will need to complete and submit SB X 7-7 Compliance Tables to verify the use of SB X7-7 Methodologies.
Suppliers that were part of a merger or consolidation since 2020 see Chapter 5 and Appendix P for guidance.

NOTES: See Section 6.8.3. Actual 2025 GPCD was 110.7.

Submittal Table 6-1 Retail: Groundwater Volume Pumped
Water Code Section 10631(4) and 10631(4)(c)

☐	Check the box if the Supplier does not pump groundwater. Proceed to the next table.
☐	Check the box if all or part of the groundwater described below is desalinated. (OPTIONAL)

Groundwater Type **Drop Down List** May use each category multiple times	Potable or Non-Potable (OPTIONAL) **Drop down list**	Location or Basin Name	2021 (AF)	2022 (AF)	2023 (AF)	2024 (AF)	2025 (AF)
Add additional rows as needed							
Alluvial Basin	Potable	Verdugo Basin	2,127	2,076	2,017	2,230	2,061
		Total	2,127	2,076	2,017	2,230	2,061

DWR NOTES:
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.

NOTES: See Section 3.5

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area
Water Code Section 10633(a)

☐	Check the box if there is no wastewater collection system. Proceed to the next table.
	Percentage of 2025 service area served by wastewater collection system (OPTIONAL)
	Percentage of 2025 service area population served by wastewater collection system (OPTIONAL)

Wastewater Collection			Recipient of Collected Wastewater	
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? OPTIONAL **Drop Down List**	Volume of Wastewater Collected from UWMP Service Area 2025 (AF)	Name of Wastewater Treatment Plant (WWTP) and Place ID Number **Drop down list**	Is WWTP Located Within UWMP Area? **Drop Down List**
Add additional rows as needed				
CVWD	Estimated	2,930	Los Angeles-Glendale WWRP, Place ID 235738	No
Total Wastewater Received from UWMP Service Area in 2025:		2,930		

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.
Additional Guidance: See Appendix M, Section M.21 for detailed guidance on this table.

NOTES: See Section 4.2

Submittal Table 6-3 Retail: Wastewater Treatment and Outcomes Within UWMP Service Area
Water Code Section 10633(b)

☑	**Check the box if no wastewater is treated or disposed of within the UWMP service area.** Proceed to the next table.

Wastewater Treatment Plant Name and Place ID Number **Drop down list**	Does This Plant Treat Wastewater Generated Outside the UWMP Service Area? (OPTIONAL) **Drop down list**	2025 Volume of Wastewater Received from UWMP Service Area (As Reported in Submittal Table 6-2 R) (AF)	Total 2025 Volume of Water Treated (AF)	2025 Outcomes of Treated Wastewater										
				Water Recycled Within UWMP Service Area (enter data as applicable)		**Water Recycled Outside of UWMP Service Area** (enter data as applicable)		**Effluent Discharge that is not a Permitted Recycled Water Use** (enter data as applicable)		**Required Discharge for Instream Flow** (enter data as applicable)		**Delivered to Another Entity for Additional Treatment** (enter data as applicable)		
				Treatment Level **Drop down list**	Volume (AF)	Treatment Level **Drop down list**	Volume (AF)	Treatment Level **Drop down list**	Volume (AF)	Treatment Level **Drop down list**	Volume (AF)	Treatment Level **Drop down list**	Volume (AF)	Name of other entity
Add additional rows as needed														
Total		0	-		0		0		0		0		0	

DWR NOTES:
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.
IPR: Indirect Potable Reuse would have the treatment level of its end use requirement in the Level of Treatment drop-down.
Additional Guidance: See Appendix M, Section M.21 for detailed guidance on this table.

NOTES: See Section 4.2

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area
Water Code Section 10633 (c),(d),(e)

☑	Check box if recycled water is not used and is not planned for use within the service area of the supplier. The supplier will only complete the column on "Potential Recycled Water Use" and submit an accompanying narrative on the feasibility of that potential recycled water use.

Name(s) of Facility/ies Producing (Treating) the Recycled Water (OPTIONAL) :	
Name of Supplier Operating the Recycled Water Distribution System (OPTIONAL) :	
Volume of Supplemental Water Added in 2025 (OPTIONAL) :	
Source of 2025 Supplemental Water (OPTIONAL) :	

Use Type **Drop down list**	**Potable or Non-Potable** (after treatment if treated) (OPTIONAL) Drop down list	Additional Information (as needed)	2025 (AF)	2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)	2050 (AF)	**Potential Recycled Water Use**	
									Volume	Narrative page number (OPTIONAL)
Add additional rows as needed										
		Subtotal Potable	0	0	0	0	0	0	0	
		Subtotal Non-Potable	0	0	0	0	0	0	0	
		Total	0	0	0	0	0	0	0	0

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.
Additional Guidance: See Appendix M, Section M.21 for detailed guidance on this table.
Potential recycled water use: a description of the feasibility of these uses must be included in the narrative.
Multiple Producers: If you have multiple recycled water producers, submit a separate table for each.

NOTES: See Section 4.3

Submittal Table 6-5 Retail: 2020 UWMP Recycled Water Use Projection Compared to 2025 Actual
Water Code Section 10633(e)

☑	Check the box if recycled water was not used in 2025 nor previously projected for use in 2020. Proceed to the next table.

Use Type Drop Down list	2020 Projection for 2025 (AF)	2025 Actual Use (AF)
Add additional rows as needed		
Total	0	0

DWR NOTES:
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure reported in Submittal Table 2-3
Additional Guidance: See Appendix M, Section M.21 for detailed guidance on this table.

NOTES: See Section 4.3

Submittal Table 6-6 Retail: Methods to Encourage Future Recycled Water Use
Water Code Section 10633(f)

☑	Check the box if the Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.
	Provide page location of narrative in the UWMP

Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use (AF)
Add additional rows as needed			
		Total (AF)	0
		Unit Conversion to AF	0

DWR NOTES:
Units of measure (AF, CCF, MG) MUST remain consistent with units reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.
The unit conversion to Acre Feet addresses the Water Code's requirement that this value be provided in acre-feet.

NOTES: See Section 4.3

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs
Water Code Section 10631(f)

☐	Check the box if there are no expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Proceed to the next table.
☑	Check the box if some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.
Section 3.7.1	Provide page location of narrative in the UWMP

Name of Future Projects or Programs	Joint Project with other suppliers?		Additional Description (as needed)	**Potable or Non-Potable** (after treatment if treated) (OPTIONAL) Drop Down list	Planned Implementation Year	Planned for Use in Year Type **Drop Down List**	Expected Increase in Water Supply to Supplier (This may be a range) (AF)
	Drop Down List (yes/no)	If Yes, Supplier Name					
Add additional rows as needed							
Crescenta Valley County Park Multiuse Project	No		District to increase groundwater storage in the Basin by installation and maintenance of underground infiltration galleries	Potable	N/A	Average Year	340

DWR NOTES:
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure reported in Submittal Table 2-3.

NOTES: See Section 3.7.1

Submittal Table 6-8 Retail: Water Supplies — Actual
Water Code Section 10631(b)

Water Supply	Additional Description (as needed)	**2025**		
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		**Potable or Non-Potable** (after treatment if treated) (OPTIONAL) Drop Down list	Actual Volume (AF)	Total Entitlement (OPTIONAL) See 'DWR Notes' below (AF)
Add additional rows as needed				
Purchased or Imported Water	FMWD	Potable	1,602	2,154
Groundwater (not desalinated)	CVWD Wells	Potable	1,828	3,294
Groundwater (not desalinated)	Well #16 (GWP)	Potable	233	500
		Subtotal Potable	3,663	5,948
		Subtotal Non-Potable	0	0
		Total	3,663	5,948

DWR NOTES:
Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the unit of measure selected in Submittal Table 2-3.
Total Entitlement: e.g. Water Right, Groundwater Allocation, Contracted Amount.

NOTES: See Section 3.3 & 3.5

Optional Table 6-8DS: Source Water Desalination by Urban Water Supplier

☑ Check the box if the Supplier does not reduce salinity in either groundwater or surface water prior to distribution.

Desalination Facility **Drop Down list**	Plant Capacity	Intake Type **Drop down list**	Source Water Type **Drop down list**	Influent TDS	Brine Discharge **Drop down list**	Volume of Water Desalinated					Name(s) of Agencies that Receive this Water
						2021 (AF)	**2022 (AF)**	**2023 (AF)**	**2024 (AF)**	**2025 (AF)**	
Add additional rows as needed											
					Total	0	0	0	0	0	

DWR NOTES:

Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table identifies the units of measure reported in Submittal Table 2-3.

NOTES:

Submittal Table 6-9 Retail: Water Supplies — Projected
Water Code Section 10631 (b)

Water Supply			Projected Water Supply (Report to the Extent Practicable)									
			2030		2035		2040		2045		2050 (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool	Additional Detail on Water Supply	**Potable or Non-Potable** (after treatment if treated) (OPTIONAL) Drop Down list	Reasonably Available Volume (AF)	Total Entitlement (OPTIONAL) See 'DWR Notes' below (AF)	Reasonably Available Volume (AF)	Total Entitlement (OPTIONAL) See 'DWR Notes' below (AF)	Reasonably Available Volume (AF)	Total Entitlement (OPTIONAL) See 'DWR Notes' below (AF)	Reasonably Available Volume (AF)	Total Entitlement (OPTIONAL) See 'DWR Notes' below (AF)	Reasonably Available Volume (AF)	Total Entitlement (OPTIONAL) See 'DWR Notes' below (AF)
Add additional rows as needed												
Purchased or Imported Water	FMWD	Potable	1,785	2,154	1,805	2,154	1,823	2,154	1,841	2,154	1,855	2,154
Groundwater (not desalinated)	CVWD Wells & Well #16 (GWP)	Potable	1,930	3,794	1,953	3,794	1,973	3,794	1,992	3,794	2,007	3,794
		Subtotal Potable	3,715	5,948	3,758	5,948	3,796	5,948	3,833	5,948	3,862	5,948
		Subtotal Non-Potable	0	0	0	0	0	0	0	0	0	0
		Total	3,715	5,948	3,758	5,948	3,796	5,948	3,833	5,948	3,862	5,948

DWR NOTES:

Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.

Total Entitlement: e.g. Water Right, Groundwater Allocation, Contracted Amount.

NOTES: See Section 7.7

Optional Submittal Table O-1B: Recommended Energy Reporting - SINGLE DELIVERY PRODUCT - TOTAL UTILITY APPROACH

Water Delivery Product drop down list (If delivering more than one type of product recommend using Table O-1C)	Retail Potable Deliveries	**Only for Water Delivery Products Under the Urban Water Supplier's Operational Control**		
Start Date of Reporting Period	1/1/2025	**Sum of All Water Management Processes**	**Non-Consequential Hydropower**	
End Date of Reporting Period	12/31/2025			
Is upstream embedded energy in the values reported?	No			
Units of Measure for Water	AF	**Total Utility** See DWR NOTES	**Hydropower**	**Net Utility**
Volume of Water Entering Process		2,061		2,061
Energy Consumed (kWh)		2,100,666		2,100,666
Energy Intensity (kWh/vol. converted to MG)		3,129	-	3,129

DWR NOTES:

Total Utility: The volume of water entered in the "Total Utility" column should equal the volume of water entering the distribution system (excluding recycled water); in most cases, this is the total volume calculated in UWMP Table 4-1: 2025 Actual Total Uses for Potable and Non-Potable Water. Note if recycled water is included in your Submittal Table 4-1, you must exclude it from your volume in this table.

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality (Estimate, Metered Data, Combination of Estimates and Metered Data)

Metered Data

Data Quality Narrative:

Volume shown is based on total water volume delivered. All water volumes are metered. Total water in process within same period is 4,216 AF. Energy consumption is based on all water related facilities within the District's service area and Well #16 from GWP. Energy data is metered and obtained from SCE and GWP. Total energy usage was 4,297,984 kWh.

Narrative:

Energy Intensity is based on the total energy consumption and total water volume. Per Energy Use Excel, Energy Intensity is converted to units of kWh/MG. the District's energy intensity is 3,128.6 kWh/MG.

NOTES:

Optional Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2024-2025, use 2025	Available Supplies if Year Type Repeats ☑ Check the box if quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. **Location:** Section 7 Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available (AF)	% of Average Supply
Average Year			100%
Single-Dry Year			
Consecutive Dry Years 1st Year			
Consecutive Dry Years 2nd Year			
Consecutive Dry Years 3rd Year			
Consecutive Dry Years 4th Year			
Consecutive Dry Years 5th Year			
DWR NOTES: Supplier may use multiple versions of Submittal Table 7-1 R if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Submittal Table 7-1 R, in the "Note" section of each submittal table, state that multiple versions of Submittal Table 7-1 R are being used and identify the particular water source that is being reported in each submittal table. **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Submittal Table 2-3. This table reports the units of measure reported in Submittal Table 2-3.			
NOTES: Section 7			

Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison Water Code Section 10635 (a)					
	2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)	2050 (AF)
Supply totals (autofill from Submittal Table 6-9 R)	3,715	3,758	3,796	3,833	3,862
Use totals (autofill from Submittal Table 4-2 R)	3,715	3,758	3,796	3,833	3,862
Surplus/(shortfall)	0	0	0	0	0
OPTIONAL Planned WSCP Actions					
WSCP - supply augmentation benefit					
WSCP - use reduction savings benefit					
Revised Surplus/(shortfall)					
DWR NOTES : Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.					
NOTES: See Section 7.7					

Submittal Table 7-3 Retail: Single Dry Year Supply and Use Comparison Water Code Section 10635(a)					
	2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)	2050 (AF)
Supply totals	4,123	4,171	4,214	4,253	4,287
Use totals	4,123	4,171	4,214	4,253	4,287
Surplus/(shortfall)	0	0	0	0	0
OPTIONAL Planned WSCP Actions					
WSCP - supply augmentation benefit					
WSCP - use reduction savings benefit					
Revised Surplus/(shortfall)					
DWR NOTES : Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.					
NOTES: See Section 7.7					

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Use Comparison Water Code Section 10635(a)						
		2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)	2050 (AF)
First year	Supply totals	4,299	4,282	4,331	4,375	4,414
	Use totals	4,299	4,282	4,331	4,375	4,414
	Surplus/(shortfall)	0	0	0	0	0
	OPTIONAL Planned WSCP Actions					
	WSCP - supply augmentation benefit					
	WSCP - use reduction savings benefit					
	Revised Surplus/(shortfall)					
Second year	Supply totals	4,516	4,516	4,567	4,611	4,651
	Use totals	4,516	4,516	4,567	4,611	4,651
	Surplus/(shortfall)	0	0	0	0	0
	OPTIONAL WSCP Actions					
	WSCP - supply augmentation benefit					
	WSCP - use reduction savings benefit					
	Revised Surplus/(shortfall)					
Third year	Supply totals	4,546	4,564	4,614	4,658	4,697
	Use totals	4,546	4,564	4,614	4,658	4,697
	Surplus/(shortfall)	0	0	0	0	0
	OPTIONAL Planned WSCP Actions					
	WSCP - supply augmentation benefit					
	WSCP - use reduction savings benefit					
	Revised Surplus/(shortfall)					
Fourth year	Supply totals	4,279	4,312	4,358	4,399	4,435
	Use totals	4,279	4,312	4,358	4,399	4,435
	Surplus/(shortfall)	0	0	0	0	0
	OPTIONAL Planned WSCP Actions					
	WSCP - supply augmentation benefit					
	WSCP - use reduction savings benefit					
	Revised Surplus/(shortfall)					
Fifth year	Supply totals	3,529	3,570	3,607	3,640	3,669
	Use totals	3,529	3,570	3,607	3,640	3,669
	Surplus/(shortfall)	0	0	0	0	0
	OPTIONAL Planned WSCP Actions					
	WSCP - supply augmentation benefit					
	WSCP - use reduction savings benefit					
	Revised Surplus/(shortfall)					
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.						
NOTES: See Section 7.7						

Submittal Table 7-5 Retail: Five-Year Drought Risk Assessment Water Code Section 10635(b)(3)	
2026	**Total**
Total Water Use (AF)	4,299
Total Supplies (AF)	4,299
Surplus/Shortfall w/o WSCP Action	0
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	
WSCP - use reduction savings benefit (AF)	
Revised Surplus/(shortfall)	
2027	**Total**
Total Water Use (AF)	4,516
Total Supplies (AF)	4,516
Surplus/Shortfall w/o WSCP Action	0
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	
WSCP - use reduction savings benefit (AF)	
Revised Surplus/(shortfall)	
2028	**Total**
Total Water Use (AF)	4,546
Total Supplies (AF)	4,546
Surplus/Shortfall w/o WSCP Action	0
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	
WSCP - use reduction savings benefit (AF)	
Revised Surplus/(shortfall)	
2029	**Total**
Total Water Use (AF)	4,279
Total Supplies (AF)	4,279
Surplus/Shortfall w/o WSCP Action	0
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	
WSCP - use reduction savings benefit (AF)	
Revised Surplus/(shortfall)	
2030	**Total**
Total Water Use (AF)	3,529
Total Supplies (AF)	3,529
Surplus/Shortfall w/o WSCP Action	0
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit (AF)	
WSCP - use reduction savings benefit (AF)	
Revised Surplus/(shortfall)	
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.	
NOTES: See Section 7.7	

Submittal Table 8-1: Cross-reference for Standard vs Supplier Shortage Levels Water Code Section 10632(a)(3)(B)			
☑	Check the box if the Supplier uses the Standard six levels of water shortage. Proceed to the next table.		
Standard Shortage Levels	**Percent Shortage Range**	**Suppliers Shortage Levels**	**Percent Shortage Range**
1	Up to 10%		
2	Up to 20%		
3	Up to 30%		
4	Up to 40%		
5	Up to 50%		
6	>50%		
NOTES: See Section 8.7			

Submittal Table 8-2 Retail: Supply Augmentation and Other Actions Water Code Section 10632(a)(4)(A),(C) and (E)				
Yes	Is the Supplier completing this table using the standard six levels? (yes/no)			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier **Drop down list** These are the only categories that will be accepted by the WUEdata online submittal tool	How much is this going to reduce the shortage gap?		Additional Explanation or Reference (OPTIONAL)
		Volume or Percentage Drop down	Shortage Gap Reduction Value (May be a range) (AF)	
Add additional rows as needed				
1	Other Actions (describe)	Percentage	Up to 10%	Standard Water Conservation. FMWD can meet all Member Agency demands. Voluntary water conservation applies.
2	Other Actions (describe)	Percentage	10% to 20%	Increased Water Conservation. Some supplies have been impacted, and consumers should increase efforts to conserve.
3	Other Actions (describe)	Percentage	20% to 30%	Extraordinary Water Conservation. MWD is withdrawing water from most of its storage programs to meet demands. Extraordinary conservation is called for from consumers.
4	Other Actions (describe)	Percentage	30% to 40%	Allocation. MWD has implemented its allocation plan to its member agencies. Thus, supplies are limited.
5	Other Actions (describe)	Percentage	40% to 50%	Critical. Water supplies are reduced drastically.
6	Other Actions (describe)	Percentage	Greater than 50%	Emergency. Water supplies are only available for health and safety needs.
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.				
NOTES: See Section 8.7.9 / Table 8.2				

Submittal Table 8-3 Retail: Demand Reduction Actions
Water Code Section 10632(a)(4)(B),(D), and (E)

Yes	Is the Supplier completing this table using the standard six levels? (yes/no)				
Shortage Level	Demand Reduction Actions **Drop down list** These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.	How much is this going to reduce the shortage gap?		Additional Explanation or Reference (OPTIONAL)	Penalty, Charge, or Other Enforcement? **For Retail Suppliers Only** Drop Down List
		Volume or Percentage Drop down	Shortage Gap Reduction Value (May be a range) (AF)		
Add additional rows as needed					
1	Other - Prohibit use of potable water for washing hard surfaces	Percentage	Up to 10%	Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.	Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation	Percentage	Up to 10%	Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, streets, adjacent lands or into gutters shall not be permitted.	Yes
1	Water Features - Restrict water use for decorative water features, such as fountains	Percentage	Up to 10%	Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	Up to 10%	Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.	Yes
1	Landscape - Limit landscape irrigation to specific times	Percentage	Up to 10%	No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, but not limited to, golf courses, parks, cemeteries and school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings. With the exception of drip irrigation systems or weather based irrigation controllers, residential timers shall not run for more than a total of 10 minutes per station.	Yes
1	Landscape - Other landscape restriction or prohibition	Percentage	Up to 10%	Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.	Yes
1	Landscape - Other landscape restriction or prohibition	Percentage	Up to 10%	No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.	Yes
1	Other	Percentage	Up to 10%	The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.	Yes
1	Pools and Spas - Require covers for pools and spas	Percentage	Up to 10%	Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.	Yes
1	Other	Percentage	Up to 10%	Water for construction purposes including but not limited to de- brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.	Yes
1	Other	Percentage	Up to 10%	The use of potable water from fire hydrants shall be limited to firefighting related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.	Yes
1	CII - Restaurants may only serve water upon request	Percentage	Up to 10%	No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.	Yes
1	CII - Other CII restriction or prohibition	Percentage	Up to 10%	Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about CVWD's water conservation policy and urging guests to conserve water. Water conservation notices will be provided by CVWD.	Yes
1	CII - Lodging establishment must offer opt out of linen service	Percentage	Up to 10%	Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.	Yes
1	CII - Commercial kitchens required to use pre-rinse spray valves	Percentage	Up to 10%	Where applicable, restaurants must utilize water conserving nozzles.	Yes
2	Landscape - Other landscape restriction or prohibition	Percentage	10% - 20%	Watering Days: Odd/Even assigned days	Yes
3	Landscape - Limit landscape irrigation to specific days	Percentage	20% - 30%	Watering Days: Tuesday, Thursday, Saturday	Yes
4	Landscape - Limit landscape irrigation to specific days	Percentage	30% - 40%	Residential and commercial landscape irrigation is limited to no more than two (2) days per week on Tuesday and Saturday. Exempt are public areas owned or operated by School Districts or public use areas greater than 4,000 square feet.	Yes
4	Other water feature or swimming pool restriction	Percentage	30% - 40%	The filling, refilling or adding of water to indoor and outdoor pools, wading pools, or spas is prohibited. Exemptions: Commercial Repairs mandated by the Federal Virginia Graeme Baker Act, or adding water for the prevention of equipment failure is permissible, however, the District strongly urges that a cover be used to prevent evaporation and thereby reducing the frequency of refilling.	Yes
4	Water Features - Restrict water use for decorative water features, such as fountains	Percentage	30% - 40%	The use of water to clean, maintain, fill, or refill decorative fountains or similar structures is prohibited. Exemptions: Adding water for the prevention of equipment failure is permissible.	Yes
4	Other	Percentage	30% - 40%	Vehicle washing is restricted to the use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle.	Yes
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	30% - 40%	Fix leaks within 48 hours.	Yes
5	Landscape - Limit landscape irrigation to specific days	Percentage	40% - 50%	1 day limit per week year-round irrigation.	Yes
6	Landscape - Prohibit all landscape irrigation	Percentage	Greater than 50%	All outdoor water use is prohibited.	Yes
6	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	Greater than 50%	Fix any leaks within 24 hours.	Yes

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.

NOTES: See Section 8.7.9 / Table 8.3

Submittal Table 10-1 Retail: Notification to Cities and Counties Water Code Section 10621(b) and 10642		
City Name	60 Day Notice Drop Down (yes/no)	Notice of Public Hearing Drop Down (yes/no)
Add additional rows as needed		
District Staff	Yes	Yes
District Board	Yes	Yes
Foothill Municipal Water District	Yes	Yes
City of Glendale	Yes	Yes
Glendale Water and Power	Yes	Yes
La Cañada Irrigation District	Yes	Yes
Crescenta Valley Town Council	Yes	Yes
Upper Los Angeles River Area Watermaster	Yes	Yes
Interested General Public	Yes	Yes
County Name Drop Down List	60 Day Notice Drop Down (yes/no)	Notice of Public Hearing Drop Down (yes/no)
Add additional rows as needed		
Los Angeles County	Yes	Yes
NOTES: See Section 1.2		

Appendix F: Dept. of Water Resources SBx7-7 Tables

Crescenta Valley Water District 2025 Urban Water Management Plan

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	32,462
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	4,216			-		-	**4,216**

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Groundwater
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	2,075	-	2,075

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Foothill Municipal Water District
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	2,141		2,141

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*

[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)

2020 Gross Water *Fm SB X7-7 Table 4*	2020 Population *Fm SB X7-7 Table 3*	2020 GPCD
4,216	32,462	**116**

NOTES:

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
116	-	-	-	-	116	142	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Appendix G: UWMP Notices: 60-Day Notice, 2-Week and 1 Week Notices

Crescenta Valley Water District 2025 Urban Water Management Plan

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
Jeffery W. Johnson
Sharon S. Raghavachary
Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Ara Sargsyan
Assistant Director of Community Development
City of Glendale
141 N. Glendale Ave.
Glendale, CA 91206

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Mr. Sargsyan:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

Water Code Section 10621(b) requires an urban water supplier reviewing and considering amendments or changes to its UWMP to notify cities and counties within its service area of the update at least sixty (60) days prior to holding a public hearing. This letter serves as the Crescenta Valley Water District's notice that it is preparing and updating its 2025 UWMP and WSCP and is part of the Crescenta Valley Water District's efforts under Water Code Section 10642 to encourage public involvement in the UWMP and WSCP.

The Crescenta Valley Water District will hold a public hearing to consider, and to receive public comments on its draft 2025 UWMP. The public hearing will be held a minimum of sixty (60) days from the date of this letter at the District's Board Room (located at 2700 Foothill Boulevard, La Crescenta, CA 91214). A public notice stating the specific date, time, and location of the public hearing will be issued two (2) weeks prior to said hearing.

All interested parties are invited to attend the public hearing and to comment on the District's Draft 2025 UWMP. Alternatively, interested parties may submit written comments to the District. Prior to the public hearing, a draft copy of the Crescenta Valley Water District's 2025 UWMP will be made available at the Crescenta Valley Water District Office, 2700 Foothill Blvd, La Crescenta, CA 91214, and on the District's website.

Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
Jeffery W. Johnson
Sharon S. Raghavachary
Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Jeffrey Rodriguez
Crescenta Valley Town Council
PO Box 8676
La Crescenta, CA 91224-0676

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Mr. Rodriguez:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

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Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
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Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Nina Jazmadarian
General Manager
Foothill Municipal Water District
4536 Hampton Road
La Canada, CA 91011

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Ms. Jazmadarian:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

Water Code Section 10621(b) requires an urban water supplier reviewing and considering amendments or changes to its UWMP to notify cities and counties within its service area of the update at least sixty (60) days prior to holding a public hearing. This letter serves as the Crescenta Valley Water District's notice that it is preparing and updating its 2025 UWMP and WSCP and is part of the Crescenta Valley Water District's efforts under Water Code Section 10642 to encourage public involvement in the UWMP and WSCP.

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Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
Jeffery W. Johnson
Sharon S. Raghavachary
Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Chisom Obegolu
Assistant General Manager – Water
Glendale Water and Power
141 N. Glendale Ave
Glendale, CA 91206

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Mr. Obegolu:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

Water Code Section 10621(b) requires an urban water supplier reviewing and considering amendments or changes to its UWMP to notify cities and counties within its service area of the update at least sixty (60) days prior to holding a public hearing. This letter serves as the Crescenta Valley Water District's notice that it is preparing and updating its 2025 UWMP and WSCP and is part of the Crescenta Valley Water District's efforts under Water Code Section 10642 to encourage public involvement in the UWMP and WSCP.

The Crescenta Valley Water District will hold a public hearing to consider, and to receive public comments on its draft 2025 UWMP. The public hearing will be held a minimum of sixty (60) days from the date of this letter at the District's Board Room (located at 2700 Foothill Boulevard, La Crescenta, CA 91214). A public notice stating the specific date, time, and location of the public hearing will be issued two (2) weeks prior to said hearing.

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Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
Jeffery W. Johnson
Sharon S. Raghavachary
Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Amy J. Bodek
Headquarters – Regional Planning
320 West Temple Street, 13th Floor
Los Angeles, CA 90012

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Ms. Bodek:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

Water Code Section 10621(b) requires an urban water supplier reviewing and considering amendments or changes to its UWMP to notify cities and counties within its service area of the update at least sixty (60) days prior to holding a public hearing. This letter serves as the Crescenta Valley Water District's notice that it is preparing and updating its 2025 UWMP and WSCP and is part of the Crescenta Valley Water District's efforts under Water Code Section 10642 to encourage public involvement in the UWMP and WSCP.

The Crescenta Valley Water District will hold a public hearing to consider, and to receive public comments on its draft 2025 UWMP. The public hearing will be held a minimum of sixty (60) days from the date of this letter at the District's Board Room (located at 2700 Foothill Boulevard, La Crescenta, CA 91214). A public notice stating the specific date, time, and location of the public hearing will be issued two (2) weeks prior to said hearing.

All interested parties are invited to attend the public hearing and to comment on the District's Draft 2025 UWMP. Alternatively, interested parties may submit written comments to the District. Prior to the public hearing, a draft copy of the Crescenta Valley Water District's 2025 UWMP will be made available at the Crescenta Valley Water District Office, 2700 Foothill Blvd, La Crescenta, CA 91214, and on the District's website.

Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
Jeffery W. Johnson
Sharon S. Raghavachary
Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Justin Bailey
General Manager
La Cañada Irrigation District
1443 Foothill Blvd.
La Cañada Flintridge, CA 91011

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Mr. Bailey:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

Water Code Section 10621(b) requires an urban water supplier reviewing and considering amendments or changes to its UWMP to notify cities and counties within its service area of the update at least sixty (60) days prior to holding a public hearing. This letter serves as the Crescenta Valley Water District's notice that it is preparing and updating its 2025 UWMP and WSCP and is part of the Crescenta Valley Water District's efforts under Water Code Section 10642 to encourage public involvement in the UWMP and WSCP.

The Crescenta Valley Water District will hold a public hearing to consider, and to receive public comments on its draft 2025 UWMP. The public hearing will be held a minimum of sixty (60) days from the date of this letter at the District's Board Room (located at 2700 Foothill Boulevard, La Crescenta, CA 91214). A public notice stating the specific date, time, and location of the public hearing will be issued two (2) weeks prior to said hearing.

All interested parties are invited to attend the public hearing and to comment on the District's Draft 2025 UWMP. Alternatively, interested parties may submit written comments to the District. Prior to the public hearing, a draft copy of the Crescenta Valley Water District's 2025 UWMP will be made available at the Crescenta Valley Water District Office, 2700 Foothill Blvd, La Crescenta, CA 91214, and on the District's website.

Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Crescenta Valley Water District
2700 Foothill Boulevard, La Crescenta, California 91214
Phone (818) 248-3925 Fax (818) 248-1659

Directors
James D. Bodnar
Kerry D. Erickson
Jeffery W. Johnson
Sharon S. Raghavachary
Jennifer T. Valdez

General Manager
James Lee

March 13, 2026

Richard C. Slade
ULARA Watermaster
c/o Richard C. Slade & Associates LLC
14051 Burbank Blvd Suite 300
Sherman Oaks CA 91401

Subject: **Crescenta Valley Water District Urban Water Management Plan 2025 Update**
Notice Pursuant to Section 10621(b) of the California Water Code

Dear Mr. Slade:

The purpose of this letter is to provide notice that the Crescenta Valley Water District is revising its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) in compliance with the Urban Water Management Planning Act. The Urban Water Management Planning Act and the California Water Code requires every urban water supplier providing water for municipal purposes, either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, to prepare and adopt an UWMP and periodically update that plan at least every five (5) years. The UWMP is a planning document and a source document which reports, describes and evaluates water deliveries and uses, water supply sources and conservation efforts.

Water Code Section 10621(b) requires an urban water supplier reviewing and considering amendments or changes to its UWMP to notify cities and counties within its service area of the update at least sixty (60) days prior to holding a public hearing. This letter serves as the Crescenta Valley Water District's notice that it is preparing and updating its 2025 UWMP and WSCP and is part of the Crescenta Valley Water District's efforts under Water Code Section 10642 to encourage public involvement in the UWMP and WSCP.

The Crescenta Valley Water District will hold a public hearing to consider, and to receive public comments on its draft 2025 UWMP. The public hearing will be held a minimum of sixty (60) days from the date of this letter at the District's Board Room (located at 2700 Foothill Boulevard, La Crescenta, CA 91214). A public notice stating the specific date, time, and location of the public hearing will be issued two (2) weeks prior to said hearing.

All interested parties are invited to attend the public hearing and to comment on the District's Draft 2025 UWMP. Alternatively, interested parties may submit written comments to the District. Prior to the public hearing, a draft copy of the Crescenta Valley Water District's 2025 UWMP will be made available at the Crescenta Valley Water District Office, 2700 Foothill Blvd, La Crescenta, CA 91214, and on the District's website.

Sincerely,

Carla Dillon

Carla Dillon, P.E.
Director of Engineering and Operations

Notice of Public Hearing

This is a notice that the District will conduct a public hearing pursuant to Water Code sections 10642 to receive public comments and consider adoption of a Draft 2025 Urban Water Management Plan (UWMP) and Draft Water Shortage Contingency Plan (WSCP).

In compliance with California Water Code (§§ 10610-10657 and § 10608) the UWMP and WSCP are required to contain detailed evaluations of the water supplies necessary to reliably meet demands over at least a 20-year period in both normal and dry years. Public input from diverse social, cultural and economic elements of the population is encouraged and will be considered during the finalization of the 2025 UWMP.

The Draft 2025 UWMP documents CVWD's plans to ensure adequate water supplies to meet existing and future demands under a range of water supply conditions, including water shortages. The Draft WSCP documents CVWD's plans to manage and mitigate an actual water shortage condition, should one occur because of drought or other impacts on water supplies.

A public hearing will be held on:

TUESDAY,

MAY 26, 2026
7:00 P M

at CVWD Board Room
2700 Foothill Blvd
La Crescenta, CA 91214

A copy of the Draft 2025 UWMP and Draft WSCP can be accessed at www.cvwd.com/uwmp a week before the public hearing.

If you have any questions regarding CVWD's 2025 UWMP, WSCP or the public hearing, please contact us at (818) 248-3925 or feedback@cvwd.com. Written comments may be submitted until May 26, 2026. Public comments can also be made at the in-person public hearing at the time and place listed above. Following the public hearing, CVWD Board of Directors may revise, change, modify and/or adopt the 2025 UWMP and WSCP with recommended modifications as a result of public input.

Appendix H: Final Transmittals to County and State Library

Crescenta Valley Water District 2025 Urban Water Management Plan

Appendix I: ULARA Judgment

Crescenta Valley Water District 2025 Urban Water Management Plan

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

THE CITY OF LOS ANGELES, Plaintiff, vs. CITY OF SAN FERNANDO, ET AL. Defendants.	No. 650079 JUDGMENT

There follows by consecutive paging a Table of Contents (pages i. to vi.), Recitals (page 1), Definitions and List of Attachments (pages 1 to 6), Designation of Parties (page 6), Declaration re Geology and Hydrology (pages 6 to 12), Declaration of Rights (pages 12 to 21), Injunctions (pages 21 to 22), Continuing Jurisdiction (page 23), Watermaster (pages 23 to 29), Physical Solution (pages 29 to 34), and Miscellaneous Provisions (pages 34 to 35), and Attachments (pages 36 to 46). Each and all of said several parts constitute a single integrated Judgment herein.

1. RECITALS

This matter was originally tried before the Honorable Edmund M. Moor, without jury, commencing on March 1, 1966, and concluding with entry of Findings, Conclusions and Judgment on March 14, 1968, after more than 181 trial days. Los Angeles appealed from said judgment and the California Supreme Court, by unanimous opinion, (14 Cal. 3d 199) reversed and remanded the case; after trial of some remaining issues on remand, and consistent with the opinion of the Supreme Court, and pursuant to stipulations, the Court signed and filed Findings of Fact and Conclusions of Law. Good cause thereby appearing,

IT IS ORDERED, ADJUDGED AND DECREED:

2. DEFINITIONS AND ATTACHMENTS

2.1 Definitions of Terms. As used in this Judgment, the following terms shall have the meanings herein set forth:

[1] Basin or Ground Water Basin -- A subsurface geologic formation with defined boundary conditions, containing a ground water reservoir, which is capable of yielding a significant quantity of ground water.

[2] Burbank -- Defendant City of Burbank.

[3] Crescenta Valley -- Defendant Crescenta Valley County Water district.

[4] Colorado Aqueduct -- The aqueduct facilities and system owned and operated by MWD for the importation of water from the Colorado River to its service area.

[5] Deep Rock -- Defendant Evelyn M. Pendleton, dba Deep Rock Artesian Water Company.

[6] Delivered Water -- Water utilized in a water supply distribution system, including reclaimed water.

[7] Eagle Rock Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[8] Extract or Extraction -- To produce ground water, or its production, by pumping or any other means.

[9] Fiscal Year -- July 1 through June 30 of the following calendar year.

[10] Foremost -- Defendant Foremost Foods Company, successor to defendant Sparkletts Drinking Water Corp.

[11] Forest Lawn -- Collectively, defendants Forest Lawn Cemetery Association, Forest Lawn Company, Forest Lawn Memorial-Park Association, and American Security and Fidelity Corporation.

[12] Gage F-57 -- The surface stream gaging station operated by Los Angeles County Flood Control District and situated in Los Angeles Narrows immediately upstream from the intersection of the Los Angeles River and Arroyo Seco, at which point the surface outflow from ULARA is measured.

[13] Glendale -- Defendant City of Glendale.

[14] Ground Water -- Water beneath the surface of the ground and within the zone of saturation.

[15] Hersch & Plumb -- Defendants David and Eleanor A. Hersch and Gerald B. and Lucille Plumb, successors to Wellesley and Duckworth defendants.

[16] Import Return Water -- Ground water derived from percolation attributable to delivered imported water.

[17] Imported Water -- Water used within ULARA, which is derived from sources outside said watershed. Said term does not include inter-basin transfers wholly within ULARA.

[18] In Lieu Storage -- The act of accumulating ground water in a basin by intentional reduction of extractions of ground water which a party has a right to extract.

[19] Lockheed -- Defendant Lockheed Aircraft Corporation.

[20] Los Angeles -- Plaintiff City of Los Angeles, acting by and through its Department of Water and Power.

[21] Los Angeles Narrows -- The physiographic area northerly of Gage F-57 bounded on the east by the San Rafael and Repetto Hills and on the west by the Elysian Hills, through which all natural outflow of the San Fernando Basin and the Los Angeles River flow en route to the Pacific Ocean.

[22] MWD -- The Metropolitan Water District of Southern California, a pubic agency of the State of California.

[23] Native Safe Yield -- That portion of the safe yield of a basin derived from native waters.

[24] Native Waters -- Surface and ground waters derived from precipitation within ULARA.

[25] Overdraft -- A condition which exists when the total annual extractions of ground water from a basin exceed its safe yield, and when any temporary surplus has been removed.

[26] Owens-Mono Aqueduct -- The aqueduct facilities owned and operated by Los Angeles for importation to ULARA water from the Owens River and Mono Basin watersheds easterly of the Sierra-Nevada in Central California.

[27] Private Defendants -- Collectively, all of those defendants who are parties, other than Glendale, Burbank, San Fernando and Crescenta Valley.

[28] Reclaimed Water -- Water which, as a result of processing of waste water, is made suitable for and used for a controlled beneficial use.

[29] Regulatory Storage Capacity -- The volume of storage capacity of San Fernando Basin which is required to regulate the safe yield of the basin, without significant loss, during any long-term base period of water supply.

[30] Rising Water -- The effluent from a ground water basin which appears as surface flow.

[31] Rising Water Outflow -- The quantity of rising water which occurs within a ground water basin and does not rejoin the ground water body or is not captured prior to flowing past a point of discharge from the basin.

[32] Safe Yield - The maximum quantity of water which can be extracted annually from a ground water basin under a given set of cultural conditions and extraction patterns, based on the long-term supply, without causing a continuing reduction of water in storage.

[33] San Fernando -- Defendant City of San Fernando.

[34] San Fernando Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[35] Sportsman's Lodge -- Defendant Sportsman's Lodge Banquet Association.

[36] Stored Water -- Ground water in a basin consisting of either (1) imported or reclaimed water which is intentionally

spread, or (2) safe yield water which is allowed to accumulate by In Lieu Storage. Said ground waters are distinguished and separately accounted for in a ground water basin, notwithstanding that the same may be physically commingled with other waters in the basin.

[37] Sylmar Basin -- The separate ground water basin underlying the area indicated as such on Attachment "A".

[38] Temporary Surplus - The amount of ground water which would be required to be removed from a basin in order to avoid waste under safe yield operation.

[39] Toluca Lake -- Defendant Toluca Lake Property Owners Association.

[40] ULARA or Upper Los Angeles River Area - The Upper Los Angeles River watershed, being the surface drainage area of the Los Angeles River tributary to Gage F-57.

[41] Underlying Pueblo Waters -- Native ground waters in the San Fernando Basin which underlie safe yield and stored waters.

[42] Valhalla -- Collectively, Valhalla Properties, Valhalla Memorial Park, Valhalla Mausoleum Park.

[43] Van de Kamp -- Defendant Van de Kamp's Holland Dutch Bakers, Inc.

[44] Verdugo Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[45] Water Year -- October 1 through September 30 of the following calendar year.

Geographic Names, not herein specifically defined, are used to refer to the places and locations thereof as shown on Attachment "A".

2.2 List of Attachments. There are attached hereto the following documents, which are by this reference incorporated in this Judgment and specifically referred to in the text hereof:

"A" -- Map entitled "Upper Los Angeles River Area", showing Separate Basins therein.

"B" -- List of "Dismissed Parties".

"C" -- List of "Defaulted Parties".

"D" -- List of "Disclaiming Parties".

"E" -- List of "Prior Stipulated Judgments."

"F" -- List of "Stipulated Non-Consumptive or Minimal-Consumptive Use Practices."

"G" -- Map entitled "Place of Use and Service Area of Private Defendants."

"H" -- Map entitled "Public Agency Water Service Areas."

3. PARTIES

3.1 Defaulting and Disclaiming Defendants. Each of the defendants listed on Attachment "C" and Attachment "D" is without any right, title or interest in, or to any claim to extract ground water from ULARA or any of the separate ground water basins therein.

3.2 No Rights Other Than as Herein Declared. No party to this action has any rights in or to the waters of ULARA except to the extent declared herein.

4. DECLARATION RE GEOLOGY AND HYDROLOGY

4.1 Geology.

4.1.1 ULARA. ULARA (or Upper Los Angeles River Area), is the watershed or surface drainage area tributary to the Los

Angeles River at Gage F-57. Said watershed contains a total of 329,000 acres, consisting of approximately 123,000 acres of valley fill area and 206,000 acres of hill and mountain area, located primarily in the County of Los Angeles, with a small portion in the County of Ventura. Its boundaries are shown on Attachment "A". The San Gabriel Mountains form the northerly portion of the watershed, and from them two major washes--the Pacoima and the Tujunga--discharge southerly. Tujunga Wash traverses the valley fill in a southerly direction and joins the Los Angeles River, which follows an easterly course along the base of the Santa Monica Mountains before it turns south through the Los Narrows. The waters of Pacoima Wash as and when they flow out of Sylmar Basin are tributary to San Fernando Basin. Lesser tributary washes run from the Simi Hills and the Santa Susana Mountains in the westerly portion of the watershed. Other minor washes, including Verdugo Wash, drain the easterly portion of the watershed which consists of the Verdugo Mountains, the Elysian, San Rafael and Repetto Hills. Each of said washes is a non-perennial stream whose flood flows and rising waters are naturally tributary to the Los Angeles River. The Los Angeles River within ULARA and most of said tributary natural washes have been replaced, and in some instances relocated, by concrete-lined flood control channels. There are 85.3 miles of such channels within ULARA, 62% of which have lined concrete bottoms.

4.1.2 San Fernando Basin. San Fernando Basin is the major ground water basin in ULARA. It underlies 112,047 acres and is located in the area shown as such on Attachment "A". Boundary conditions of the San Fernando Basin consist on the east and

northeast of alluvial contacts with non-waterbearing series along the San Rafael Hills and Verdugo Mountains and the Santa Susana Mountains and Simi Hills on the northwest and west and the Santa Monica Mountains on the south. Water-bearing material in said basin extends to at least 1000 feet below the surface. Rising water outflow from the San Fernando Basin passes its downstream and southerly boundary in the vicinity of Gage F-57, which is located in Los Angeles Narrows about 300 feet upstream from the Figueroa Street (Dayton Street) Bridge. The San Fernando Basin is separated from the Sylmar Basin on the north by the eroded south limb of the Little Tujunga Syncline which causes a break in the ground water surface of about 40 to 50 feet.

4.1.3 Sylmar Basin. Sylmar Basin underlies 5,565 acres and is located in the area shown as such on Attachment "A". Water-bearing material in said basin extends to depths in excess of 12,000 feet below the surface. Boundary conditions of Sylmar Basin consist of the San Gabriel Mountains on the north, a topographic divide in the valley fill between the Mission Hills and San Gabriel Mountains on the west, the Mission Hills on the southwest, Upper Lopez Canyon Saugus Formation on the east, along the east bank of Pacoima Wash, and the eroded south limb of the Little Tujunga Syncline on the south.

4.1.4 Verdugo Basin. Verdugo Basin underlies 4,400 acres and is located in the area shown as such on Attachment "A". Boundary conditions of Verdugo Basin consist of the San Gabriel Mountains on the north, the Verdugo Mountains on the south and southwest, the San Rafael Hills on the southeast and the topographic divide on the east between the drainage area that is

tributary to the Tujunga Wash to the west and Verdugo Wash to the east, the ground water divide on the west between Monk Hill-Raymond Basin and the Verdugo Basin on the east and a submerged dam constructed at the mouth of Verdugo Canyon on the south.

4.1.5 Eagle Rock Basin. Eagle Rock Basin underlies 807 acres and is located in the area shown as such on Attachment "A". Boundary conditions of Eagle Rock Basin consist of the San Rafael Hills on the north and west and the Repetto Hills on the east and south with a small alluvial area to the southwest consisting of a topographic divide.

4.2 Hydrology.

4.2.1 Water Supply. The water supply of ULARA consists of native waters, derived from precipitation on the valley floor and runoff from the hill and mountain areas, and of imported water from outside the watershed. The major source of imported water has been from the Owens-Mono Aqueduct, but additional supplies have been and are now being imported through MWD from its Colorado Aqueduct and the State Aqueduct.

4.2.2 Ground Water Movement. The major water-bearing formation in ULARA is the valley fill material bounded by hills and mountains which surround it. Topographically, the valley-fill area has a generally uniform grade in a southerly and easterly direction with the slope gradually decreasing from the base of the hills and mountains to the surface drainage outlet at Gage F-57. The valley fill material is a heterogeneous mixture of clays, silts, sand and gravel laid down as alluvium. The valley fill is of greatest permeability along and easterly of Pacoima and Tujunga Washes and generally throughout the eastern

portion of the valley fill area, except in the vicinity of Glendale where it is of lesser permeability. Ground water occurs mainly within the valley fill, with only negligible amounts occurring in hill and mountain areas. There is no significant ground water movement from the hill and mountain formations into the valley fill. Available geologic data do not indicate that there are any sources of native ground water other than those derived from precipitation. Ground water movement in the valley fill generally follows the surface topography and drainage except where geologic or man-made impediments occur or where the natural flow has been modified by extensive pumping.

4.2.3 Separate Ground Water Basins. The physical and geologic characteristics of each of the ground water basins, Eagle rock, Sylmar, Verdugo and San Fernando, cause impediments to inter-basin ground water flow whereby there is created separate underground reservoirs. Each of said basins contains a common source of water supply to parties extracting ground water from each of said basins. The amount of underflow from Sylmar Basin, Verdugo Basin and Eagle Rock Basin to San Fernando Basin is relatively small, and on the average has been approximately 540 acre feet per year from the Sylmar Basin; 80 acre feet per year from Verdugo Basin; and 50 acre feet per year from Eagle Rock Basin. Each has physiographic, geologic and hydrologic differences, one from the other, and each meets the hydrologic definition of "basin". The extractions of water in the respective basins affect the other water users within that basin but do not significantly or materially affect the ground water levels in any of the other basins. The underground reservoirs of

Eagle Rock, Verdugo and Sylmar Basins are independent of one another and of the San Fernando Basin.

4.2.4 Safe Yield and Native Safe Yield. The safe yield and native safe yield, stated in acre feet, of the three largest basins for the year 1964-65 was as follows:

Basin	Safe Yield	Native Safe Yield
San Fernando	90,680	43,660
Sylmar	6,210	3,850
Verdugo	7,150	3,590

The safe yield of Eagle Rock Basin is derived from imported water delivered by Los Angeles. There is no measurable native safe yield.

4.2.5 Separate Basins -- Separate Rights. The rights of the parties to extract ground water within ULARA are separate and distinct as within each of the several ground water basins within said watershed.

4.2.6 Hydrologic Condition of Basins. The several basins within ULARA are in varying hydrologic conditions, which result in different legal consequences.

4.2.6.1 San Fernando Basin. The first full year of overdraft in San Fernando Basin was 1954-55. It remained in overdraft continuously until 1968, when an injunction herein became effective. Thereafter, the basin was placed on safe yield operation. There is no surplus ground water available for appropriation or overlying use from San Fernando Basin.

4.2.6.2 Sylmar Basin. Sylmar Basin is not in overdraft. There remains safe yield over and above the present reasonable beneficial overlying uses, from which

safe yield the appropriative rights of Los Angeles and San Fernando may be and have been exercised.

4.2.6.3 Verdugo Basin. Verdugo Basin was in overdraft for more than five consecutive years prior to 1968. Said basin is not currently in overdraft, due to decreased extractions by Glendale and Crescenta Valley on account of poor water quality. However, the combined appropriative and prescriptive rights of Glendale and Crescenta Valley are equivalent to the safe yield of the Basin. No private overlying or appropriative rights exist in Verdugo Basin.

4.2.6.4 Eagle Rock Basin. The only measure water supply to Eagle Rock Basin is import return water by reason of importations by Los Angeles. Extractions by Foremost and Deep Rock under the prior stipulated judgments have utilized the safe yield of Eagle Rock Basin, and have maintained hydrologic equilibrium therein.

5. DECLARATION OF RIGHTS

5.1 Right to Native Waters.

5.1.1 Los Angeles River and San Fernando Basin.

5.1.1.1 Los Angeles' Pueblo Right. Los Angeles, as the successor to all rights, claims and powers of the Spanish Pueblo de Los Angeles in regard to water rights, is the owner of a prior and paramount pueblo right to the surface waters of the Los Angeles River and the native ground waters of San Fernando Basin to meet its reasonable beneficial needs and for its inhabitants.

5.1.1.2 Extent of Pueblo Right. Pursuant to said pueblo right, Los Angeles is entitled to satisfy its needs and those of its inhabitants within its boundaries as from time to time modified. Water which is in fact used for pueblo right purposes is and shall be deemed needed for such purposes.

5.1.1.3 Pueblo Right -- Nature and Priority of Exercise. The pueblo right of Los Angeles is a prior and paramount right to all of the surface waters of the Los Angeles River, and native ground water in San Fernando Basin, to the extent of the reasonable needs and uses of Los Angeles and its inhabitants throughout the corporate area of Los Angeles, as its boundaries may exist from time to time. To the extent that the Basin contains native waters and imported waters, it is presumed that the first water extracted by Los Angeles in any water year is pursuant to its pueblo right, up to the amount of the native safe yield. The next extractions by Los Angeles in any year are deemed to be from import return water, followed by stored water, to the full extent of Los Angeles' right to such import return water and stored water. In the event of need to meet water requirements of its inhabitants, Los Angeles has the additional right, pursuant to its pueblo right, withdraw temporarily from storage Underlying Pueblo Waters, subject to an obligation to replace such water as soon as practical.

5.1.1.4 Rights of Other Parties. No other party to this action has any right in or to the surface waters of the

Los Angeles River or the native safe yield of the San Fernando Basin.

5.1.2 Sylmar Basin Rights.

5.1.2.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground waters in Sylmar Basin.

5.1.2.2 Overlying Rights. Defendants Moordigian and Hersch & Plumb own lands overlying Sylmar Basin and have a prior correlative right to extract native waters from said Basin for reasonable beneficial uses on their said overlying lands. Said right is appurtenant to said overlying lands and water extracted pursuant thereto may not be exported from said lands nor can said right be transferred or assigned separate and apart from said overlying lands.

5.1.2.3 Appropriative Rights of San Fernando and Los Angeles. San Fernando and Los Angeles own appropriative rights, of equal priority, to extract and put to reasonable beneficial use for the needs of said cities and their inhabitants, native waters of the Sylmar Basin in excess of the exercised reasonable beneficial needs of overlying users. Said appropriative rights are:

San Fernando	3,580 acre feet
Los Angeles	1,560 acre feet.

5.1.2.4 No Prescription. The Sylmar Basin is not presently in a state of overdraft and no rights by prescription exist in said Basin against any overlying or appropriative water user.

5.1.2.5 Other Parties. No other party to this action owns or possesses any right to extract native ground waters from the Sylmar Basin.

5.1.3 Verdugo Basin Rights.

5.1.3.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground water in Verdugo Basin.

5.1.3.2 Prescriptive Rights of Glendale and Crescenta Valley. Glendale and Crescenta Valley own prescriptive rights as against each other and against all private overlying or appropriative parties in the Verdugo Basin to extract, with equal priority, the following quantities of water from the combined safe yield of native and imported waters in Verdugo Basin:

Glendale	3,856 acre feet
Crescenta Valley	3,294 acre feet.

5.1.3.3 Other Parties. No other party to this action owns or possesses any right to extract native ground waters from the Verdugo Basin.

5.1.4 Eagle Rock Basin Rights.

5.1.4.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground water in Eagle Rock Basin.

5.1.4.2 No Rights in Native Waters. The Eagle Rock Basin has no significant or measurable native safe yield and no parties have or assert any right or claim to native waters in said Basin.

5.2 Rights to Imported Waters.

5.2.1 San Fernando Basin Rights.

5.2.1.1 Rights to Recapture Import Return Water. Los Angeles, Glendale, Burbank and San Fernando have each caused imported waters to be brought into ULARA and to be delivered to lands overlying the San Fernando Basin, with the result that percolation and return flow of such delivered water has caused imported waters to become a part of the safe yield of San Fernando Basin. Each of said parties has a right to extract from San Fernando Basin that portion of the safe yield of the Basin attributable to such import return waters.

5.2.1.2 Rights to Store and Recapture Stored Water. Los Angeles has heretofore spread imported water directly in San Fernando Basin. Los Angeles, Glendale, Burbank and San Fernando each have rights to store water in San Fernando Basin by direct spreading or in lieu practices. To the extent of any future spreading or in lieu storage of import water or reclaimed water by Los Angeles, Glendale, Burbank or San Fernando, the party causing said water to be so stored shall have a right to extract an equivalent amount of ground water from San Fernando Basin. The right to extract waters attributable to such storage practices is an undivided right to a quantity of water in San Fernando Basin equal to the amount of such Stored Water to the credit of any party, as reflected in Watermaster records.

5.2.1.3 Calculation of Import Return Water and Stored Water Credits. The extraction rights of Los Angeles, Glendale, Burbank and San Fernando in San Fernando Basin in

any year, insofar as such rights are based upon import return water, shall only extend to the amount of any accumulated import return water credit of such party by reason of imported water delivered after September 30, 1977. The annual credit for such import return water shall be calculated by Watermaster based upon the amount of delivered water during the preceding water year, as follows:

Los Angeles:	20.8% of all delivered water (including reclaimed water) to valley fill lands of San Fernando Basin.
San Fernando:	26.3% of all imported and reclaimed water delivered to valley-fill lands of San Fernando Basin.
Burbank:	20.0% of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas.
Glendale:	20.0% of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas (i.e., total delivered water, [including reclaimed water], less 105% of total sales by Glendale in Verdugo Basin and its tributary hills).

In calculating Stored Water credit, by reason of direct spreading of imported or reclaimed water, Watermaster shall assume that 100% of such spread water reached the ground water in the year spread.

5.2.1.4 Cumulative Import Return Water Credits. Any import return water which is not extracted in a given water year shall be carried over, separately accounted for,

and maintained as a cumulative credit for purposes of future extractions.

5.2.1.5 Overextractions. In addition to extractions of stored water, Glendale, Burbank or San Fernando may, in any water year, extract from San Fernando Basin an amount not exceeding 10% of such party's last annual credit for import return water, subject, however, to an obligation to replace such overextraction by reduced extractions during the next succeeding water year. Any such overextraction which is not so replaced shall constitute physical solution water, which shall be deemed to have been extracted in said subsequent water year.

5.2.1.6 Private Defendant. No private defendant is entitled to extract water from the San Fernando Basin on account of the importation of water thereto by overlying public entities.

5.2.2 Sylmar Basin Rights.

5.2.2.1 Rights to Recapture Import Return Waters. Los Angeles and San Fernando have caused imported waters to be brought into ULARA and delivered to lands overlying the Sylmar Basin with the result that percolation and return flow of such delivered water has caused imported waters to become a part of the safe yield of Sylmar Basin. Los Angeles and San Fernando are entitled to recover from Sylmar Basin such imported return waters. In calculating the annual entitlement to recapture such import return water, Los Angeles and San Fernando shall be entitled to 35.7% of the preceding water year's imported water delivered by such

party to lands overlying Sylmar Basin. Thus, by way of example, in 1976-77, Los Angeles was entitled to extract 2370 acre feet of ground water from Sylmar Basin, based on delivery to lands overlying said Basin of 6640 acre feet during 1975-76. The quantity of San Fernando's imported water to, and the return flow therefrom, in the Sylmar Basin in the past has been of such minimal quantities that it has not been calculated.

5.2.2.2 Rights to Store and Recapture Stored Water. Los Angeles and San Fernando each have the right to store water in Sylmar Basin equivalent to their rights in San Fernando Basin under paragraph 5.2.1.2 hereof.

5.2.2.3 Carry Over. Said right to recapture stored water, import return water and other safe yield waters to which a party is entitled, if not exercised in a given year, can be carried over for not to exceed five years, if the underflow through Sylmar Notch does not exceed 400 acre feet per year.

5.2.2.4 Private Defendants. No private defendant is entitled to extract water from within the Sylmar Basin on account of the importation of water thereto by overlying public entities.

5.2.3 Verdugo Basin Rights.

5.2.3.1 Glendale and Crescenta Valley. Glendale and Crescenta Valley own appropriative and prescriptive rights in and to the total safe yield of Verdugo Basin, without regard as to the portions thereof derived from native water and from delivered imported waters,

notwithstanding that both of said parties have caused waters to be imported and delivered on lands overlying Verdugo Basin. Said aggregate rights are as declared in Paragraph 5.1.3.2 of these Conclusions.

5.2.3.2 Los Angeles. Los Angeles may have a right to recapture its import return waters by reason of delivered import water in the Basin, based upon imports during and after water year 1977-78, upon application to Watermaster not later than the year following such import and on subsequent order after hearing by the Court.

5.2.3.3 Private Defendants. No private defendant, as such, is entitled to extract water from within the Verdugo Basin on account of the importation of water thereto by overlying public entities.

5.2.4 Eagle Rock Basin Rights.

5.2.4.1 Los Angeles. Los Angeles has caused imported water to be delivered for use on lands overlying Eagle Rock Basin and return flow from said delivered imported water constitutes the entire safe yield of Eagle Rock Basin. Los Angeles has the right to extract or cause to be extracted the entire safe yield of Eagle Rock Basin.

5.2.4.2 Private Defendants. No private defendants have a right to extract water from within Eagle Rock Basin, except pursuant to the physical solution herein.

6. INJUNCTIONS

Each of the parties named or referred to in this Part 6, its officers, agents, employees and officials is, and they are, hereby

ENJOINED and RESTRAINED from doing or causing to be done any of the acts herein specified:

6.1 Each and Every Defendant -- from diverting the surface waters of the Los Angeles River or extracting the native waters of SAN FERNANDO BASIN, or in any manner interfering with the prior and paramount pueblo right of Los Angeles in and to such waters, except pursuant to the physical solution herein decreed.

6.2 Each and Every Private Defendant -- from extracting ground water from the SAN FERNANDO, VERDUGO, or EAGLE ROCK BASINS, except pursuant to physical solution provisions hereof.

6.3 Defaulting and Disclaiming Parties (listed in Attachments "C" and "D") -- from diverting or extracting water within ULARA, except pursuant to the physical solution herein decreed.

6.4 Glendale -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution; and from extracting water from VERDUGO BASIN n excess of its appropriative and prescriptive right declared herein.

6.5 Burbank -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution decreed herein.

6.6 San Fernando -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution herein decreed.

6.7 Crescenta Valley -- from extracting ground water from VERDUGO BASIN in any year in excess of its appropriative and prescriptive right declared herein.

6.8 Los Angeles -- from extracting ground water from SAN FERNANDO BASIN in any year in excess of the native safe yield, plus any import return water credit and stored water credit of said city; provided, that where the needs of Los Angeles require the extraction of Underlying Pueblo Waters, Los Angeles may extract such water subject to an obligation to replace such excess as soon as practical; and from extracting ground water from VERDUGO BASIN in excess of any credit for import return water which Los Angeles may acquire by reason of delivery of imported water for use overlying said basin, as hereinafter confirmed on application to Watermaster and by subsequent order of the Court.

6.9 Non-consumptive and Minimal Consumptive Use Parties. The parties listed in Attachment "F" are enjoined from extracting water from San Fernando Basin, except in accordance with practices specified in Attachment "F", or pursuant to the physical solution herein decreed.

7. CONTINUING JURISDICTION

7.1 Jurisdiction Reserved. Full jurisdiction, power and authority are retained by and reserved to the Court for purposes of enabling the Court upon application of any party or of the Watermaster by motion and upon at least 30 days' notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate, for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment or to add to the provisions thereof consistent with the rights herein decreed; provided, however, that no such modification, amendment or amplification shall result in a change in the provisions of Section 5.2.1.3 or 9.2.1 hereof.

8. WATERMASTER

8.1 Designation and Appointment.

8.1.1 Watermaster Qualification and Appointment. A qualified hydrologist, acceptable to all active public agency parties hereto, will be appointed by subsequent order of the Court to assist the Court in its administration and enforcement of the provisions of this Judgment and any subsequent orders of the Court entered pursuant to the Court's continuing jurisdiction. Such Watermaster shall serve at the pleasure of the Court, but may be removed or replaced on motion of any party after hearing and showing of good cause.

8.2 Powers and Duties.

8.2.1 Scope. Subject to the continuing supervision and control of the Court, Watermaster shall exercise the express powers, and shall perform the duties, as provided in this

Judgment or hereafter ordered or authorized by the Court in the exercise of the Court's continuing jurisdiction.

8.2.2 Requirement for Reports, Information and Records. Watermaster may require any party to furnish such reports, information and records as may be reasonably necessary to determine compliance or lack of compliance by any party with the provisions of this Judgment.

8.2.3 Requirement of Measuring Devices. Watermaster shall require all parties owning or operating any facilities for extraction of ground water from ULARA to install and maintain at all times in good working order, at such party's own expense, appropriate meters or other measuring devices satisfactory to the Watermaster.

8.2.4 Inspection by Watermaster. Watermaster shall make inspections of (a) ground water extraction facilities and measuring devices of any party, and (b) water use practices by any party under physical solution conditions, at such times and as often as may be reasonable under the circumstances to verify reported data and practices of such party. Watermaster shall also identify and report on any new or proposed new ground water extractions by any party or non-party.

8.2.5 Policies and Procedures. Watermaster shall, with the advice and consent of the Administrative Committee, adopt and amend from time to time Policies and Procedures as may be reasonably necessary to guide Watermaster in performance of its duties, powers and responsibilities under the provisions of this judgment.

8.2.6 Data Collection. Watermaster shall collect and verify data relative to conditions of ULARA and its ground water basins from the parties and one or more other governmental agencies. Where necessary, and upon approval of the Administrative Committee, Watermaster may develop supplemental data.

8.2.7 Cooperation With Other Agencies. Watermaster may act jointly or cooperate with agencies of the United States and the State of California or any political subdivisions, municipalities or districts (including any party) to secure or exchange data to the end that the purpose of this Judgment, including its physical solution, may be fully and economically carried out.

8.2.8 Accounting for Non-consumptive Use. Watermaster shall calculate and report annually the non-consumptive and consumptive uses of extracted ground water by each party listed in Attachment "F".

8.2.9 Accounting for Accumulated Import Return Water and Stored Water. Watermaster shall record and verify additions, extractions and losses and maintain an annual and cumulative account of all (a) stored water and (b) import return water in San Fernando Basin. Calculation of losses attributable to Stored Water shall be approved by the Administrative Committee or by subsequent order of the Court. For purposes of such accounting, extractions in any water year by Glendale, Burbank or San Fernando shall be assumed to be first from accumulated import return water, second from stored water, and finally pursuant to physical solution; provided, that any such city may, by written

notice of intent to Watermaster, alter said priority of extractions as between import return water and stored water.

8.2.10 Recalculation of Safe Yield. Upon request of the Administrative Committee, or on motion of any party and subsequent Court order, Watermaster shall recalculate safe yield of any basin within ULARA. If there has been a material long-term change in storage over a base period (excluding any effects of stored water) in San Fernando Basin the safe yield shall be adjusted by making a corresponding change in native safe yield of the Basin.

8.2.11 Watermaster Report. Watermaster shall prepare annually and (after review and approval by Administrative Committee) cause to be served on all active parties, on or before May 1, a report of hydrologic conditions and Watermaster activities within ULARA during the preceding water year. Watermaster's annual report shall contain such information as may be requested by the Administrative Committee, required by Watermaster Policies and Procedures or specified by subsequent order of this Court.

8.2.12 Active Party List. Watermaster shall maintain at all times a current list of active parties and their addresses.

8.3 Administrative Committee.

8.3.1 Committee to be Formed. An Administrative Committee shall be formed to advise with, request or consent to, and review actions of Watermaster. Said Administrative Committee shall be composed of one representative of each party having a right to extract ground water from ULARA, apart from the physical

solution. Any such party not desiring to participate in such committee shall so advise Watermaster in writing.

8.3.2 Organization and Voting. The Administrative Committee shall organize and adopt appropriate rules and regulations to be included in Watermaster Policies and Procedures. Action of the Administrative Committee shall be by unanimous vote of its members, or of the members affected in the case of an action which affects one or more basins but less than all of ULARA. In the event of inability of the Committee to reach a unanimous position, the matter may, at the request of Watermaster or any party, be referred to the Court for resolution by subsequent order after notice and hearing.

8.3.3 Function and Powers. The Administrative Committee shall be consulted by Watermaster and shall request or approve all discretionary Watermaster determinations. In the event of disagreement between Watermaster and the Administrative Committee, the matter shall be submitted to the Court for review and resolution.

8.4 Watermaster Budget and Assessments.

8.4.1 Watermaster's Proposed Budget. Watermaster shall, on or before May 1, prepare and submit to the Administrative Committee a budget for the ensuing water year. The budget shall be determined for each basin separately and allocated between the separate ground water basins. The total for each basin shall be allocated between the public agencies in proportion to their use of ground water from such basin during the preceding water year.

8.4.2 Objections and Review. Any party who objects to the proposed budget, or to such party's allocable share thereof, may

apply to the Court within thirty (30) days of receipt of the proposed budget from Watermaster for review and modification. Any such objection shall be duly noticed to all interested parties and heard within thirty (30) days of notice.

8.4.3 Notice of Assessment. After thirty (30) days from delivery of Watermaster's proposed budget, or after the order of Court settling any objections thereto, Watermaster shall serve notice on all parties to be assessed of the amount of assessment and the required payment schedule.

8.4.4 Payment. All assessments for Watermaster expenses shall be payable on the dates designated in the notice of assessment.

8.5 Review of Watermaster Activities.

8.5.1 Review Procedures. All actions of Watermaster (other than budget and assessment matters, which are provided for in Paragraph 8.4.2) shall be subject to review by the Court on its own motion or on motion by any party, as follows:

8.5.1.1 Noticed Motion. Any party may, by a regularly noticed motion, apply to the court for review of any Watermaster's action. Notice of such motion shall be served personally or mailed to Watermaster and to all active parties.

8.5.1.2 De Novo Nature of Proceedings. Upon the filing of any such motion, the Court shall require the moving party to notify the active parties of a date for taking evidence and argument, and on the date so designated shall review de novo the question at issue. Watermaster's findings or decision, if any, may be received in evidence at

said hearing, but shall not constitute presumptive or prima facie proof of any fact in issue.

8.5.1.3 Decision. The decision of the Court in such proceeding shall be an appealable supplemental order in this case. When the same is final, it shall be binding upon the Watermaster and all parties.

9. PHYSICAL SOLUTION

9.1 Circumstances Indicating Need for Physical Solution. During the period between 1913 and 1955, when there existed temporary surplus waters in the San Fernando Basin, overlying cities and private overlying landowners undertook to install and operate water extraction, storage and transmission facilities to utilize such temporary surplus waters. If the injunction against interference with the prior and paramount rights of Los Angeles to the waters of the San Fernando and Eagle Rock Basins were strictly enforced, the value and utility of those water systems and facilities would be lost or impaired. It is appropriate to allow continued limited extraction from the San Fernando and Eagle Rock Basins by parties other than Los Angeles, subject to assurance that Los Angeles will be compensated for any cost, expense or loss incurred as a result thereof.

9.2 Prior Stipulated Judgments. Several defendants heretofore entered into separate stipulated judgments herein, during the period June, 1958 to November, 1965, each of which judgments was subject to the court's continuing jurisdiction. Without modification of the substantive terms of said prior judgments, the same are categorized and merged into this judgment and superseded hereby in the exercise of the Court's continuing jurisdiction, as follows:

9.2.1 Eagle Rock Basin Parties. Stipulating defendants Foremost and Deep Rock have extracted water from Eagle Rock Basin, whose entire safe yield consist of import return waters of Los Angeles. Said parties may continue to extract water from Eagle Rock Basin to supply their bottled drinking water requirements upon filing all required reports on said extraction with Watermaster and Los Angeles and paying Los Angeles annually an amount equal to $21.78 per acre foot for the first 200 acre feet, and $39.20 per acre foot for any additional water extracted in any water year.

9.2.2 Non-consumptive or Minimal-consumptive Operations. Certain stipulating defendants extract water from San Fernando Basin for uses which are either non-consumptive or have a minimal consumptive impact. Each of said defendants who have a minimal consumptive impact has a connection to the City of Los Angeles water system and purchases annually an amount of water at least equivalent to the consumptive loss of extracted ground water. Said defendants are:

Non-Consumptive

Walt Disney Productions

Sears, Roebuck & Co.

Minimal-Consumptive

Conrock Co., for itself and as successor to California Materials Co.; Constance Ray White and Lee L. White; Mary L. Akmadzich and Peter J. Akmadzich

Livingston Rock & Gravel, for itself and as successor to Los Angeles Land & Water Co.

The nature of each said defendant's water use practices is described in Attachment "F". Subject to required reports to and inspections by Watermaster, each said defendant may continue extractions for said purposes so long as in any year such party continues such non-consumptive or minimal-consumptive use practices.

9.2.3 Abandoned Operations. The following stipulating defendants have ceased extracting water from San Fernando Basin and no further need exists for physical solution in their behalf:

Knickerbocker Plastic Company, Inc.

Carnation Company

Hidden Hills Mutual Water Company

Southern Pacific Railroad Co.

Pacific Fruit Express Co.

9.3 Private Defendants. There are private defendants who installed during the years of temporary surplus relatively substantial facilities to extract and utilize ground waters of San Fernando Basin. Said defendants may continue their extractions for consumptive use up to the indicated annual quantities upon payment of compensation to the appropriate city wherein their use of water is principally located, on the basis of the following physical solution:

9.3.1 Private Defendants and Appropriate Cities. Said private defendants and the cities to which their said extractions shall be charged and to which physical solution payment shall be made are:

			Annual Quantities (acre feet)
Los Angeles	-	Toluca Lake	100
		Sportsman's Lodge	25
		Van de Kamp	120
Glendale	-	Forest Lawn	400
		Southern Service Co.	75
Burbank	-	Valhalla	300
		Lockheed	25

Provided that said private defendants shall not develop, install or operate new wells or other facilities which will increase existing extraction capacities.

9.3.2 Reports and Accounting. All extractions pursuant to this physical solution shall be subject to such reasonable reports and inspection as may be required by Watermaster.

9.3.3 Payment. Water extracted pursuant hereto shall be compensated for by annual payment to Los Angeles, and as agreed upon pursuant to paragraph 9.3.3.2 to Glendale and Burbank, thirty days from day of notice by Watermaster, on the following basis:

9.3.3.1 Los Angeles. An amount equal to what such party would have paid had water been delivered from the distribution system of Los Angeles, less the average energy cost of extraction of ground water by Los Angeles from San Fernando.

9.3.3.2 Glendale or Burbank. An amount equal to the sum of the amount payable to Los Angeles under paragraph 9.4 hereof and any additional charges or conditions agreed upon by either such city and any private defendant.

9.4 Glendale and Burbank. Glendale and Burbank have each installed, during said years of temporary surplus, substantial facilities to extract and utilize waters of the San Fernando Basin. In addition to the use of such facilities to recover import return water, the distribution facilities of such cities can be most efficiently utilized by relying upon the San Fernando Basin for peaking supplies in order to reduce the need for extensive new surface storage. Glendale and Burbank may extract annual quantities of ground water from the San Fernando Basin, in addition to their rights to import return water or stored water, as heretofore declared, in quantities up to:

Glendale	5,500 acre feet
Burbank	4,200 acre feet;

provided, that said cities shall compensate Los Angeles annually for any such excess extractions over and above their declared rights at a rate per acre foot equal to the average MWD price for municipal and industrial water delivered to Los Angeles during the fiscal year, less the average energy cost of extraction of ground water by Los Angeles from San Fernando Basin during the preceding fiscal year. Provided, further, that ground water extracted by Forest Lawn and Southern Service Co. shall be included in the amount taken by Glendale, and the amount extracted by Valhalla and Lockheed shall be included in the amount taken by Burbank. All water taken by Glendale or Burbank pursuant hereto shall be charged against Los Angeles' rights in the

year of such extractions.

In the event of emergency, and upon stipulation or motion and subsequent order of the Court, said quantities may be enlarged in any year.

9.5 San Fernando. San Fernando delivers imported water on lands overlying the San Fernando Basin, by reason of which said city has a right to recover import return water. San Fernando does not have water extraction facilities in the San Fernando Basin, nor would it be economically or hydrologically useful for such facilities to be installed. Both San Fernando and Los Angeles have decreed appropriative rights and extraction facilities in the Sylmar Basin. San Fernando may extract ground water from the Sylmar Basin in a quantity sufficient to utilize its San Fernando Basin import return water credit, and Los Angeles shall reduce its Sylmar Basin extractions by an equivalent amount and receive an offsetting entitlement for additional San Fernando Basin extractions.

9.6 Effective Date. This physical solution shall be effective on October 1, 1978, based upon extractions during water year 1978-79.

10. MISCELLANEOUS PROVISIONS

10.1 Designation of Address for Notice and Service. Each party shall designate the name and address to be used for purposes of all subsequent notices and service herein by a separate designation to be filed with Watermaster within thirty (30) days after Notice of Entry of Judgment has been served. Said designation may be changed from time to time by filing a written notice of such change with the Watermaster. Any party desiring to be relieved of receiving notices of Watermaster activity may file a waiver of notice on a form to be

provided by Watermaster. Thereafter such party shall be removed from the Active Party list. For purposes of service on any party or active party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to such party or active party under or pursuant to the Judgment, such service shall be made personally or by deposit in the United States mail, first class, postage prepaid, addressed to the designee and at the address in the latest designation filed by such party or active party.

10.2 Notice of Change in Hydrologic Condition -- Sylmar Basin. If Sylmar Basin shall hereafter be in a condition of overdraft due to increased or concurrent appropriations by Los Angeles and San Fernando, Watermaster shall so notify the Court and parties concerned, and notice of such overdraft and the adverse effect thereof on private overlying rights shall be given by said cities as prescribed by subsequent order of the Court, after notice and hearing.

10.3 Judgment Binding on Successors. This Judgment and all provisions thereof are applicable to and binding upon not only the parties to this action, but also upon their respective heirs, executors, administrators, successors, assigns, lessees and licensees and upon the agents, employees and attorneys in fact of all such persons.

10.4 Costs. Ordinary court costs shall be borne by each party, and reference costs shall be borne as heretofore allocated and paid.

DATED: _____, 1979.

_____
Judge of the Superior Court

TABLE OF CONTENTS

	Page
1. RECITALS	1
2. DEFINITIONS AND ATTACHMENTS	1
2.1 Definition of Terms	1
2.2 List of Attachments	6
3. PARTIES	6
3.1 Defaulting and Disclaiming Defendants	6
3.2 No Rights Other Than as Herein Declared	6
4. DECLARATION RE GEOLOGY AND HYDROLOGY	6
4.1 Geology	6
4.1.1 ULARA	6
4.1.2 San Fernando Basin	7
4.1.3 Sylmar Basin	8
4.1.4 Verdugo Basin	8
4.1.5 Eagle Rock Basin	9
4.2 Hydrology	9
4.2.1 Water Supply	9
4.2.2 Ground Water Movement	9
4.2.3 Separate Ground Water Basins	10
4.2.4 Safe Yield and Native Safe Yield	11
4.2.5 Separate Basins -- Separate Rights	11
4.2.6 Hydrologic Condition of Basins	11
4.2.6.1 San Fernando Basin	11
4.2.6.2 Sylmar Basin	12
4.2.6.3 Verdugo Basin	12
4.2.6.4 Eagle Rock Basin	12
5. DECLARATION OF RIGHTS	12

Page

5.1 Right to Native Waters 12
5.1.1 Los Angeles River and San Fernando Basin. . . 12
5.1.1.1 Los Angeles' Pueblo Right. 12
5.1.1.2 Extent of Pueblo Right 13
5.1.1.3 Pueblo Right -- Nature and Priority of Exercise 13
5.1.1.4 Rights of Other Parties 14
5.1.2 Sylmar Basin Rights 14
5.1.2.1 No Pueblo Rights 14
5.1.2.2 Overlying Rights 14
5.1.2.3 Appropriative Rights of San Fernando and Los Angeles 14
5.1.2.4 No Prescription 15
5.1.2.5 Other Parties 15
5.1.3 Verdugo Basin Rights 15
5.1.3.1 No Pueblo Rights 15
5.1.3.2 Prescriptive Rights of Glendale and Crescenta Valley 15
5.1.3.3 Other Parties 15
5.1.4 Eagle Rock Basin Rights 15
5.1.4.1 No Pueblo Rights 15
5.1.4.2 No Rights in Native Waters 16
5.2 Rights to Imported Waters 16
5.2.1 San Fernando Basin Rights 16
5.2.1.1 Rights to Recapture Import Return Water 16
5.2.1.2 Rights to Store and Recapture Stored Water 16

Page

5.2.1.3 Calculation of Import Return Water and Stored Water Credits . 17
5.2.1.4 Cumulative Import Return Water Credits 18
5.2.1.5 Overextractions 18
5.2.1.6 Private Defendant 18
5.2.2 Sylmar Basin Rights 18
5.2.2.1 Rights to Recapture Import Return Waters 18
5.2.2.2 Rights to Store and Recapture Stored Water 19
5.2.2.3 Carry Over 19
5.2.2.4 Private Defendants 19
5.2.3 Verdugo Basin Rights 20
5.2.3.1 Glendale and Crescenta Valley . . 20
5.2.3.2 Los Angeles 20
5.2.3.3 Private Defendants 20
5.2.4 Eagle Rock Basin Rights 20
5.2.4.1 Los Angeles 20
5.2.4.2 Private Defendants 21
6. INJUNCTIONS 21
6.1 Each and Every Defendant 21
6.2 Each and Every Private Defendant 21
6.3 Defaulting and Disclaiming Parties 21
6.4 Glendale 21
6.5 Burbank 21
6.6 San Fernando 22

Page

6.7 Crescenta Valley 22
6.8 Los Angeles 22
6.9 Non-Consumptive and Minimal Consumptive Use Parties 22
7. CONTINUING JURISDICTION 23
7.1 Jurisdiction Reserved 23
8. WATERMASTER 23
8.1 Designation and Appointment 23
8.1.1 Watermaster Appointment 23
8.2 Power and Duties 23
8.2.1 Scope 23
8.2.2 Requirement for Reports, Information and Records 24
8.2.3 Requirement of Measuring Devices 24
8.2.4 Inspection by Watermaster 24
8.2.5 Policies and Procedures 24
8.2.6 Data Collection 25
8.2.7 Cooperation With Other Agencies 25
8.2.8 Accounting for Non-consumptive Use 25
8.2.9 Accounting for Accumulated Import Return Water and Stored Water 25
8.2.10 Recalculation of Safe Yield 26
8.2.11 Watermaster Report 26
8.2.12 Active Party List 26
8.3 Administrative Committee 26
8.3.1 Committee to be Formed 26
8.3.2 Organization and Voting 27
8.3.3 Function and Powers 27

Page

8.4 Watermaster Budget and Assessments 27
8.4.1 Watermaster's Proposed Budget 27
8.4.2 Objections and Review 28
8.4.3 Notice of Assessment 28
8.4.4 Payment 28
8.5 Review of Watermaster Activities 28
8.5.1 Review Procedures 28
8.5.1.1 Noticed Motion 28
8.5.1.2 De Novo Nature of Proceedings . . . 28
8.5.1.3 Decision 29
9. PHYSICAL SOLUTION 29
9.1 Circumstances Indicating Need for Physical Solution 29
9.2 Prior Stipulated Judgment 29
9.2.1 Eagle Rock Basin Parties 30
9.2.2 Non-Consumptive or Minimal-Consumptive Operations 30
9.2.3 Abandoned Operations 31
9.3 Private Defendants 31
9.3.1 Private Defendants and Appropriate Cities . 32
9.3.2 Reports and Accounting 32
9.3.3 Payment 32
9.3.3.1 Los Angeles 32
9.3.3.2 Glendale or Burbank 33
9.4 Glendale and Burbank 33
9.5 San Fernando 34
9.6 Effective Date 34
10. MISCELLANEOUS PROVISIONS 34

Page

10.1 Designation of Address for Notice and Service . . . 34

10.2 Notice of Change in Hydrologic Condition--
Sylmar Basin 35

10.3 Judgment Binding on Successors 35

10.4 Costs 35

ATTACHMENTS

"A" -- Map entitled "Upper Los Angeles River Area",
showing separate basins therein 36

"B" -- List of "Dismissed Parties" 37

"C" -- List of "Defaulted Parties" 39

"D" -- List of "Disclaiming Parties 41

"E" -- List of "Prior Stipulated Judgment 42

"F" -- List of "Stipulated Non-consumptive or Minimal-
consumptive Use Practices" 43

"G" -- Map entitled "Place of Use and Service Area of
Private Defendants" 45

"H" -- Map entitled "Public Agency Water Service Areas" . . 46

Page

10.1 Designation of Address for Notice and Service . . . 34

10.2 Notice of Change in Hydrologic Condition--
Sylmar Basin 35

10.3 Judgment Binding on Successors 35

10.4 Costs 35

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"F" -- List of "Stipulated Non-consumptive or Minimal-
consumptive Use Practices" 43

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Private Defendants" 45

"H" -- Map entitled "Public Agency Water Service Areas" . . 46

Appendix J: Rockhaven Well Operation & Water Sale Agreement

Crescenta Valley Water District 2025 Urban Water Management Plan

R105828

CITY OF GLENDALE

AND

CRESCENTA VALLEY WATER DISTRICT

ROCKHAVEN WELL OPERATION

AND WATER PURCHASE/SALE AGREEMENT

This Agreement for the operation of the Rockhaven Well and Water Purchase/Sale Agreement ("Agreement"), is made and entered between the City of Glendale acting by and through Glendale Water and Power (interchangeably referred to as "Glendale" or "GWP") and Crescenta Valley Water District (referred to as "District") (also referred to as each a "PARTY" and collectively, the "PARTIES"), on this ____ day of _____, 2015 ("Effective Date"), with reference to the following facts and intentions, which the PARTIES agree are true and correct to the best of their knowledge and belief:

RECITALS

A. The groundwater rights of District and Glendale within the Verdugo Basin located within the Upper Los Angeles River Watershed in Los Angeles County ("Verdugo Basin") are defined by the January 26, 1979 Judgment in Los Angeles County Superior Court Case No. 650079, entitled *City of Los Angeles, a Municipal Corporation v. City of San Fernando, et. al.* ("Judgment"). The Judgment is incorporated in the Agreement by this reference as though fully set forth herein.

B. District and Glendale are the only parties with rights in and to the Verdugo Basin. The Judgment provides that the total Safe-Yield for the Verdugo Basin is 7,150 acre-feet per year ("AF/Y"). The Judgment further adjudicates the rights of the PARTIES to the Verdugo Basin and allocates the entire Safe Yield between them.

C. Each PARTY holds adjudicated water rights in and to the Verdugo Basin as follows: 3,856 AF/Y for GWP and 3,294 AF/Y for District.

D. In 2011, GWP constructed a groundwater well, commonly known as the Rockhaven Well ("Well"), at 2740 Hermosa Avenue in order to pump groundwater from the Verdugo Basin for its use.

E. The Well is capable of producing groundwater, however, the water is contaminated with nitrates, rendering the groundwater from the Well unsuitable for reasonable use without proper treatment.

F. The District desires to operate the Well and its existing infrastructure for GWP and construct additional facilities and features through which groundwater pumped at the Well can be purchased by the District and delivered to District's nitrate treatment facility pursuant to the terms and conditions as set forth in this Agreement and District may thereafter make use of such treated water for its use.

NOW, THEREFORE, in consideration of the foregoing recitals, which are incorporated into the operative provisions of this Agreement by this reference, and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the PARTIES hereto agree as follows:

AGREEMENT

1. ADJUDICATED RIGHTS.

1.1 District recognizes and acknowledges Glendale's right to pump 3,856 AF/Y from the Verdugo Basin under the Judgment.

1.2 Glendale recognizes and acknowledges District's right to pump 3,294 AF/Y from the Verdugo Basin.

1.3 The PARTIES acknowledge that they are each entitled to pump no more than their rights as set forth herein, per the Judgment.

1.4 District acknowledges and agrees that nothing in this Agreement, or otherwise, shall be construed as a past, present, or future, abandonment, forfeiture or waiver by Glendale of its rights, nor any portion thereof, to the 3,856 AF/Y from the Verdugo Basin. District further acknowledges and agrees that District's past, present or future pumping from the Verdugo Basin in excess of District's right at 3,294 AF/Y shall not give rise to any right, claim or interest by District to any quantity of water in excess of District's right as set forth herein per the Judgment.

2. TERM. The term of this Agreement shall be for a period of 25 years commencing on the Effective Date; provided, however, that PARTIES may terminate this Agreement pursuant to Article 10, below.

3. FINANCAL. GWP shall invoice the District on a monthly basis, an amount based on the following three (3) components and the Five Year Cost Agreement as shown in Exhibit "A". GWP shall invoice the District using the sample form in Exhibit "B".

a. **Existing Well and Infrastructure Cost.** District agrees to reimburse GWP for the original cost of construction of the Well and existing facilities and features thereto ("Existing Infrastructure"). The amount to be reimbursed shall be based on the 50-year life cycle of the Existing Infrastructure over the 25-year term of the lease and an agreed upon interest rate on investment. In other words, this component of the monthly payment will be 1/600 of the original cost of construction, and at the conclusion of the original term of this Agreement, half the cost will be repaid.

District acknowledges and agrees that payments made pursuant to this section shall not cause or vest any ownership interest in District in the Well. District shall own the improvements constructed by District pursuant to Section 4 of this Agreement.

b. **Water Usage Cost.** District agrees to pay GWP for the groundwater produced from the Well at a reasonably consistent rate equal to or better than 225 gallons per minute, at a rate per acre-foot as shown in Exhibit "A".

District agrees to pay GWP for the groundwater produced, if the Well is unable to produce water at a reasonably consistent rate of 225 gallons per minute, at a rate per acre-foot as shown in Exhibit "A".

District acknowledges and agrees that the water pumped from the well shall be from the Glendale adjudicated right of 3,856 AF/Y.

District acknowledges that water currently available from the Well may not be suitable for consumption, potable or agricultural use and agrees to purchase water under this Agreement and during its term on an "as is" basis.

c. **Land Lease Cost.** District agrees to enter into a ground lease agreement ("Lease Agreement") with the City of Glendale whereby District shall lease the land necessary to carry out the intent of this Agreement. The form of the Lease Agreement is attached hereto as Exhibit "D". The cost to lease the land for the term in Section 2 is shown in Exhibit "A".

3.1 District agrees to pay Glendale within 30 calendar days after receiving the invoice following the first of each month.

3.2 These components are based on a Cost Analysis Study dated October 2014, prepared by Raftelis Financial Consultants and attached hereto as Exhibit "C". The Cost Analysis Study, the study assumptions and the components shall be reviewed and adjusted every five (5) years from the date of this agreement.

4 **IMPROVEMENTS.**

District shall, at its sole cost and expense, design and install any necessary infrastructure, equipment, facilities, or features ("Improvement(s)") including but not limited to, pumps, motors, piping, meters, small structures, electrical and telemetry systems, waste drain lines, and water mains in connection with the transportation and delivery of water from the Well to District's water treatment facility. District agrees to install a water meter at the Well to accurately record water flows in a manner acceptable to GWP. District shall obtain any necessary permits or licenses related to the construction of any Improvement at its sole cost and expense. District shall comply with all laws and regulatory standards in effect at the time of construction of any Improvement, including any requirements imposed under the California Environmental Quality Act (CEQA) and California Department of Public Health. District shall own any and all Improvements constructed.

5 **MAINTENANCE AND REPAIRS.** District shall, at its sole cost and expense, keep and maintain the Existing Infrastructure and any additional Improvements and shall make all necessary repairs and alterations thereto. District agrees to annually calibrate any water meter(s) installed to maintain their accuracy, and any such calibration shall be conducted in the presence of GWP staff.

6 **LEASE OF GLENDALE LAND BY DISTRICT.** District agrees to lease the land necessary for District to access and operate the Existing Infrastructure as well as build, maintain and operate the Improvements. The subject land is depicted in the map attached hereto as Exhibit "D". The Lease Agreement to be executed by the PARTIES shall be

concurrent to this Agreement and shall be incorporated herein by reference, for the amount and under the terms and conditions stated therein.

7 **WATER OPERATION.** Upon the execution of Ground Lease Agreement described in Section 6 of this Agreement, District shall be solely responsible for the cost and operations of the Existing Infrastructure and any Improvements thereon.

8 **GRANTS.** District shall be the lead agency for obtaining any grants from the State of California to finance the construction of the Improvements.

District shall obtain prior approval from Glendale of any future improvements not described in Section 4 of this agreement

District and GWP shall share equally the costs associated with providing matching funds as part of any grants obtained from the State of California for the project proposed herein.

The parties agree that District will apply and deduct the payments to be made by District to Glendale pursuant to Section 3 of this Agreement towards Glendale's portion of the matching funds for grants obtained pursuant to this Section 8, until such time that Glendale's matching fund portion obligation is paid in full.

9 **INDEMNITY.** Each PARTY agrees to indemnify, defend, and hold the other PARTY and its respective officers, employees, and agents and representatives harmless from and against any and all liability, suits, actions, proceedings, judgments, claims, losses, liens, damages, injuries (whether in contract, in tort, including personal injury, accidental death or property damage, or as part of an environmental claim, and regardless of whether the allegations are false, fraudulent or groundless), costs and expenses (including attorney fees, litigation, arbitration, mediation, appeal expenses) which in whole or in part arise out of or are connected with, or which are alleged to have arisen out of or to have been connected with, each PARTY's performance under this Agreement.

The indemnified PARTY: (i) shall promptly provide the indemnifying PARTY with written notice of any claim, demand, lawsuit, or the like for which it seeks indemnification pursuant to this Article __ and provide the indemnifying PARTY with copies of any demands, notices, summons, or legal papers received in connection with such claim, demand, lawsuit, or the like; (ii) shall not settle any such claim, demand, lawsuit, or the like without the prior written consent of the indemnifying PARTY; and (iii) shall fully cooperate with the indemnifying PARTY in the defense of the claim, demand, lawsuit, or the like. A delay in notice shall not relieve the indemnifying PARTY of its indemnity obligation, except (1) to the extent the indemnifying PARTY can show it was prejudiced by the delay; and (2) the indemnifying PARTY shall not be liable for any settlement or litigation expenses incurred before the time when notice is given. This provision shall survive expiration or termination of the Agreement.

10 **TERMINATION.**

10.1 Termination Right of GWP. GWP shall have the right to terminate this Agreement upon giving written notice of such termination to District at least ninety (90) days in advance and pursuant to the notice requirements as set forth in

Section 11.9. In the event that such termination by GWP occurs then Glendale will reimburse the depreciated cost incurred by District in connection with the construction based on the 50-year life cycle of the Improvements. Under no circumstances shall GWP have a right or interest in the District's Glenwood nitrate treatment facility.

10.2 Termination Right of District. District shall have the right to terminate this Agreement upon giving written notice of such termination to GWP at least ninety (90) days in advance, pursuant to the notice requirements as set forth in Section 11.9. In the event of such termination by District, GWP shall not be obligated to reimburse District for any costs incurred by District in the construction, or removal, as elected by District in its sole discretion, of any Improvement. Under no circumstances shall GWP have a right or interest in the District's Glenwood nitrate treatment facility.

10.3 Termination of Lease Agreement. This Agreement shall automatically be terminated upon the termination of the Lease Agreement.

11 GENERAL PROVISIONS.

11.1 Assignment. No PARTY shall assign any right or interest in this Agreement, nor delegate any duty owed, without the other PARTY'S prior written consent. Any attempted assignment or delegation shall be void and ineffective for all purposes, and shall constitute a material breach and grounds for immediate termination or suspension of this Agreement. In the event PARTIES consent to an assignment or delegation, the assignee, delegatee, or its legal representative shall agree in writing to personally assume, perform, and be bound by all of the terms of this Agreement.

11.2 Successors. Subject to the provision regarding assignment, above, this Agreement shall be binding on the heirs, executors, administrators, successors, and assigns of the respective PARTIES.

11.3 Insurance. During the term of this Agreement, District shall carry, at its own cost and expense, the following policies of insurance: (i) Insurance against loss or damage to Existing Infrastructure and any Improvements thereon, as is customarily maintained with respect to works and properties of a like character, which may be carried in conjunction with any other policies of fire and extended coverage insurance; (ii) commercial general liability (CGL) insurance with respect to District's activities in connection with this Agreement, such insurance to afford protection of up to One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) general aggregate; and (iii) Workers' Compensation insurance as necessary and required by the laws of the State of California. Upon written request, District shall deliver to GWP copies of each certificate insurance policy obtained.

11.4 No Third-Party Beneficiaries. This Agreement is for the benefit of PARTIES only, and is not intended to benefit any third parties. This Agreement does not

create, and shall not be construed to create, any rights enforceable by any person, partnership, corporation, joint venture, limited liability company or other form of organization, association or entity of any kind that is not a PARTY to this Agreement.

11.5 **Attorneys' Fees.** If any action at law or in equity is brought to enforce or interpret the provisions of this Agreement, the prevailing PARTY shall be entitled to reasonable attorney's fees in addition to any other relief to which it may be entitled.

11.6 **Construction.** The provisions of this Agreement shall be liberally construed to effectuate its purposes. The language of this Agreement shall be construed simply according to its plain meaning and shall not be construed for or against any PARTY, as each PARTY has participated in the drafting of this Agreement.

11.7 **Entire Agreement.** In conjunction with the matters considered herein, this Agreement, and the concurrently executed Ground Lease Agreement between the Parties, shall contain the entire understanding and agreement of the PARTIES, and there have been no promises, representations, agreements, warranties or undertakings by any of the PARTIES, either oral or written, of any character or nature binding except as stated herein and the Ground Lease Agreement. This Agreement, and/or the Ground Lease Agreement, may be modified, altered or amended only by an instrument in writing, executed by the PARTIES, and by no other means. Each PARTY waives its right to claim, contest or assert that this Agreement was modified, canceled, superseded or changed by any oral agreement, course of conduct, waiver or estoppel.

11.8 **Severability.** Should any part, term or provision of this Agreement or any document required herein to be executed be declared invalid, void or unenforceable, all remaining parts, terms and provisions hereof shall remain in full force and effect and shall in no way be invalidated, impaired or affected thereby.

11.9 **Notices.** All notices, approvals, acceptances, and other communication required or permitted under this Agreement shall be in writing and shall be deemed validly given on the date either: 1) personally delivered to the address indicated below, or 2) on the third business day following deposit, postage prepaid, using certified mail, return receipt requested, in any U.S. Postal mailbox or at any U.S. Post Office, or 3) one business day after the dispatch date by overnight delivery service, or 4) on the date of transmission by facsimile or electronic mail to the number or e-mail address provided below. All notices shall be addressed to the following:

GLENDALE WATER AND POWER
Attn: Ramon Abueg
Assistant General Manager
Glendale Water and Power
City of Glendale

141 North Glendale Ave., 4th Level
Glendale, CA 91206-4496
Facsimile: (818) 552-2852
E-mail: RAbueg@GlendaleCA.GOV

CRESCENTA VALLEY WATER DISTRICT
Attn: Dennis Erdman
General Manager
2700 Foothill Boulevard
La Crescenta, CA 91214-3516
Facsimile: (818) 248-1659
E-mail: derdman@cvwd.com

Any PARTY may change its address by giving the other PARTIES written notice of its new address as provided above.

11.10 Governing Law. This Agreement will be governed by the laws of California, without regard to conflicts of law.

11.11 Waiver. No waiver of any provision or consent to any action shall constitute a waiver of any other provision or consent to any other action, whether or not similar. No waiver or consent shall constitute a continuing waiver or consent or commit a PARTY to provide a waiver or consent in the future except to the extent specifically stated in writing. No waiver shall be binding unless executed in writing by the PARTY making the waiver, based on a full and complete disclosure of all material facts relevant to the waiver requested.

11.12 Authorizations. All individuals executing this Agreement on behalf of the respective PARTIES certify and warrant that they have the capacity, and have been duly authorized to so execute this Agreement on behalf of the entity so indicated.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their officers hereunto duly authorized on the day and year first above written.

CITY OF GLENDALE

Date: 2/23/15

Scott Ochoa
City Manager

CRESCENTA VALLEY WATER DISTRICT

Dated Nov. 24, 2014

Dennis Erdman
General Manager

APPROVED AS TO FORM

Senior Assistant City Attorney
Date 2/23/15

EXHIBIT "A"

Rockhaven Well Water Purchase and Sale Agreement

Five Year Cost Agreement

2015 – 2019

Exhibit "A"

City of Glendale and Crescenta Valley Water District
Rockhaven Well Water Purchase and Sale Agreement
Five Year Cost Agreement

Year	2015		2016		2017		2018		2019	
Existing Well and Infrastructure Cost	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly
	$51,012	$4,251	$51,012	$4,251	$51,012	$4,251	$51,012	$4,251	$51,012	$4,251
Water Usage Cost	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)	Cost/Ac-ft (above 225 gpm)	Cost/Ac-ft (below 225 gpm)
	$276	$236	$290	$248	$305	$261	$321	$275	$337	$289
Land Lease Cost	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly	Annual	Monthly
	$15,040	$1,253	$15,040	$1,253	$15,491	$1,291	$15,956	$1,330	$16,435	$1,370

Notes:

1. Cost shown above are based on the Cost Analysis Study and Worksheets prepared by Raftelis Financial Consultants dated September, 2014

1. Cost shown above are based CVWD/GWP receiving Prop. 84, Drought Relief Grant

2. Cost and Assumptions of the Cost Analysis Study and Worksheets to be reviewed and revised every 5 years, next revision in 2020.

EXHIBIT "B"

Glendale/CVWD Sample

Monthly Invoice

EXHIBIT "B"

MONTHLY PAYMENT FORM
ROCKHAVEN WELL

Month: _____ Year: 2014

WATER USAGE:

End-of-Month Rockhaven Well Meter Read = 17441424 cubic feet (cf)

Prior End-of-Month Rockhaven Well Meter Read = 00000000 cf

Total Usage for Month: 17,441,424 cf ÷ 43,560 = 400.40 Acre-Feet, (AF)

a) Usage for Month at 225 gpm or more: 17,441,424 cf ÷ 43,560 = 400.40 AF

b) Usage for Month at 225 gpm or less: 0.00 cf ÷ 43,560 = 0.00 AF

WATER USAGE COST [1]:

a)	$276 per AF x	400.4 AF =	$ 110,510.40
b)	$236 per AF x	0.00 AF =	$ 0.00
	Total Water Usage Cost		**$ 110,510.40**

EXISTING WELL AND INFRASTRUCTURE COST [1]:

$51,012 per year or $4,251 per month **$ 4,251.00**

LAND LEASE COST [1]:

$15,040 per year or $1,253 per month **$ 1,253.00**

Total Payment, CVWD to Glendale **$ 116,014.70**

Approved by: _____ Glendale

Approved by: _____ CVWD

NOTES:

1. *Unit Costs shown are in accordance with Exhibit "A" of the Agreement.*
2. *Glendale and CVWD will meet prior to the of the 5th year to revised and adjust the unit costs in accordance with Section 3.2 of the Agreement*

EXHIBIT "C"

Cost Analysis Study

Dated October 2014

Prepared by

Raftelis Financial Consultants

Table 1
Existing CVWD Water Supply Costs

Description			CY 2014	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15	CY 2030 16
Rockhaven Well Production	Production Capacity (GPM)	Annual Average Downtime																	
Average Annual Water Production (GPM)	400	25%	300																
Projected Rockhaven Water Production (AFY)			484	242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
FMWD Imported Water Costs (Base Case)	Inflation Rate	Actual 2013	CY 2014 Budgeted																
Existing FMWD Tier 1 Imported Water Supply Costs	5%	$847	$890	$935	$981	$1,030	$1,082	$1,136	$1,193	$1,252	$1,315	$1,381	$1,450	$1,522	$1,598	$1,678	$1,762	$1,850	$1,943
CVWD Power Costs for FMWD deliveries	6%	$145	$154	$163	$173	$183	$194	$206	$218	$231	$245	$260	$275	$292	$309	$328	$348	$368	$390
Total Unit Cost for FMWD deliveries ($/AF)		$992		$1,097	$1,154	$1,213	$1,276	$1,342	$1,411	$1,483	$1,560	$1,640	$1,725	$1,814	$1,908	$2,006	$2,110	$2,219	$2,333
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level				$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,026	$970,674	$1,020,794	$1,073,515	$1,128,973
Grand Total			$25,640,758																

Table 2
Rockhaven Well Future Construction Costs

Description		Cost
Rockhaven Well Project Capitalized Cost		
Transmission Pipe to Blending Plant (a)		$240,000
Well Equipment		
Pump & Motor		$90,000
Electrical		$90,000
Piping		$40,000
SCADA/Telemetry		$44,000
Building/Misc		$35,000
Site work		$25,000
Subtotal		$564,000
Construction Cost Multipliers		
Contingency	20%	$112,800
Engineering & Permitting	15%	$84,600
Soils Engineering	1%	$5,640
Construction Mgmt	10%	$56,400
CVWD Labor, Eqpt, Mtls		$21,560
Grand Total Capital Cost (2014)		**$845,000**
Rockhaven Well Site Costs (2013)		
Local Wellsite Labor		
Weekly	Hrs	10
Annual	Hrs	520
Burdened Labor Rate ($/hour)		$60
Annual Labor Cost		$31,200
Materials Cost at Wellsite ($/year)		$5,000
Total Annual Labor & Materials		**$36,200**

a. The transmission line is 1,200 ft. at $200/lf.

Table 3
Rockhaven Well Water Supply Alternative Analysis

Inputs | Conditional Output | Key Output | Cashflow Input (paid to GWP) | Cashflow Input (production costs)

Description	Amortization & Inflation Rates			CY 2014 Day 1	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15
Amortized Compensation Schedule for 2011 GWP Construction Costs at Rockhaven Well	2%	Period (Years) 50	CY 2011 Total $1,095,841	$711,426	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)	3%	25	$660,000	$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916	
Groundwater Rights Lease from GWP																			
Projected Rate for Verdugo Basin GW Leasing ($/AF)	3%			$183	$193	$202	$212	$220	$234	$246	$258	$271	$285	$299	$314	$329	$346	$363	
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	
CVWD Payment to GWP for Producing Adjudicated GW				$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708	
Rockhaven Well Variable Incremental Production Costs		2013 Rate ($/AFY)		$2,664.02	$5,487.88	$5,652.52													
Power ($95 per AF)	6%	$95		$107	$113	$120	$127	$135	$143	$151	$161	$170	$180	$191	$203	$215	$228	$241	
Treatment & Blending of Groundwater	3%	$220		$233	$240	$248	$255	$263	$271	$279	$287	$296	$305	$314	$323	$333	$343	$353	
Other Miscellaneous O&M Costs	3%	$10		$11	$11	$12	$12	$12	$13	$13	$14	$14	$14	$15	$15	$16	$16	$17	
Total Cost ($/AF)		$325		$351	$365	$379	$394	$410	$426	$443	$461	$480	$499	$520	$541	$563	$587	$611	
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	
Annual O&M Costs for Production of Rockhaven Well Water				$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657	
Rockhaven Well Fixed O&M Costs	3%			$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805	
Cashflow for Rockhaven Well Water Supply (Alternative Case)																			
CVWD Repayment of GWP Construction Costs					$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)					$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
CVWD GW Production Right Lease Payment to GWP					$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
Annual O&M Costs for Production of Rockhaven Well Water					$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657
CVWD Production Costs for Rockhaven Well Water		Grand Total			$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805
Total Annual CVWD Costs of Operating Rockhaven Well					$226,934	$368,433	$381,946	$396,056	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Grand Total 25 Yr. Expenditures for Rockhaven Well Water Supply		$14,533,308																	
Comparison of 25 Year Water Supply Alternatives		Grand Total																	
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level		$25,640,756			$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,020	$970,674	$1,020,784	$1,073,515
Less Annual CVWD Costs of Rockhaven Well Supply Alternative		$14,533,308		$150,000	$226,934	$368,433	$381,946	$396,056	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Net Annual O&M Savings of Rockhaven Well vs. Imported Supply		$11,107,449		-$150,000	$38,571	$189,916	$205,157	$221,288	$238,358	$256,420	$275,527	$295,736	$317,108	$339,707	$363,598	$388,853	$415,544	$443,751	$473,556
Discount Rate of Return for 25 Year Cashflow	8.50%			$11,107,449															
Annual Payments to GWP from CVWD		Grand Total																	
Reimbursements for GWP Construction Costs at Well		$905,601			$17,437	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
Lease of Rockhaven Wellsite		$486,005			$13,250	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
Lease of Groundwater Rights from GWP (Water)		$1,870,693			$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
		$2,842,302			$75,059	$154,555	$160,009	$165,720	$171,700	$177,962	$184,520	$191,388	$198,581	$206,114	$214,005	$222,270	$230,927	$239,997	$249,497
Rockhaven Production Payments to GWP ($/AF)			PRODUCTION		$310	$319	$331	$342	$355	$368	$381	$396	$410	$426	$442	$459	$477	$496	$516

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 255,994**	**$ 422,194**	**$ 437,989**	**$ 454,514**

FMWD Import

Imported Water Supply Equivalent			$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery			$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant			**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings		**-$160,875**	**$ 9,588**	**$ 136,318**	**$ 149,286**	**$ 163,013**
Well and Pipeline Construction Cost Subtotal		-$160,875				

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well			$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP			$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Annual Payments to GWP		**-$160,875**	**$ 132,783**	**$ 206,385**	**$ 214,063**	**$ 222,129**

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 55,920	$ 117,599	$ 123,656	$ 130,025
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 245,184**	**$ 399,460**	**$ 414,084**	**$ 429,377**

FMWD Import

Imported Water Supply Equivalent		$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery		$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant		**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings	**-$845,000**	**$ 20,398**	**$ 159,052**	**$ 173,191**	**$ 188,149**

Well and Pipeline Construction Cost

Subtotal	-$845,000

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP	$ 55,920	$ 117,599	$ 123,656	$ 130,025
Annual Payments to GWP	**$ 121,972**	**$ 183,651**	**$ 190,158**	**$ 196,993**

EXHIBIT "D"

LEASE AGREEMENT

Between City of Glendale

and

Crescenta Valley Water District

LEASE AGREEMENT

THIS GROUND LEASE AGREEMENT ("Lease Agreement") is made and entered into as of _____, 2014, by and between the **CITY OF GLENDALE, CALIFORNIA,** ("Landlord"), a municipal corporation, and **CRESCENTA VALLEY WATER DISTRICT** ("Tenant"), also referred to as each a "Party" and collectively "Parties".

RECITALS

WHEREAS, Landlord is the owner of certain real property a portion of which is the subject of the terms of this Lease Agreement, which portion is legally described in Exhibit "A" and shown in Exhibit "B" as the "Leased Premises" (hereinafter referred to as the "Leased Premises"); Said Exhibits "A" and "B" are attached hereto and incorporated herein by reference.

WHEREAS, Landlord and Tenant have entered into an executed a memorandum of understanding and agreement entitled City of Glendale and Crescenta Valley Water District Rockhaven Well Operation And Water Purchase/Sale Agreement ("MOU"), which MOU sets forth the Parties' understanding and agreement pertaining to Tenant's proposed use of the Leased Premises;

WHEREAS, Tenant desires to enter into a lease with Landlord for the Leased Premises; and

WHEREAS, Landlord is willing to grant such a lease, subject to the terms and conditions of this Lease Agreement.

NOW, THEREFORE, in consideration of the promises and of the mutual obligations and agreements in this Lease, the Parties agree as follows:

1. TERM

1.1 The term of this Lease Agreement shall be for a period of twenty five (25) years, commencing thirty days following the City Council's approval by way of an ordinance authorizing the subject Lease Agreement. The term of the Lease may be terminated sooner in any one or more of the following: abandonment or voluntary surrender of the Lease by Tenant; forfeiture of the Lease after an uncured breath of the terms of the Lease Agreement; and/or for any other reason stated in this Lease Agreement.

1.2 This Lease Agreement shall terminate prior to the expiration of its Term in the event the MOU between the Parties is terminated, at which time this Lease Agreement shall terminate on the date of the termination of the MOU.

1.3 Landlord may terminate this Lease Agreement, in the event the operations on the Lease Premises are posing or constituting an emergency affecting public welfare, safety and security, and/or in the event Landlord requires the use of the Leased Premises to address an emergency affecting public welfare, safety and security. Such termination shall be effective immediately and shall be without the requirement of any prior notice to Tenant. Landlord will make every effort to provide Tenant with one (1) week notice of termination in instances of public emergency affecting public security and/or safety only if providing such notice is possible in light of the events and circumstances surrounding the emergency.

1.4 This Lease Agreement shall terminate prior to the expiration of its Term in the event the MOU between the Parties is terminated, at which time this Lease Agreement shall terminate on the date of the termination of the MOU.

2. USE OF PREMISES

2.1 The Leased Premises shall be used solely for the purpose of installation/construction of vertical turbine pump and motor, a small building enclosure on a concrete pad over the groundwater well, above ground discharge piping with a flow meter, electrical/telemetry system to provide power for the pump and ability to remotely monitor and control the pump, asphaltic concrete paving and on-site improvements, underground discharge piping to waste, and 8-inch water main which will connect to an existing 8-inch water main to CVWD's Nitrate Removal Treatment and ingress, egress and parking of motor vehicles by Tenant and Tenant's employees, representatives and agents, and for no other purposes, without the written consent of Landlord first being obtained.

2.2 Tenant acknowledges that Landlord shall not be held responsible for the design of the facilities on the Leased Premises. Tenant acknowledges that Landlord shall not be held liable and agrees to defend and hold Landlord harmless to the maximum extent permitted by law from all claims arising out of the design, maintenance and operation of Tenant's Facilities at the Leased Premises.

3. RENT

3.1 Landlord shall invoice Tenant on a monthly basis, pursuant to Section 3 of the MOU. The single monthly invoice shall include, among other components, the rent for the Leased Premises. The rent shall be in the amount as set forth in the Cost Analysis Study dated October 2014, prepared by Raftelis Financial Consultants attached hereto as Exhibit "C". The Cost Analysis Study, the study assumptions and the components shall be reviewed and adjusted every five (5) years from the date of this agreement.

3.2 Tenant shall pay Landlord within 30 calendar days after receiving the invoice following the first of each month.

4. MAINTENANCE AND REPAIRS

4.1 Tenant shall be responsible for maintaining the lighting and landscaping, including planting, trimming and irrigating said landscaping. Tenant acknowledges and agrees that Tenant shall conform to Landlord's reasonable standards, as well as ensure that all work done and any and all site improvements by Tenant is in accordance with the rules, regulations and laws of the City of Glendale, as well as with any applicable State and Federal rules, regulations and mandates.

4.2 Tenant shall be directly responsible for all utilities required by Tenant's use of the Leased Premises, including but not limited to electricity. The cost of any utilities provided by Landlord shall be paid by Tenant to Landlord as payment separate from rent. Tenant shall pay a monthly charge for electricity computed at the then-current public utility rate.

4.3 Tenant shall keep the Leased Premises free from trash and debris. Tenant shall maintain the paved surface of the Leased Premises.

5. ACCESS

5.1 By Landlord: Landlord reserves the right to enter and use the Leased Premises for the purpose of gaining access to Landlord's adjacent properties without interfering with Tenant's use of the Leased Premises.

5.2 By Tenant: At all times throughout the Term of this Lease Agreement, and at no additional charge to Tenant, Tenant and its employees, agents, contractors, and subcontractors, will have twenty-four (24) hour per day, seven (7) day per week right of access to and over Landlord's property, along Landlord's specified access routes, for the installation, repair, maintenance and operation of the Tenant Facilities and any utilities serving the Lease Property. Tenant must provide Landlord with at least 72 hours advance prior notice for any vehicular access if the vehicle or equipment: (1) has a gross vehicle weight in excess of 10,000 pounds; (2) has skid steering including track driven vehicles or equipment; (3) possesses outriggers or stabilizers; (4) needs to be transported by trailer; or (5) is not recognized by the Department of Motor Vehicles to be legally driven or operated across/over public roads or highways. Tenant is responsible for and shall reimburse Landlord for any and all damages to the access to Landlord's property caused by Tenant's activity on Landlord's Property.

6. COMPLIANCE WITH ALL LAWS

6.1 Tenant shall comply with all applicable requirements of federal, state and local laws, rules and to monitor and certify such compliance in accordance with requirements as may be established by Landlord.

6.2 Tenant's ability to use the Lease Property shall be dependent upon Tenant obtaining all the certificates, permits, and other approvals, which may be required from any federal, state, or local authorities. Landlord shall reasonably cooperate with Tenant, but at no expense to Landlord, in obtaining such approvals. If any application by Tenant for any such approval is finally denied or rejected, or if any such certificate, permit, license or approval expires, lapses or is otherwise withdrawn or terminated, or if due to technological changes or for any other reason, Tenant, in its sole discretion, determines that it will be unable to use the Lease Property for Tenant's intended purposes, then Tenant shall have the right to terminate this Lease in accordance with the applicable Sections herein.

7. SIGNS

Tenant shall consult with the Planning Division of the City of Glendale to determine what signs will be permitted. Only those signs permitted by ordinance may be erected on the Leased Premises.

8. TAXES

8.1 Tenant recognizes and understands that this lease may create a possessory interest subject to property taxation and that Tenant may be subject to the payment of property taxes levied on such interest, and Tenant agrees to pay all such taxes levied. Tenant bears the responsibility to determine the subject taxes. Landlord shall not be liable for Tenant's failure to pay such possessory property taxes.

8.2 Tenant shall also pay, before delinquency, all taxes assessed against any personal property of Tenant, which may be located in or upon the Leased Premises, including all facilities, furnishings, fixtures, equipment. Tenant shall not be liable to pay any taxes and assessments arising from fee simple ownership of the Leased Premises.

9. RIGHT OF INSPECTION

Landlord reserves the right, to its officers, agents or employees, to enter upon the Leased Premises, and every part thereof, at all reasonable times during regular business hours for the purpose of inspecting same.

10. INDEMNIFICATION

10.1 Tenant agrees to indemnify, defend and hold harmless, to the maximum extent permitted by law, Landlord and its officers, agents, employees and representatives, from and against any and all liability, suits, actions, proceedings, judgments, claims losses, liens, damages, injuries (whether in contract or in tort, including personal injury, accidental death or property damage, and regardless of whether the allegations are false, fraudulent or groundless), costs and expenses (including attorney's fees), litigation, arbitration, mediation, appeal expenses) which in whole or in part arise out of or are connected with, or which are alleged to have arisen out of or to have been connected with Tenant's use, occupancy, activities, events, or operations on, in or about the Leased Premises.

10.2 Tenant's obligation to indemnify, defend and hold harmless shall remain in effect and shall be binding upon Tenant whether such injury or damage shall accrue, or may be discovered, before or after the termination of this Lease.

11. INSURANCE

11.1 At its own expense, Tenant shall obtain, pay for and maintain during the term of the Lease Agreement an "occurrence" policy for Commercial General Liability (including Contractual Liability) which shall protect Tenant and Landlord from claims for injuries and damages. The policy shall add Landlord, its officers, agents and employees as additional named insureds under the policy in the following amounts:

COMMERCIAL GENERAL LIABILITY INSURANCE in an amount not less than One Million Dollars ($1,000,000) per occurrence for personal injuries, including accidental death, to any one person.

PROPERTY DAMAGE INSURANCE in an amount not less than One Million Dollars ($1,000,000); and subject to the above limits and combined single limit of insurance in an amount not less than One Million Dollars ($1,000,000).

BUSINESS AUTOMOBILE LIABILITY INSURANCE in an amount not less than One Million Dollars ($1,000,000) per occurrence for bodily injury (including accidental death) to any one person and One Million Dollars ($1,000,000) per occurrence for property damage, or Two Million Dollars ($2,000,000) combined single limit.

POLLUTION LIABILITY INSURANCE in an amount not less than One Million Dollars ($1,000,000) per claim and Two Million Dollars ($2,000,000) in aggregate.

Complete WORKERS' COMPENSATION INSURANCE meeting or exceeding the coverages and amounts that California law requires.

11.2 At all times, the insurance company issuing the policy shall be an "admitted" insured in the State of California; shall be domiciled within, and organized under the laws of, a state of the United States; and shall carry an A.M. Best & Company minimum rating of "A-"

11.3 All policies shall contain a "Separation of Insured" clause and a "Primary Coverage" clause for any loss arising out of or caused by Tenant's occupation or use of the Leased Premises. In addition, the policies shall contain a statement of obligation on the insurance carrier's part to notify Landlord, by registered mail, at lest thirty (30) days in advance of any policy cancellation, termination or reduction of the state limits.

11.4 Before signing this Lease Agreement, Tenant shall deliver to Landlord a "certificate of insurance" and an "additional insured endorsement", both documents countersigned by the insurance carrier or its authorized representative, on forms satisfactory to the City Attorney, which set forth the above provisions.

11.5 Thirty (30) days prior to each anniversary date of this Lease Agreement, each Tenant shall deliver to Landlord a renewal certificate of insurance and renewal additional insured endorsement, in conformance with the requirements set forth herein.

11.6 The countersigned certificate, along with the additional insured endorsement, shall state: "The City of Glendale, its officers, agents and employees are added as additional names insureds under this policy. This insurance is primary to the coverage of the City of Glendale. Neither the Landlord nor any of its insurers shall be required to contribute to any loss. The insurance shall apply separately to each insured. The issuing company shall mail thirty (30) days advance notice to the Landlord of any policy cancellation, termination or reduction of the stated limits."

11.7 Additionally, any deductibles or self-insured retentions shall be set forth on the certificate and shall be subject to Landlord's review and approval. Landlord reserves the right to modify its insurance requirements on an annual basis.

11.8 Tenant's failure to comply with the provisions of this Section shall constitute a material breach upon which Landlord may immediately terminate this Lease Agreement.

12. DEFAULT BY TENANT

12.1 The occurrence of any one or more of the following events shall constitute an "Event of Default" hereunder by Tenant.

1. The failure by Tenant to make the payment of rent or any other payment required to be made by Tenant hereunder when due, where such failure shall continue for a period of ten (10) days after written notice thereof is received by Tenant from Landlord.
2. The failure by Tenant to observe or perform any of the covenants or provisions of this Lease Agreement to be observed or performed by Tenant, other than as specified in Section 13(A) where such failure shall continue for a period of thirty (30) days after written notice thereof is received by Tenant from Landlord; provided, however, that it shall not be deemed an Event of Default by Tenant if Tenant shall commence to cure such failure within said thirty (30) day period and thereafter diligently prosecute such cure to completion.

12.2 If there occurs an Event of Default by Tenant, in addition to any and all other remedies available to Landlord at law or in equity; Landlord shall have the option to terminate this Lease Agreement and all rights of Tenant hereunder.

12.3 In addition, Landlord shall be entitled to immediate restraint by injunction of any violation of any of the covenants, conditions, or provisions of this Lease Agreement.

12.4 Should Tenant engage in activities which may cause or allow the Leased Premises to become a threat or danger to public welfare and safety, Landlord shall have the right, prior to a determination and authorization by a court of competent jurisdiction, to re-enter the Leased Premises and remove persons and personal property therefrom.

13. ASSIGNMENT AND SUBLETTING

13.1 Tenant shall not have the right to assign this Lease, or to sublet the whole or any portion of the Property without the prior written consent of the Landlord, which consent shall not be unreasonably withheld. No assignment or sublet shall release Tenant or change Tenant's primary liability to perform Tenant's obligations hereunder.

13.2 Tenant's rights hereunder shall not be subject to assignment by attachment, execution or proceedings under any Bankruptcy Act provision. Any such assignment or subletting shall be wholly void and of no force and effect without Landlord's prior written consent.

13.3 Any consent by Landlord to Tenant to assign this lease or sublet the whole or any portion of the Property, shall not be construed as consent to any other assignment or subletting, or as a waiver of Landlord's objection or right to object to any such assignment or subletting to which it has not consented.

14. EFFECT OF BANKRUPTCY

If at any time during the Lease term, in any judicial action or Court proceeding against either of the Tenant, a receiver or other officer or agent of the court is appointed to take charge of Tenant's interest under this Lease, and remain in possession of the Leased Premises for a period of more than twenty (20) days, or if Tenant shall be adjudicated bankrupt, or should any attempt to be made to sell Tenant's interest under this Lease by judicial sale, then Landlord shall have the right, to immediately terminate this Lease Agreement.

15. LANDLORD'S RIGHTS UPON TERMINATION

In the event of a termination or cancellation of this Lease Agreement for any cause or reason whatsoever, before the expiration of the term hereof, Landlord shall be entitled to remove Tenant from the Leased Premises and, except as otherwise hereinabove expressly provided, shall be entitled to retain any sum then held by Landlord as security pursuant to Paragraph 6 hereof, to cover damages and rents owed, pursuant to Section 1950.7 of the California Civil Code.

16 HOLDING OVER

Upon termination of this Lease Agreement, Tenant shall surrender the Leased Premises in good, clean, undamaged condition, wear and tear excepted. Any holding over by Tenant after the term of this Lease Agreement expires, with the consent of Landlord, shall create a month to month tenancy, which either party may terminate by giving the

other party written notice at least thirty (30) days before the intended termination date. Rent shall be at a rate equal to the rent for the immediately preceding month, and shall be payable in advance. In the event of a holding over, all other terms and conditions of this Lease shall remain in full force and effect.

17. NOTICE

Any notice to be provided to the Landlord and Tenant hereunder shall be provided in writing and unless otherwise provided herein, shall be deemed validly given on the date either personally delivered to the address indicated below or on the third (3rd) business day following deposit, postage prepaid, using certified mail, return receipt requested, in any U.S. Postal mailbox or at any U.S. Post Office. Notices shall also be allowed via electronic mail ("email"), and shall be deemed validly given on the date of transmission when sent by email. Should Landlord or Tenant have a change of address, the other party shall immediately be notified in writing of such change, provided, however, that each address for notice must include a street address and not merely a post office box. All notices shall be addressed as follows:

TENANTS:

CRESCENTA VALLEY WATER DISTRICT
ATTN: Dennis Erdman, General Manager
2700 Foothill Boulevard
La Crescenta, CA 91214-3516
Facsimile: (818) 248-1659
Email: derdman@cvwd.com

LANDLORD

CITY OF GLENDALE WATER & POWER
ATTN: Ramon Abueg, Chief Assistant General Manager
141 North Glendale Ave., 4th Level
Glendale, CA 91206-4496
Facsimile: (818) 552-2852
Email: rabueg@glendaleca.gov

18 MISCELLANEOUS PROVISIONS

A. WAIVER. Landlord's failure to exercise any of its rights resulting from a default or breach of covenant on the part of Tenant shall not be construed as a waiver thereof, nor shall any custom or practice which may grow up between the parties in the course of administering this Lease be construed to waiver or to lessen the right of Landlord to insist upon the performance by Tenant of any term, covenant or condition hereof, or to exercise any right given it resulting from any such default. A waiver of a particular breach or default shall not be deemed to be a wavier of the same or any other subsequent breach of default.

B. TIME OF ESSENCE. Time is of the essence of this Lease and of each provision.

C. NO PARTNERSHIP. This Lease Agreement shall not be construed to constitute any form or partnership or joint venture between Landlord and Tenant.

D. CONSTRUCTION

1. Section titles or captions contained in this Lease are inserted as a matter of convenience and for reference and in no way define, limit, extend or describe the scope of this Lease or any provision hereof.
2. Unless defined otherwise, the words used in this Lease shall be construed according to their plain meaning in the English language. The language used in this Lease shall not be interpreted strictly for or against either party.
3. If any provision of this Lease is capable of two constructions, one of which would render the provision void and the other of which would render the provision valid, then the provision shall have the meaning that renders it valid.
4. The singular includes the plural and vice versa, and the masculine includes the feminine and neuter, whenever the context so requires.

E. WARRANTEE. Landlord warrants and agrees that Landlord is seized of good and sufficient title to and interest in the Leased Premises and has full authority to enter into and execute this Lease Agreement and that there are no undisclosed liens, judgment or impediments of title on the Leased Premises that would affect this Lease Agreement. Landlord makes no representation or warranty whatsoever concerning the suitability of the Leased Premises for the purposes intended by Tenant. Tenant acknowledges that neither Landlord, nor any of Landlord's officers, agents and employees have made any representations concerning the suitability of the Leased Premises for the purposes intended by Tenant, nor is Tenant entering into this Lease Agreement in reliance upon any such representations.

F. RIGHT OF QUIET ENJOYMENT. Tenant shall have the right of quiet enjoyment of the Leased Premises.

G. GOVERNING LAW. This Lease Agreement and the performance hereon shall be governed, interpreted, construed and regulated by the laws of the State of California.

H. ENTIRE AGREEMENT. This Lease Agreement constitutes the entire agreement between the parties hereto pertaining to the subject matter hereof, fully supersedes any and all prior understandings, representations, warranties and agreements between the parties hereto, or any of them, pertaining to the subject matter hereof, and may be modified only by written agreement signed by all of the parties hereto.

I. BINDING POWER. Each person executing this Lease warrants and represents that he or she is duly authorized to execute this Lease Agreement on behalf of Landlord or Tenant.

J. SEVERABILITY. If any portion of this Lease Agreement is declared by a court of competent jurisdiction to be invalid or unenforceable, then such portion shall be deemed modified to the extent necessary in such court's opinion to render such portion enforceable and, as so modified, such portion and the balance of this Lease Agreement shall continue in full force and effect.

K. ATTORNEYS' FEES. In case suit shall be brought because of the breach or alleged breach of any covenant herein contained on the part of any party to be kept or performed, or for declaratory relief, the prevailing party or parties shall recover from the non-prevailing party or parties all costs and expenses incurred herein, including reasonable attorneys' fees and expenses incurred in enforcing any judgment.

L. FORCE MAJEURE. For the purposes of this Lease Agreement, "Force Majeure" means an unforeseen event or condition deemed by Landlord as calling for immediate action to avoid the threat of loss or injury of property and/or danger to public safety, including but not limited to, an act of God, labor dispute, civil unrest, epidemic, and/or natural disaster.

19. ENFORCEMENT AUTHORIZATION

The City Manager of Landlord, or his assigned representative, is hereby authorized to act on behalf of the City in all matters pertaining to this Lease, with the exception that a termination of the Lease by Landlord due to breach of any of the terms and conditions herein shall be approved by the Council of the City of Glendale.

IN WITNESS WHEREOF, the parties hereto have caused this Lease to be executed by their officers hereunto duly authorized on the day and year first above written.

LANDLORD:	**TENANT:**
CITY OF GLENDALE	CRESCENTA VALLEY WATER DISTRICT
By:_____	By: _____
Scott Ochoa	Dennis Erdman
City Manager	General Manager

EXHIBIT "A"
LEGAL DESCRIPTION

EXHIBIT "A"

CVWD Well Site
Legal Description

A portion of Lot 230 of Tract No. 2535 in the City of Glendale, County of Los Angeles, State of California, according to the map recorded February 3rd, 1914 as filed in Book 24, at Page(s) 72, and 73 of Maps in the office of the Recorder for said County; more particularly described as follows:

Beginning at the Northern most corner of said Lot 230;

Thence, along the Northeasterly line of said Lot and along the Southwesterly line of the Hermosa Avenue right-of-way (50 feet wide) as shown on said map of Tract No. 2535, South 53° 16' 50" East, 72.5 feet to the Eastern most corner of said Lot 230;

Thence, leaving said Southwesterly line of the Hermosa Avenue right-of-way, along the Southeasterly line of said Lot 230, South 36° 43' 10" West, 86.00 feet;

Thence, leaving the Southeasterly line of said Lot 230, along a line parallel with said Southwesterly line of the Hermosa Avenue right-of-way, North 53° 16' 50" West, 72.50 feet to the Northwesterly line of said Lot 230;

Thence, along the Northwesterly line of said Lot 230, North 36° 43' 10" East, 86.00 feet to the point of beginning;

Containing 6,235 square feet.

End Description

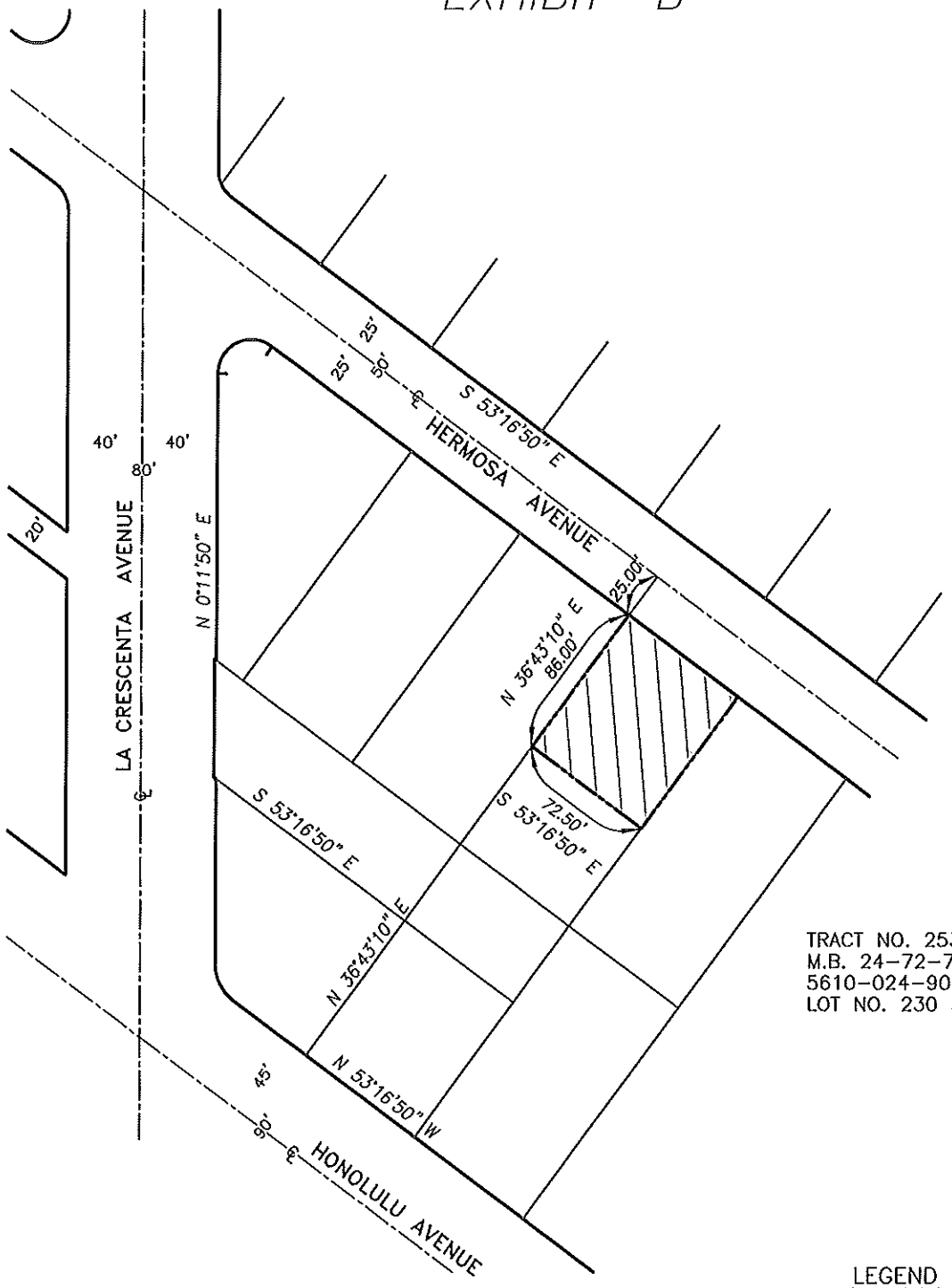
Prepared by: _____
Dan Hutchinson, LS 5139

Date: DEC. 3RD, 2014

EXHIBIT "B"

MAP

EXHIBIT "B"



TRACT NO. 2535
M.B. 24-72-73
5610-024-905
LOT NO. 230 & 231

LEGEND

- LOT LINES
- R/W LINES
- STREET CENTERLINE
- EASEMENT BOUNDARY

CRESCENTA VALLEY WATER DISTRICT GUWD	SKETCH TO ACCOMPANY LEGAL DESCRIPTION	SHT. 1 OF 1 SHTS.
	CRESCENTA VALLEY WATER DISTRICT	11-19-2014
	ROCKHAVEN WELL	JAH

FNAME
REVDATE
USER

EXHIBIT "C"

Cost Analysis Study
Dated October 2014
Prepared by
Raftelis Financial Consultants

Table 1
Existing CVWD Water Supply Costs

Description			CY 2014	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15	CY 2030 16
Rockhaven Well Production	Production Capacity (GPM)	Annual Average Downtime																	
Average Annual Water Production (GPM)	400	25%	300																
Projected Rockhaven Water Production (AFY)			484	242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
FMWD Imported Water Costs (Base Case)	Inflation Rate	Actual 2013	CY 2014 Budgeted																
Existing FMWD Tier 1 Imported Water Supply Costs	5%	$847	$890	$935	$981	$1,030	$1,082	$1,136	$1,193	$1,252	$1,315	$1,381	$1,450	$1,522	$1,598	$1,678	$1,762	$1,850	$1,943
CVWD Power Costs for FMWD deliveries	6%	$145	$154	$163	$173	$183	$194	$206	$218	$231	$245	$260	$275	$292	$309	$328	$348	$368	$390
Total Unit Cost for FMWD deliveries ($/AF)		$992		$1,097	$1,154	$1,213	$1,276	$1,342	$1,411	$1,483	$1,560	$1,640	$1,725	$1,814	$1,908	$2,006	$2,110	$2,219	$2,333
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484	484
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level				$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,026	$970,674	$1,020,794	$1,073,515	$1,128,973
Grand Total			$25,640,758																

Table 2
Rockhaven Well Future Construction Costs

Description		Cost
Rockhaven Well Project Capitalized Cost		
Transmission Pipe to Blending Plant (a)		$240,000
Well Equipment		
Pump & Motor		$90,000
Electrical		$90,000
Piping		$40,000
SCADA/Telemetry		$44,000
Building/Misc		$35,000
Site work		$25,000
Subtotal		$564,000
Construction Cost Multipliers		
Contingency	20%	$112,800
Engineering & Permitting	15%	$84,600
Soils Engineering	1%	$5,640
Construction Mgmt	10%	$56,400
CVWD Labor, Eqpt, Mtls		$21,560
Grand Total Capital Cost (2014)		**$845,000**
Rockhaven Well Site Costs (2013)		
Local Wellsite Labor		
Weekly	Hrs	10
Annual	Hrs	520
Burdened Labor Rate ($/hour)		$60
Annual Labor Cost		$31,200
Materials Cost at Wellsite ($/year)		$5,000
Total Annual Labor & Materials		**$36,200**

a. The transmission line is 1,200 ft. at $200/lf.

Table 3
Rockhaven Well Water Supply Alternative Analysis

Inputs | Conditional Output | Key Output | Cashflow input (paid to GWP) | Cashflow input (production costs)

Description	Amortization & Inflation Rates		CY 2014 Day 1	CY 2015 1	CY 2016 2	CY 2017 3	CY 2018 4	CY 2019 5	CY 2020 6	CY 2021 7	CY 2022 8	CY 2023 9	CY 2024 10	CY 2025 11	CY 2026 12	CY 2027 13	CY 2028 14	CY 2029 15
Amortized Compensation Schedule for 2011 GWP Construction Costs at Rockhaven Well	2%	Period (Years) 50	CY 2011 Total $1,095,841	$711,426 $34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)	3%	25	$660,000	$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
Groundwater Rights Lease from GWP																		
Projected Rate for Verdugo Basin GW Leasing ($/AF)	5%			$183	$193	$202	$212	$223	$234	$246	$258	$271	$285	$299	$314	$329	$346	$363
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484
CVWD Payment to GWP for Producing Adjudicated GW				$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
Rockhaven Well Variable Incremental Production Costs		2013 Rate ($/AFY)		$2,664.02	$5,487.86	$5,052.52												
Power ($95 per AF)	6%	$95		$107	$113	$120	$127	$135	$143	$151	$161	$170	$180	$191	$203	$215	$228	$241
Treatment & Blending of Groundwater	3%	$220		$233	$240	$248	$255	$263	$271	$279	$287	$296	$305	$314	$323	$333	$343	$353
Other Miscellaneous O&M Costs	3%	$10		$11	$11	$12	$12	$12	$13	$13	$14	$14	$14	$15	$15	$16	$16	$17
Total Cost ($/AF)		$325		$351	$365	$379	$394	$410	$426	$443	$461	$480	$499	$520	$541	$563	$587	$611
Projected Rockhaven Water Production (AFY)				242	484	484	484	484	484	484	484	484	484	484	484	484	484	484
Annual O&M Costs for Production of Rockhaven Well Water				$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657
Rockhaven Well Fixed O&M Costs	3%			$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805
Cashflow for Rockhaven Well Water Supply (Alternative Case)																		
CVWD Repayment of GWP Construction Costs				$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
CVWD Annual Lease of Rockhaven Wellsite from GWP (25 Year Contract)				$26,500	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
CVWD GW Projection Right Lease Payment to GWP			Well & Pipeline	$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
Annual O&M Costs for Production of Rockhaven Well Water			Const. Cost -	$84,956	$176,659	$183,498	$190,744	$198,312	$206,217	$214,477	$223,110	$232,133	$241,566	$251,431	$261,749	$272,543	$283,837	$295,657
CVWD Production Costs for Rockhaven Well Water	Grand Total		Per Grant	$36,233	$37,320	$38,439	$39,592	$40,780	$42,003	$43,264	$44,562	$45,898	$47,275	$48,694	$50,154	$51,659	$53,209	$54,805
Total Annual CVWD Costs of Operating Rockhaven Well			$150,000	$226,934	$368,433	$381,946	$396,050	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Grand Total 25 Yr. Expenditures for Rockhaven Well Water Supply		$14,533,308																
Comparison of 25 Year Water Supply Alternatives		Grand Total																
Annual CVWD Existing Payments to FMWD for the Rockhaven Well Production Level		$25,640,758		$265,505	$558,350	$587,103	$617,344	$649,150	$682,602	$717,787	$754,795	$793,720	$834,663	$877,728	$923,026	$970,674	$1,020,794	$1,073,515
Less Annual CVWD Costs of Rockhaven Well Supply Alternative		$14,533,308	$150,000	$226,934	$368,433	$381,946	$396,050	$410,791	$426,183	$442,261	$459,059	$476,612	$494,956	$514,130	$534,173	$555,129	$577,042	$599,959
Net Annual O&M Savings of Rockhaven Well vs. Imported Supply		$11,107,449	-$150,000	$38,571	$189,916	$205,157	$221,288	$238,358	$256,420	$275,527	$295,736	$317,108	$339,707	$363,598	$388,853	$415,544	$443,751	$473,556
Discount Rate of Return for 25 Year Cashflow	8.50%	$11,107,449																
Annual Payments to GWP from CVWD		Grand Total																
Reimbursements for GWP Construction Costs at Well		$505,661		$17,437	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873	$34,873
Lease of Rockhaven Wellsite		$466,038		$13,250	$26,500	$27,295	$28,114	$28,957	$29,826	$30,721	$31,642	$32,592	$33,569	$34,576	$35,614	$36,682	$37,783	$38,916
Lease of Groundwater Rights from GWP (Water)		$1,870,603		$44,372	$93,182	$97,841	$102,733	$107,869	$113,263	$118,926	$124,872	$131,116	$137,672	$144,555	$151,783	$159,372	$167,341	$175,708
		$2,842,302		$75,059	$154,555	$160,009	$165,720	$171,700	$177,962	$184,520	$191,388	$198,581	$206,114	$214,005	$222,270	$230,927	$239,997	$249,497
Rockhaven Production Payments to GWP ($/AF)			PRODUCTION	$310	$319	$331	$342	$355	$368	$381	$396	$410	$426	$442	$459	$477	$496	$515

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 255,994**	**$ 422,194**	**$ 437,989**	**$ 454,514**

FMWD Import

Imported Water Supply Equivalent			$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery			$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant			**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings		-$160,875	**$ 9,588**	**$ 136,318**	**$ 149,286**	**$ 163,013**
Well and Pipeline Construction Cost Subtotal		-$160,875				

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well			$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP			$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 66,731	$ 140,333	$ 147,560	$ 155,161
Annual Payments to GWP		-$160,875	**$ 132,783**	**$ 206,385**	**$ 214,063**	**$ 222,129**

Rockhaven Well

	Total Investment	Period				
GWP Construction Costs at Rockhaven Well	$1,095,841	50	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$376,000	25	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP			$ 55,920	$ 117,599	$ 123,656	$ 130,025
Rockhaven Well Fixed O&M	2013 Price		$ 38,405	$ 39,557	$ 40,743	$ 41,966
Treatment O&M (Variable)	$220		$56,467	$116,323	$119,812	$123,407
Other O&M (Variable)	$10		$2,515	$5,182	$5,337	$5,497
Power O&M (Variable)	$95		$25,825	$54,748	$58,033	$61,515
Total Annual O&M Rockhaven			**$ 123,212**	**$ 215,809**	**$ 223,926**	**$ 232,385**
Total Annual Expenditures Rockhaven Wellsite			**$ 245,184**	**$ 399,460**	**$ 414,084**	**$ 429,377**

FMWD Import

Imported Water Supply Equivalent			$ 226,089	$ 474,786	$ 498,526	$ 523,452
Power Costs of Delivery			$ 39,494	$ 83,726	$ 88,750	$ 94,075
Total Import Expenditure Equivilant			**$ 265,582**	**$ 558,513**	**$ 587,276**	**$ 617,527**
Net Annual Rockhaven Savings		-$845,000	**$ 20,398**	**$ 159,052**	**$ 173,191**	**$ 188,149**

Well and Pipeline Construction Cost	
Subtotal	-$845,000

Annual Payments to GWP

GWP Construction Costs at Rockhaven Well	$ 51,012	$ 51,012	$ 51,012	$ 51,012
Lease of Rockhaven Wellsite from GWP	$ 15,040	$ 15,040	$ 15,491	$ 15,956
Lease of Water Rights from GWP	$ 55,920	$ 117,599	$ 123,656	$ 130,025
Annual Payments to GWP	**$ 121,972**	**$ 183,651**	**$ 190,158**	**$ 196,993**

Appendix K: CVWD Staff Report (Rosemont Preserve)

Crescenta Valley Water District 2025 Urban Water Management Plan

CRESCENTA VALLEY WATER DISTRICT
STAFF REPORT

Action Item No. 4

To: Honorable President and Members of the Board of Directors — June 25, 2024

From: Patrick Atwater, Regulatory and Public Affairs Manager

Subject: Rosemont Preserve – Advancing Project Funds Prior to Grant Reimbursement

---

ACTION ITEM:

Discussion and potential authorization for the General Manager to advance funds for the Rosemont Preserve stormwater recharge and water education project to ensure timely delivery prior to grant reimbursement from the Arroyo and Foothills Conservancy.

BACKGROUND:

Goss Canyon, a ~250-acre watershed at the base of the San Gabriel Mountains, is characterized by chaparral-covered hillsides and a lush, oak-lined stream bed, home to diverse wildlife. It is mostly privately owned and crucial for recharging La Crescenta's Verdugo Groundwater Basin. With low water demands, the District has been increasingly reliant on groundwater and the Verdugo Basin has seen declining water levels over the past decades.

A material amount of stormwater is lost annually to the LA County flood control system and the ocean from this watershed. The Arroyo and Foothills Conservancy (AFC) manages the bottom of Goss Canyon in partnership with Crescenta Valley Water District and County Flood Control. The joint project proposes to enable additional groundwater recharge from stormwater through a straightforward ditch and furrow method.

The Community Relations and Water Conservation Committee discussed the project on February 8th, 2024. Following up on that committee meeting, staff participated in a successful water education tour at the preserve on April 28th and continued to develop the project vision in coordination with AFC staff. The resulting project concept is attached.

The project includes several core components that provide substantial water resources and public affairs benefits to the District in line with the Strategic Plan and Public Engagement Master Plan:

- **Stormwater Capture:**
  - Reshape Goss Canyon debris basin using the "Ditch & Furrow" method.
  - Enhance stormwater retention and groundwater recharge.
  - Serve as a precursor to a larger scale stormwater capture at CV Park.

- **Community Access & Beautification:**
  - Replace the existing chain-link gate with a multi-purpose landmark gate.
  - Improve functionality, safety, and aesthetics of the entryway.
  - Expand accessibility for school buses and community visitors.

- **Educational Enhancements:**
  - Install informational kiosks and educational signage.
  - Create an outdoor lending library focused on local history, ecology, and water conservation.

The community strongly supports the Rosemont Preserve partnership. Over 70% of residents had a more favorable impression of the District after learning about the partnership. Of those, over 55% had a

strongly more favorable impression of the District and over half of respondents who initially disapproved of the District had a more favorable impression upon learning about the project.

DISCUSSION:

The Arroyo and Foothills Conservancy anticipates a high probability that it will be able to secure grant funding to reimburse the District. Thus, there is a low risk that the District will not be able to recover funds. If a grant is not secured, the District will seek alternative sources. Ultimately, it is anticipated that the water supply savings from stormwater capture alone will recoup the project costs. This Board authorization provides the General Manager the flexibility to execute on contracts to ensure timely project progression. It is anticipated that the project costs will be under $50k.

RECOMMENDATION:

Authorize the General Manager to advance project funds.

Prepared and Submitted by:

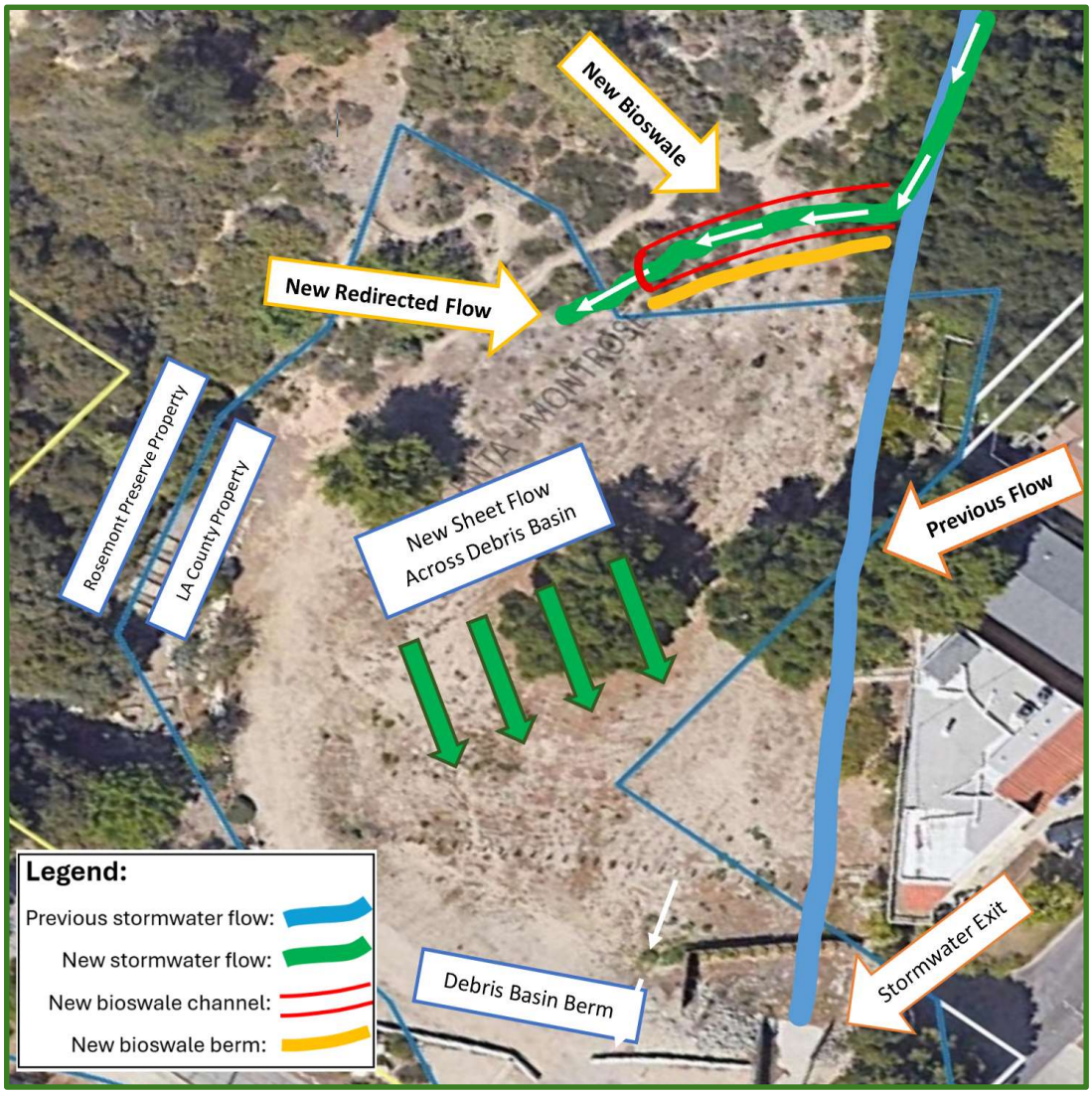
Patrick Atwater
Regulatory and Public Affairs Manager

Attachments:

★Rosemont Preserve
Stormwater Capture & Groundwater Recharge

On-site Stormwater Capture Structure (Bioswale)

- Utilizes nature-based solution (bioswale) to ensure more stormwater absorbs into soil and recharges local groundwater basin. Water would otherwise exit property through County storm channel to the ocean.
- Captures 10's to 100's of thousands of gallons of rainwater per year.
- Preserves full function of adjacent LA County flood control debris basin, ensuring public safety during large storm events.
- Provides proof of concept for other similar canyons & debris basins (160 debris basins exist in LA County alone), and test case for stormwater retention assessment tool (DROPS) currently under development.



Verdugo Groundwater Basin

- Source of 50-60% of drinking water CVWD provides La Crescenta
- Water levels struggle from urbanization of watershed, septic tank removal in the 1970's, & extended drought

Goss Canyon Watershed

- 250-acre Goss Canyon is significant watershed for recharging Verdugo Basin
- Rosemont Preserve sits at mouth of Goss Canyon

A Community Partnership of: Arroyos & Foothills Conservancy · Crescenta Valley Water District CVWD · Public Works Los Angeles County · Friends of Rosemont Preserve

ArroyosFoothills.org
CVWD.com

Bioswale Performance Report — Feb 13, 2025

RAIN EVENT: at Rosemont Preserve, La Crescenta CA, Feb. 13, 2025 8:00-18:30, Rainfall: 3.65” rain in ~12 hours

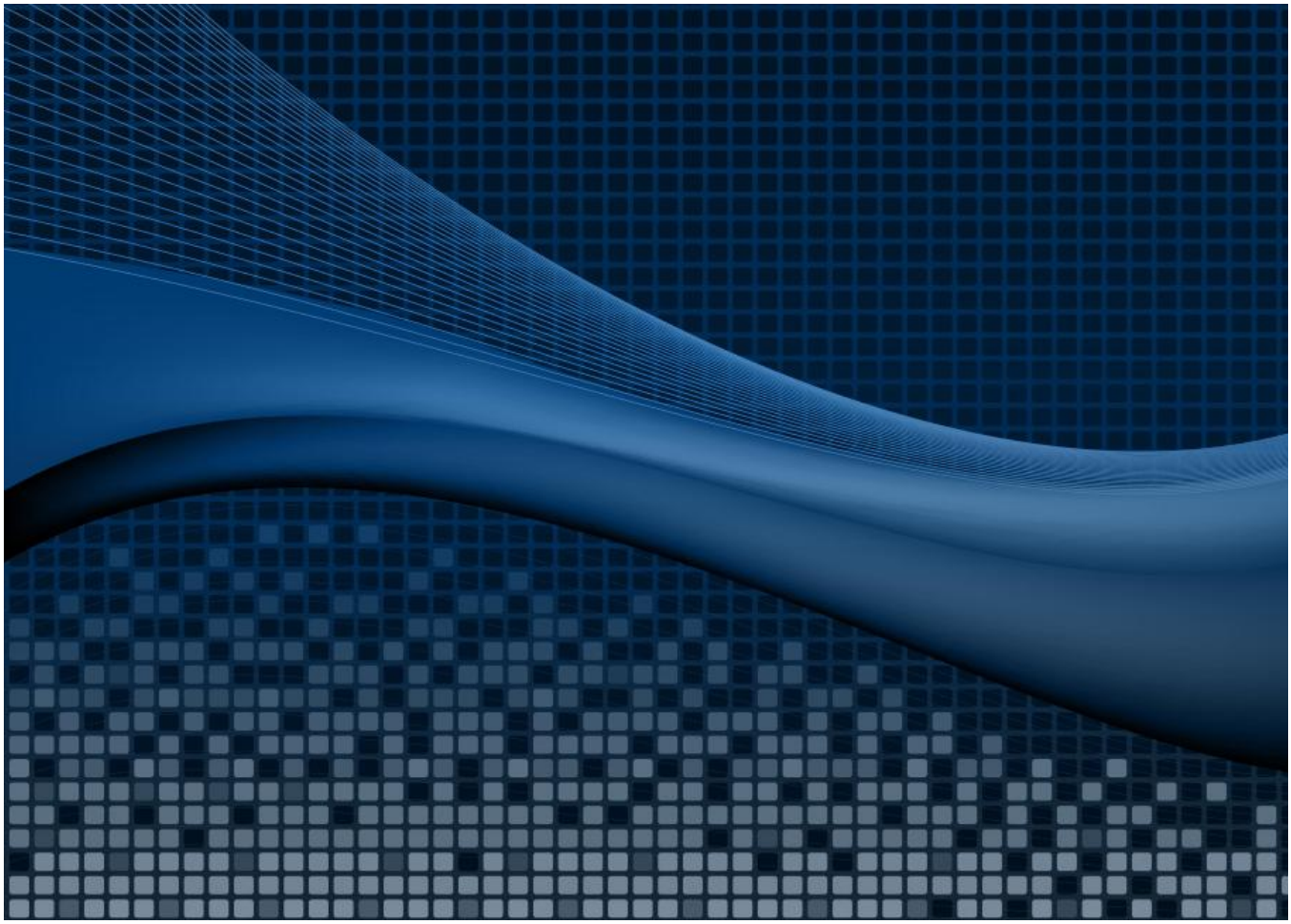
08:04 – Light rain starts, bioswale still dry (rain event begins)	13:31 – Rain intensifies, bioswale almost full, deer passing through flooded bioswale
13:44 – Bioswale full, begins overflowing into debris basin	14:04 – Rain eases, water soaks into porous soil emptying bioswale
17:44 – Rain resumes, heaviest of day, overflow peaks, water sheets across debris basin for further absorption	18:29 – Rain stops, overflow stops and water soaks in, ultimately recharging groundwater basin (rain event over)

Appendix L: 2021 CVWD Hazard Mitigation Plan

Crescenta Valley Water District 2025 Urban Water Management Plan

CRESCENTA VALLEY WATER DISTRICT

Hazard Mitigation Plan



TETRA TECH

November 2021

Crescenta Valley Water District
Hazard Mitigation Plan

November 2021

PREPARED FOR

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CONTENTS

Part 1. Background and Methods

1. Introduction to the Planning Process 1-1
   1.1 The Big Picture 1-1
   1.2 A Plan for the Crescenta Valley Water District 1-1
   1.3 Plan Organization 1-2
2. The Planning Process 2-1
   2.1 Core Planning Team, Planning Area and Steering Committee 2-1
   2.2 Coordination with Other Agencies 2-2
   2.3 Review of Existing Programs 2-3
   2.4 Public Involvement 2-3
   2.5 Plan Development Chronology/Milestones 2-9
3. District Profile 3-1
   3.1 District Structure and leadership 3-2
   3.2 Financial Summary 3-2
   3.3 District History 3-2
   3.4 Service Areas 3-3
   District Facilities 3-5
   3.5 Physical Characteristics 3-7
   3.6 Development Profile 3-9
   3.7 Demographics 3-11
4. Relevant Laws, Ordinances, Programs and Capabilities 4-1
   4.1 Relevant Federal and State Agencies, Programs and Regulations 4-1
   4.2 County, City or Other District 4-3
   4.3 District Core Capabilities 4-4
   4.4 Opportunities for Integration 4-8

Part 2. Risk Assessment

5. Hazards of Concern 5-1
   5.1 History of Hazard Events in the Planning Area 5-1
   5.2 Hazards Identified for Risk Assessment 5-3
6. Risk Assessment Methodology 6-1
   6.1 Risk Assessment Tools 6-1
   6.2 Risk Assessment Approach 6-2
   6.3 Sources of Data Used in Modeling and Exposure analyses 6-3
   6.4 Limitations 6-4
7. Drought 7-1
   7.1 General Background 7-1
   7.2 Local Water Supply 7-5
   7.3 Hazard Profile 7-6
   7.4 Exposure and Vulnerability 7-11
   7.5 Development Trends 7-11
   7.6 Scenario 7-11

7.7 Issues 7-12
8. Earthquake 8-1
8.1 General Background 8-1
8.2 Hazard Profile 8-5
8.3 Exposure 8-15
8.4 Vulnerability 8-19
8.5 Development Trends 8-32
8.6 Scenario 8-33
8.7 Issues 8-33
9. Flood 9-1
9.1 General Background 9-1
9.2 Hazard Profile 9-3
9.3 Exposure and Vulnerability 9-9
9.4 Development Trends 9-9
9.5 Scenario 9-9
9.6 Issues 9-10
10. Landslide and Debris Flow 10-1
10.1 General Background 10-1
10.2 Hazard Profile 10-4
10.3 Exposure 10-9
10.4 Vulnerability 10-9
10.5 Future Trends in Development 10-9
10.6 Scenario 10-12
10.7 Issues 10-13
11. Severe Weather 11-1
11.1 General Background 11-1
11.2 Hazard Profile 11-4
11.3 Exposure 11-6
11.4 Vulnerability 11-6
11.5 Future Trends in Development 11-7
11.6 Scenario 11-7
11.7 Issues 11-7
12. Wildfire 12-1
12.1 General Background 12-1
12.2 Hazard Profile 12-1
12.3 Exposure 12-6
12.4 Vulnerability 12-8
12.5 Future Trends in Development 12-8
12.6 Scenario 12-9
12.7 Issues 12-9
13. Climate Change Considerations 13-1
13.1 What is Climate Change? 13-1
13.2 How Climate Change Affects Hazard Mitigation 13-2
13.3 Current Global Indications of Climate Change 13-2
13.4 Projected Future Impacts 13-3
13.5 Responses to Climate Change 13-6

13.6 Climate Change Impacts on Hazards....13-7
14. Risk Ranking....14-1
14.1 Probability of Occurrence....14-1
14.2 Impact....14-2
14.3 Risk Rating and Ranking....14-3
15. Other Hazards of Interest....15-1
15.1 Cyber-Threats....15-1
15.2 Hazardous Materials....15-4
15.3 Epidemic/Pandemic....15-6

Part 3. Mitigation Plan

16. Goals and Objectives....16-1
16.1 Goals....16-1
16.2 Objectives....16-1
17. Mitigation Best Practices....17-1
18. Mitigation Actions....18-1
18.1 Recommended Mitigation Actions....18-1
18.2 Action Plan Prioritization....18-3
18.3 Classification of Mitigation Actions....18-5
18.4 Action Plan Implementation....18-6
19. Plan Adoption and Maintenance....19-1
19.1 Plan Adoption....19-1
19.2 Plan Maintenance Strategy....19-1
References....1

Appendices

Appendix A. Public Involvement Materials
Appendix B. Summary of Federal and State Agencies, Programs and Regulations
Appendix C. Detailed Risk Assessment Results
Appendix D. Hazard Mitigation Plan Adoption Resolution

Tables

Table 2-1. Steering Committee Members....2-2
Table 2-2. Plan Development Chronology/Milestones....2-9
Table 3-1. Crescenta Valley Water District Assets....3-7
Table 3-2. Average Los Angeles County Climate Data....3-8
Table 3-3. Land Use within the CVWD Service Area....3-10
Table 3-4. Annual Population Data....3-12

Table 4-1. Summary of Relevant Federal Agencies, Programs and Regulations....4-1
Table 4-2. Summary of Relevant State Agencies, Programs and Regulations....4-2
Table 4-3. Fiscal Capability....4-7
Table 4-4. Administrative and Technical Capability....4-7
Table 4-5. Education and Outreach Capability....4-8

Table 5-1. Presidential Disaster Declarations with Affected Area Including the District Service Area....5-1

Table 6-1. Hazus Model Data Documentation....6-4

Table 7-1. State Drought Management Program....7-2

Table 8-1. Mercalli Scale and Peak Ground Acceleration Comparison....8-2
Table 8-2. NEHRP Soil Classification System....8-3
Table 8-3. Earthquakes Magnitude 5.0 or Larger Within 100-Mile Radius of the Planning Area....8-6
Table 8-4. Number of District Structures Exposed to the Earthquake Hazard....8-16
Table 8-5. Length of District Pipeline Within Earthquake Hazard Areas....8-16
Table 8-6. Earthquake Scenario Loss Estimates for District Structures....8-19
Table 8-7. Earthquake Scenario Loss Estimates for District Pipelines....8-32
Table 8-8. Time to Return Structures to Functionality....8-33

Table 9-1. History of Flood Events....9-4

Table 10-1. Landslide Events in and near the District Planning Area....10-5
Table 10-2. Length of District Pipeline Within Landslide Hazard Areas....10-10
Table 10-3. Number of District Structures Exposed to the Landslide Hazard....10-10

Table 11-1. Beaufort Wind Scale....11-2
Table 11-2. NWS Weather Warnings, Watches and Advisories....11-6
Table 12-1. Damaging Urban-Wildland Interface Fires in Los Angeles County Since 2005....12-2

Table 12-2. Number of District Structures Exposed to the Wildfire Hazard....12-6

Table 13-1. Summary of Climate Change Impacts Likely to Affect the Planning Area....13-4

Table 14-1. Probability of Hazards....14-2
Table 14-2. Hazard Impact on People, Property and Operations....14-3
Table 14-3. Hazard Risk Rating....14-3

Table 15-1. Common Mechanisms for Cyber-Attacks....15-2

Table 17-1. Alternatives to Mitigate the Drought Hazard....17-2
Table 17-2. Alternatives to Mitigate the Earthquake Hazard....17-3
Table 17-3. Alternatives to Mitigate the Flood Hazard....17-4
Table 17-4. Alternatives to Mitigate the Landslide Hazard....17-5
Table 17-5. Alternatives to Mitigate the Severe Weather Hazard....17-6
Table 17-6. Alternatives to Mitigate the Wildfire Hazard....17-7

Table 18-1. Hazard Mitigation Action Plan Matrix....18-1
Table 18-2. Mitigation Action Priority....18-5
Table 18-3. Analysis of Mitigation Actions....18-6

Table 19-1. Plan Maintenance Matrix....19-2

Figures

Figure 2-1. Sample Page from Survey Distributed to the Public 2-5
Figure 2-2. Public Outreach Plan for Public Meeting 2-6
Figure 2-3. CV Weekly Public Notice for Final Public Comment period 2-7
Figure 2-4. Sample Page from Hazard Mitigation Plan Website 2-8

Figure 3-1. District at a Glance 3-1
Figure 3-2. Potable Water System 3-4
Figure 3-3. Wastewater System 3-6
Figure 3-4. California and La Cañada Flintridge Population Growth 3-12
Figure 3-5. Age Distribution in the La Crescenta Montrose CDP 3-14
Figure 3-6. La Crescenta-Montrose CDP Race Distribution 3-14
Figure 3-7. City of La Cañada Flintridge Race Distribution 3-15

Figure 7-1. Crop Moisture Index for Week Ending October 3, 2020 7-3
Figure 7-2. Palmer Z Index Short-Term Drought Conditions (September 2020) 7-3
Figure 7-3. Palmer Drought Severity Index (September 2020) 7-4
Figure 7-4. Palmer Hydrological Drought Index (September 2020) 7-4
Figure 7-5. 24-Month Standardized Precipitation Index (October 2018 – September 2020) 7-5
Figure 7-6. Water Conservation Alter System 7-10

Figure 8-1. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years in Southern California 8-4
Figure 8-2. Earthquake Fault Zones in Los Angeles County 8-7
Figure 8-3. Potable Water System - NEHRP Soil Class 8-10
Figure 8-4. Wastewater System - NEHRP Soil Class 8-11
Figure 8-5. Potable Water System - Liquefaction 8-12
Figure 8-6. Wastewater System - Liquefaction 8-13
Figure 8-7. UCERF3 Forecast for Magnitude 6.7 or Larger Earthquake in the Next 30 Years. 8-14
Figure 8-8. Percent of District Potable Water Structures Exposed to the Earthquake Hazard 8-17
Figure 8-9. Percent of District Wastewater Structures Exposed to the Earthquake Hazard 8-18
Figure 8-10. Potable Water System - Sierra Madre M7.1 Earthquake Scenario 8-20
Figure 8-11. Wastewater System - Sierra Madre M7.16 Earthquake Scenario 8-21
Figure 8-12. Potable Water System - Verdugo M6.9 Earthquake Scenario 8-22
Figure 8-13. Wastewater System - Verdugo M6.9 Earthquake Scenario 8-23
Figure 8-14. Potable Water System - Puente Hills M6.95 Earthquake Scenario 8-24
Figure 8-15. Wastewater System - Puente Hills M6.95 Earthquake Scenario 8-25
Figure 8-16. Potable Water System - Northridge M6.89 Earthquake Scenario 8-26
Figure 8-17. Wastewater System - Northridge M6.89 Earthquake Scenario 8-27
Figure 8-18. Potable Water System - Raymond M6.71 Earthquake Scenario 8-28
Figure 8-19. Wastewater System - Raymond M6.71 Earthquake Scenario 8-29
Figure 8-20. Potable Water System - 100-Year Probabilistic Earthquake Scenario 8-30
Figure 8-21. Wastewater System - 100-Year Probabilistic Earthquake Scenario 8-31

Figure 9-1. Surrounding FEMA Flood Zones 9-7
Figure 9-2. Example Hydrograph 9-8

Figure 10-1. Potable Water System - Susceptibility to Deep-Seated Landslides 10-6

Figure 10-2. Wastewater System - Susceptibility to Deep-Seated Landslides....10-7
Figure 10-3. Percent of District Potable Water Facilities Exposed to the Landslide Hazard....10-11
Figure 10-4. Percent of District Wastewater Facilities Exposed to the Landslide Hazard....10-12

Figure 11-1. Extreme Heat Index 11-3

Figure 12-1. Potable Water System - Wildfire Hazard Severity Zones 12-4
Figure 12-2. Wastewater System - Wildfire Hazard Severity Zones 12-5
Figure 12-3. Percent of District Potable Water Structures Exposed to the Wildfire Hazard 12-7
Figure 12-4. Percent of District Wastewater Structures Exposed to the Wildfire Hazard 12-8

Figure 13-1. Global Carbon Dioxide Concentrations Over Time 13-1
Figure 13-2. Observed and Projected Average Temperatures for the Los Angeles Region....13-5
Figure 13-3. Projected Number of Extreme Heat Days by Year for the Los Angeles Region....13-5
Figure 13-4. Projected Changes in Fire Risk for Los Angeles Region, Relative to 2010 Levels 13-6
Figure 13-5. Worldwide Natural Catastrophe Events, 1980 – 2018....13-10

Figure 14-1. Hazard Risk Rating....14-4

ACRONYMS/ABBREVIATIONS

Acronym or Abbreviation	Definition
%g	Percent acceleration force of gravity
44 CFR	Code of Federal Regulations, Title 44
APA	Approval Pending Adoption
BRIC	Building Resilient Infrastructure & Communities grant program
Cal OES	California Governor's Office of Emergency Services
CDBG	Community Development Block Grant
COVID-19	Coronavirus Disease 2019
CVWD	Crescenta Valley Water District
DWR	California Department of Water Resources
EMPG	Emergency Management Performance Grant
EPA	U.S. Environmental Protection Agency
ESA	US Endangered Species Act
FEMA	Federal Emergency Management Administration
FHSZ	fire hazard severity zone
FMWD	Foothill Municipal Water District
GIS	Geographic Information System
Hazus	Hazards U.S.
HMA	Hazard Mitigation Assistance
HUD	U.S. Department of Housing and Urban Development
IBC	International Building Code
IT	Information Technology
MWD	Metropolitan Water District of Southern California
NEHRP	National Earthquake Hazards Reduction Program
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
PGA	Peak Ground Acceleration
ppm	Parts per million
SC	Steering Committee (CVWD Hazard Mitigation Plan)
ULARA	Upper Los Angeles River Area
USACE	US Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	United States Geological Survey

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- Harry Leon, President of Crescenta Valley Town Council
- James Bodnar, Board Member for CVWD
- Paul Dutton, CERT Program lead for Dutton Real Estate
- Ken Herman, District Engineer for Foothill Municipal Water District
- Doug Caister, General Manager of La Cañada Irrigation District
- Shahan Atmajian, Emergency Operations Center Coordinator for the City of La Cañada Flintridge
- Brian Hodge, President of Crescenta Valley Fire Safe Council
- Michael De Ghetto, Chief Asst. General Manager of Glendale Water and Power
- Dan Hardgrove, Deputy Director of Public Works/Field Services, City of Glendale
- David Weeshoff, Conservation Chair, San Fernando Valley Audubon Society

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EXECUTIVE SUMMARY

The Crescenta Valley Water District (the District, or CVWD) provides essential services (water and sewerage) in the Crescenta Valley portion of Los Angeles County. The District's ability to continue to provide these services will be critical to the area's ability to recover from a hazard event. To address this need, the District has completed its first formal plan to prepare for and mitigate the impacts of hazards that could impact the District. The *Crescenta Valley Water District Hazard Mitigation Plan* provides a framework for all hazards that are likely to impact the District.

The hazard mitigation plan strives to reduce risk for assets that are vital for the District's continuity of operations following hazard events. The plan's goals and recommendations lay the groundwork for implementing local mitigation activities. The contents of the plan comply with requirements of the federal Disaster Mitigation Act, under which communities with approved hazard mitigation plans are eligible for various hazard mitigation funding programs provided by the Federal Emergency Management Agency.

The plan was prepared by a core planning team of District staff and professional consultants, with oversight by an 11-member steering committee of local residents and stakeholders representing interests within the District's service area boundaries. Public input for the plan was solicited through a survey, public meetings, and media outreach.

DISTRICT DESCRIPTION

CVWD serves the Crescenta Valley area of Los Angeles County, in the foothills of the San Gabriel Mountains between the San Fernando and San Gabriel valleys. The District provides water distribution and sewage collection within its boundaries to the unincorporated communities of La Crescenta, Montrose, and Verdugo City as well as a small portion of the City of La Cañada Flintridge.

The District serves an area of approximately 4 square miles in relatively steep terrain ranging from 1,200 feet to almost 3,000 feet above sea level. The District currently provides water to over 8,000 accounts representing a population of approximately 33,000.

CVWD is an independent special district, operating under the authority of Division 12 of the California Water Code. CVWD has been providing water and wastewater services to residents since 1950. The District is governed by a five-member Board of Directors, elected at-large from within the District boundaries. The District General Manager administers the day-to-day operations of the District in accordance with the policies and procedures established by the Board of Directors. CVWD employs a full-time staff of 27 employees. The Board of Directors' regularly scheduled meetings are on the second and fourth Tuesdays of each month. Meetings are publicly noticed, and customers are encouraged to attend. The Board of Directors adopted this plan after approval pending adoption was granted by FEMA; the District director of engineering will oversee its implementation.

The District's key assets generally consist of buildings, wells, pumps, tanks, and pipelines, which are defined for this plan as the District's critical facilities. Table ES-1 summarizes the District's critical assets and their value. The Hazard Mitigation Plan assesses the potential risk that natural hazards pose to buildings, infrastructure and equipment owned by the District.

Table ES-1. Crescenta Valley Water District Assets

Asset	Count	Estimated Replacement Cost
General Structures		
Buildings	4	$8,180,000
Total	*4*	*$8,180,000*
Potable Water Structures		
Aeration Tower	2	$380,000
Emergency Interconnection	21	$1,575,000
Fitting	1,924	$2,886,000
Hydrant	695	$5,212,500
Interconnection	2	$606,250
Mixing Station	1	$510,000
Motor Control Center	21	$6,500,000
Potable Water Treatment Plant	10	$1,512,500
Potable Water Valve	2,279	$11,395,000
Pressure Reducing Station	7	$2,375,000
Reservoir	19	$47,405,000
Water Booster Pump Station	14	$13,175,000
Well	12	$31,500,000
Total	***5,007***	***$125,032,250***
Wastewater Structures		
Sewer Control Valve	3	$1,350,000
Sewer Fitting	6,482	$6,482,000
Sewer Flow Meter	1	$150,000
Sewer Manhole	1,270	$25,400,000
Sewer Wet Well	1	$20,000
Wastewater Lift Station	2	$1,700,000
Total	***7,759***	***$35,102,000***
Pipelines	**Miles**	
Potable Water Pipelines	95	$231,919,368
Wastewater Pipelines	68.9	$181,863,149
Total	***172.2***	***$413,782,517***
Total Value for All District Assets		**$582,096,767**

HAZARDS OF CONCERN

The Steering Committee considered the full range of natural hazards that could impact the District and ranked those that present the greatest concern. The hazards ranked as being of highest concern are earthquake, landslide drought and wildfire. Hazards ranked as being of medium concern are flood and severe weather. Figure ES-1 shows the hazard ranking.

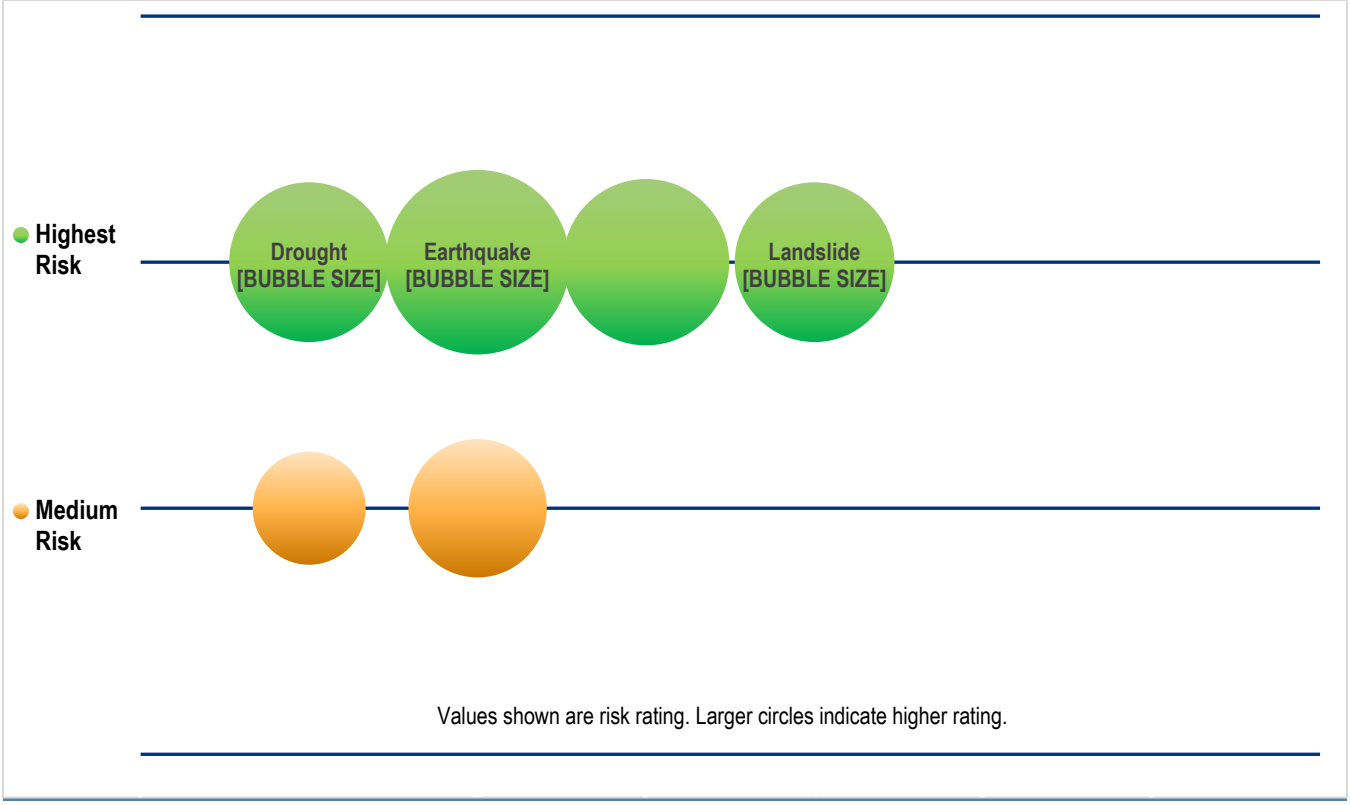


Figure ES-1. Hazard Risk Ranking

In addition to the ranked hazards of concern, the Steering Committee recognized other hazards that present risks to the District but are difficult to quantify. These other hazards of interest are cyber-attack, hazardous materials, and pandemic. The hazard mitigation plan provides general descriptions of the nature of these hazards. It also presents an overview on climate change, and how all hazards have the potential to be affected by it.

RISK ASSESSMENT

Risk assessments in the hazard mitigation plan describe the risks associated with each identified hazard of concern. For each hazard, a general profile of the hazard as it may affect the District was developed, and an assessment was completed to determine the number of District critical facilities that the hazard could affect (this is called "exposure") and the potential damage that could result (this is called "vulnerability").

This risk assessment found that, although many District facilities have exposure to most or all of the identified hazards of concern, quantifiable damage to facilities is likely only from the earthquake scenarios that were evaluated. Table ES-2 summarizes loss estimates for these hazards. For pipelines, loss estimations were made in several categories: number of repairs needed (leaks and breaks), days required to implement repairs, and economic loss. Table ES-3 summarizes the results.

Estimates also were developed for the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. The analysis of CVWD structures was performed for all modeled earthquake scenarios for each individual facility found to be damaged. Table ES-4 summarizes the results for structures.

Table ES-2. Estimated Overall Damage to Critical Facilities from Earthquake

Earthquake Scenario	Average Probability of Damage to Structure					Total Damage
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage	
Potable Water Facilities						
Sierra Madre M7.1	8.07%	27.65%	28.75%	23.93%	11.58%	$42,287,519
Verdugo M6.9	5.76%	24.97%	33.16%	24.69%	11.40%	$44,298,868
Puente Hills M6.95	7.68%	27.26%	31.90%	24.77%	8.37%	$39,328,636
Northridge M6.89	48.65%	29.30%	12.72%	7.86%	1.45%	$11,550,512
Raymond M6.71	41.50%	30.58%	15.19%	10.60%	2.10%	$15,357,719
100-Year Probabilistic	54.84%	19.28%	12.85%	10.63%	2.38%	$15,294,107
Wastewater Facilities						
Sierra Madre M7.1	23.30%	39.56%	21.69%	12.43%	3.01%	$357,502
Verdugo M6.9	12.12%	39.66%	32.35%	12.84%	3.01%	$375,478
Puente Hills M6.95	8.75%	36.80%	38.12%	13.30%	3.02%	$367,494
Northridge M6.89	56.40%	29.10%	4.28%	8.16%	2.04%	$178,033
Raymond M6.71	30.78%	37.06%	17.58%	11.70%	2.85%	$267,366
100-Year Probabilistic	59.33%	20.79%	8.09%	9.44%	2.34%	$198,536

Table ES-3. Estimated Overall Damage to Pipelines from Earthquake

Earthquake Scenario	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
Potable Water Pipelines							
Sierra Madre- M7.16	168.7	49.9	218.6	48.2	28.5	76.7	$1,592,008
Verdugo M6.9	143.3	46.5	189.8	40.9	26.6	67.5	$1,414,099
Puente Hills-M6.95	72.7	27.9	100.6	20.8	16.0	36.7	$782,375
Northridge-M6.89	17.4	5.7	23.1	5.0	3.2	8.2	$172,249
Raymond- M6.71	25.8	9.1	34.9	7.4	5.2	12.6	$265,379
100-Year Probabilistic	18.2	6.3	24.5	5.2	3.6	8.8	$185,378
Wastewater Pipelines							
Sierra Madre- M7.16	108.4	31.8	140.3	31.0	18.2	49.2	$1,019,510
Verdugo M6.9	93.6	30.8	124.5	26.8	17.6	44.4	$930,592
Puente Hills-M6.95	49.7	19.8	69.5	14.2	11.3	25.5	$545,426
Northridge-M6.89	11.2	3.5	14.7	3.2	2.0	5.2	$107,913
Raymond- M6.71	21.3	8.5	29.7	6.1	4.8	10.9	$233,037
100-Year Probabilistic	12.2	4.5	16.6	3.5	2.6	6.0	$127,972

Table ES-4. Time to Return Structures to Functionality

	% Functionality					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Potable Water Facilities						
Sierra Madre M7.1	36.46	58.88	67.44	70.56	77.33	87.57
Verdugo M6.9	33.58	57.46	66.82	70.12	77.17	87.76
Puente Hills M6.95	36.12	59.83	69.56	72.82	79.55	89.34
Northridge M6.89	69.46	85.14	91.34	92.87	94.70	97.36
Raymond M6.71	64.19	81.33	88.49	90.57	93.25	96.98
100-Year Probabilistic	70.39	83.29	88.51	90.27	92.51	96.07
Wastewater Facilities						
Sierra Madre M7.1	38.72	72.18	85.07	87.08	91.83	98.38
Verdugo M6.9	29.02	65.60	83.93	86.75	91.57	98.38
Puente Hills M6.95	25.80	61.75	82.80	86.27	91.05	98.32
Northridge M6.89	66.50	86.55	90.20	91.30	94.18	98.75
Raymond M6.71	45.43	74.22	85.13	87.70	91.98	98.40
100-Year Probabilistic	67.27	83.38	88.57	89.93	93.13	98.53

MITIGATION

Based on the risk assessment and hazard ranking, the Steering Committee identified 23 actions the District should take to mitigate the loss potential associated with the hazards of concern. These actions were chosen from a range of alternatives, using the following goals and objectives for guidance:

- Goals:
  - Protect life and property
  - Maintain continuity of essential water and sewer services
  - Increase public awareness of the risks of loss of water/sewer service
  - Facilitate partnerships with recognized stakeholders within the Crescenta Valley and implement a coordination plan between the stakeholders
  - Protect local water supply sources
  - Protect against environmental consequences caused by water and sewer system failure initiated by natural hazards
- Objectives:
  - Implement activities that assist in protecting lives by making CVWD's infrastructure, critical facilities, and other properties more resistant to natural hazards
  - Protect water quality and supply
  - Properly address aging infrastructure issues to reduce/minimize future hazards and disasters
  - Raise awareness and communicate to the Crescenta Valley community about risks to District assets
  - Leverage grant funding and low interest loan programs to implement hazard mitigation capital projects
  - Establish policies to ensure mitigation projects are prioritized for critical facilities, services, and infrastructure
  - Create, rehabilitate, enhance, and preserve local ecosystems to serve as natural hazard mitigation functions

Table ES-5 lists the recommended hazard mitigation actions that make up the action plan. It also indicates priorities for each action in terms of implementing the action and pursuing grant funding for the action. These priorities are based on estimated benefits and costs of each action, how many objectives the action can accomplish, the availability of existing funding, and the action's eligibility for various grant programs.

Table ES-5. Recommended Hazard Mitigation Actions

Recommended Action	Implementation Priority	Grant Pursuit Priority
Action #1 -- Acquire stationary emergency electric generators for Main Booster Stations (2 total)	Medium	High
Action #2 – Acquire stationary emergency electric generators for well sites (5 total sites)	Medium	High
Action #3 – Acquire portable emergency electric generators for booster stations (4 total)	Medium	High
Action #4 – Acquire portable emergency electric generators for well sites (4 total)	Medium	High
Action #5 – Install seismic sensors and valve actuators on reservoir inlet/outlet valves (4 sites)	Medium	Low
Action #6 – Install security cameras at reservoir and well sites (88 cameras total)	Medium	Low
Action #7 – Install an emergency chlorine / ammonia portable station	High	Low
Action #8 – Conduct seismic evaluation study of existing CVWD building (4 buildings)	High	Low
Action #9 – Seismically upgrade/retrofit CVWD buildings	Medium	Low
Action #10 – Repair slope and inlet/outlet pipeline at Edmund #2 Reservoir	Medium	Medium
Action #11 – Replace above ground outlet pipe at Gross Canyon Reservoir such that it will mitigate the future impacts from earthquake, landslide, and wildfire events.	Medium	Medium
Action #12 – Conduct feasibility study for relocation / upgrades to access roads at reservoirs	High	Low
Action #13 – Relocate access roadway at Pickens Canyon Reservoir	Medium	Medium
Action #14 – Retrofit access road to Edmund #2 Reservoir	Low	Low
Action #15 – Retrofit access roadway at Shields Reservoir	Low	Low
Action #16 – Retrofit CVWD / La Cañada Irrigation District interconnection at Canalda Dr.	High	Low
Action #17 – Install emergency interconnection pipeline among Glendale, Foothill Municipal Water District, and CVWD	Medium	Medium
Action #18 – Conduct feasibility study for sewer bypass system for large diameter pipeline with Glendale	High	Low
Action #19 – Install sewer bypass system for large diameter pipeline with Glendale	Medium	Medium
Action #20 – Conduct feasibility study of protection of water and sewer pipeline within Caltrans Bridge Freeway crossing	High	Low
Action #21 – Conduct feasibility study for new water storage facility and pipeline crossings of Pickens Canyon	High	Low
Action #22 – Conduct feasibility study for pipeline crossing of LA County Flood Control Channels	High	Low
Action #23 – Develop Emergency Community Water Fulfillment Center	Low	Low

Part 1. Background and Methods

1. INTRODUCTION TO THE PLANNING PROCESS

1.1 THE BIG PICTURE

Hazard mitigation is defined as any action taken to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. Through hazard mitigation planning, the Crescenta Valley Water District (the District, or CVWD) can implement long- and short-term actions before, during and after disasters to achieve these aims. Hazard mitigation activities include planning efforts, policy changes, programs, studies, improvement projects, and other steps to reduce the impacts of hazards.

The federal Disaster Mitigation Act (DMA) emphasizes planning for disasters before they occur. The DMA requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Regulations developed to fulfill the DMA's requirements are included in Title 44 of the Code of Federal Regulations (44 CFR). The DMA promotes sustainability in hazard mitigation. To be sustainable, hazard mitigation needs to incorporate sound management of natural resources and address hazards and mitigation in the largest possible social and economic context.

1.2 A PLAN FOR THE CRESCENTA VALLEY WATER DISTRICT

CVWD has completed a planning process to prepare for the impacts of hazards that could impact the District's service area. The District worked with its neighbors and stakeholders to prepare a detailed, multi-hazard plan and to identify steps to be taken in advance to mitigate impacts from those hazards. Through the hazard mitigation planning process, the District engaged CVWD customers to inform them about risk and seek their input on ways that the District can reduce that risk and become more resilient.

The *Crescenta Valley Water District Hazard Mitigation Plan* is the District's first formal plan pursuant to the Disaster Mitigation Act of 2000 (Public Law 106-109). The plan promotes sound policy to protect the District's critical assets from the impacts of natural hazards. It identifies resources, information, and strategies for reducing risk from those hazards. Elements and strategies in the plan were selected because they meet a program requirement and because they best meet the needs of CVWD and its community.

All residential and commercial CVWD customers are the ultimate beneficiaries of this hazard mitigation plan. The plan strives to reduce risk for District assets that are vital for its continuity of operations following hazard events. The District provides essential services (water supply and wastewater collection), and its ability to continue to provide these services will be critical to the area's ability to recover from a hazard event. This plan provides a viable planning framework for all hazards that are likely to impact the District. Participation in development of the plan by key stakeholders helped ensure that outcomes will be mutually beneficial. The plan's goals and recommendations lay the groundwork for implementing local mitigation activities and partnerships.

1.3 PLAN ORGANIZATION

The *Crescenta Valley Water District Hazard Mitigation Plan* consists of three parts:

- Part 1 describes the concept of hazard mitigation, the process and methodologies used to develop this hazard mitigation plan, and significant hazard-related profile characteristics of the District.
- Part 2 provides a detailed risk assessment of the specific hazards of concern to the District. The assessment of each hazard describes the history, location, frequency and severity of the hazard, the District's exposure to the hazard, and the potential losses that could result from occurrences of the hazard.
- Part 3 defines the District's goals and objectives for hazard mitigation, recommended actions to mitigate hazard risks, and a strategy for implementing the recommended actions.

2. THE PLANNING PROCESS

2.1 CORE PLANNING TEAM, PLANNING AREA AND STEERING COMMITTEE

CVWD applied for and was awarded a planning grant (Project #DR-4407-0020-P) funded by the Federal Emergency Management Agency (FEMA) to develop a hazard mitigation plan that addresses the mandates in the DMA. The first step in developing the hazard mitigation plan was to establish a planning team to carry out the planning process and document preparation and a steering committee of local stakeholders to guide the planning team.

The District hired Tetra Tech through a procurement process to assist in the facilitation of the planning process. The Tetra Tech project manager assumed the role of the lead planner, reporting directly to a District-designated project manager. A core planning team was formed to lead the planning effort, made up of the following members:

- Crescenta Valley Water District staff:
  - David Gould, Director of Engineering
  - Brook Yared, Senior Engineer
  - Nem Ochoa, General Manager
  - Dennis Maxwell, Director of Operations
  - Christy Colby, Regulatory and Public Affairs Manager
  - James Lee, Director of Finance and Administration
  - Jennifer Bautista, Project Coordinator
- Consultant staff:
  - John Robinson, Grant Administrator, John Robinson Consulting, Inc
  - Rob Flaner, CFM, Project Manager, Tetra Tech
  - Bart Spencer, Lead Project Planner, Tetra Tech
  - Carol Baumann, Risk Assessment Lead, Tetra Tech
  - Desmian Alexander, MUP, Planner, Tetra Tech

The core planning team met every other week as needed, for a total of 14 times over the course of this planning process (meeting summaries are available upon request). At the outset of planning, the core planning team defined the specific boundaries of the planning area to be addressed. These boundaries affect both the detailed risk assessment and the selection of mitigation actions. For this hazard mitigation plan, the planning area was defined as the District's service area boundaries for both potable water and wastewater services.

To be successful, hazard mitigation planning requires the collaboration and support of diverse parties whose interests can be affected by hazard losses. The plan was developed with significant public input, and its

development was overseen by a steering committee. The core planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. From these candidates, the Steering Committee was formed to oversee all phases of the plan. Table 2-1 lists the committee members.

Table 2-1. Steering Committee Members

Name	Title	Department or Agency
Sharon Raghavachary	Board Member, Chair of Steering Committee	Crescenta Valley Water District
Harry Leon	President, Vice-Chair of Steering Committee	Crescenta Valley Town Council
James Bodnar	Board Member	Crescenta Valley Water District
Paul Dutton	CERT Program	Dutton Real Estate
Ken Herman	District Engineer	Foothill Municipal Water District
Doug Caister	General Manager	La Cañada Irrigation District
Shahan Atmajian	Emergency Operations Center Coordinator	City of La Cañada Flintridge
Brian Hodge	President	Crescenta Valley Fire Safe Council
Michael De Ghetto	Chief Assistant General Manager	Glendale Water and Power
Dan Hargrove	Deputy Director of Public Works/Field Services	City of Glendale, Public Works
David Weeshoff	Conservation Chair	San Fernando Valley Audubon Society

The Steering Committee, made up of local stakeholders, was tasked with identifying potential natural hazards and providing input into preparation and mitigation efforts to be outlined in the hazard mitigation plan. The committee met nine times over the 10-month period commencing in October 2020. Appendix A provides summaries of the Steering Committee meetings.

2.2 COORDINATION WITH OTHER AGENCIES

During a 10-month process to prepare the plan, CVWD customers and officials from neighboring agencies were invited to contribute by sharing local knowledge of the area's vulnerability to hazards and by suggesting ways the District can mitigate disasters. The following agencies were invited to participate and were kept apprised of plan development milestones:

- Crescenta Valley Fire Safe Council
- Crescenta Valley Town Council
- Glendale Water and Power
- City of Glendale Public Works
- City of Glendale Police Department
- City of Glendale Fire Department
- City of La Cañada Flintridge
- Los Angeles County Office of Emergency Management
- Los Angeles County Sheriff's Department
- Los Angeles County Public Works
- Los Angeles County Fire Department

- La Cañada Irrigation District
- Foothill Municipal Water District
- California Governor's Office of Emergency Services (Cal OES)
- California Department of Water Resources, Division of Safety of Dams
- FEMA Region IX

These agencies received meeting announcements, meeting agendas, and meeting minutes by e-mail throughout the plan update process or were kept apprised through other outreach methods. They supported the effort by attending meetings or providing feedback on issues. They were provided an opportunity to comment on this plan, primarily through the hazard mitigation plan website. Each was sent an e-mail message informing them when draft portions of the plan were available for review. In addition, the complete draft plan was sent to Cal OES and FEMA Region IX for a pre-adoption review to ensure program compliance.

2.3 REVIEW OF EXISTING PROGRAMS

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports, and technical information (44 CFR, Section 201.6(b)(3)). Chapter 4 of this plan provides a review of laws and ordinances in effect within the planning area that can affect hazard mitigation actions. In addition, the following programs can affect mitigation within the planning area:

- 2019 County of Los Angeles All-Hazards Mitigation Plan
- 2021 Los Angeles County Comprehensive Flood Hazard Management Plan
- City of Glendale Hazard Mitigation Plan
- Foothill Municipal Water District (CVWD's wholesaler) America's Water Infrastructure Act Plan
- General plan safety elements for cities within the District's service area
- CVWD 2020 Strategic Plan
- CVWD 2015 Urban Water Management Plan

2.4 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)). The core planning team developed a public involvement strategy at this project's outset to provide the public access to all phases of the plan's development. This strategy was significantly influenced by the ongoing COVID-19 global pandemic, which limited the District's capabilities for in-person public engagement. The public engagement strategy for this plan relied heavily of digital, remote media techniques, centered on a dedicated website, a survey, and social media to engage the public.

2.4.1 Defining the "Public"

As a special purpose district with authorities to provide water and wastewater services to the planning area, the CVWD role in mitigating impacts from natural hazards that can impact its service area is different from that of

municipal local governments. CVWD lacks the permitting and regulatory authorities that municipal governments have to implement mitigation actions on the general building stock (private property) within the planning area. It is not the District's responsibility to implement actions that protect property it does not own or operate. The District's responsibility as a "lifeline service provider" is to continue to provide water and sewer service after being impacted by a hazard event. This continuity of operation is the principal focus of the District's mitigation strategy in this plan.

With this understanding in mind, the "public" as defined for this planning process consists of the rate payers and constituents who make up the CVWD serviced population. The District's messaging to this population will include elements about the impacts that natural hazards can have on the public, but the emphasis will be on what the District will do to maintain its continuity of operations for lifeline services.

2.4.2 Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies, advisory groups, and jurisdictions that have a vested interest in the recommendations of the hazard mitigation plan. The District's goal was to include stakeholders in this process, including participation on the Steering Committee. Stakeholders targeted for this process included the following:

- Local public safety and emergency services agencies
- Community member representatives
- Local disaster-preparedness and relief organizations
- Local special-purpose districts and utilities

Steering Committee meeting notices were posted on the District's website. Opportunity was provided for public comment during these meetings.

2.4.3 Survey

The core planning team developed a hazard mitigation plan survey with guidance from the Steering Committee. The survey was used to gauge household preparedness for natural hazards and the level of knowledge of tools and techniques that assist in reducing risk and loss from natural hazards. The survey was designed to help identify areas vulnerable to one or more natural hazards. The answers to its 12 questions helped guide the Steering Committee in affirming goals and objectives and in the development of mitigation strategies. In addition to multiple-choice questions, respondents were offered the opportunity to provide additional information through several open response sections, most of which were associated with a closed response question to ensure as much detail as possible. The survey was available through a link on the District website. A sample page is shown in Figure 2-1

2.4.4 Public Meeting

On April 21, 2021, the District hosted a virtual public meeting to discuss findings about hazards of concern and potential mitigation measures. In addition to streaming live on-line, a recording of the meeting was available for on-line viewing at the District office. The District's Regulatory and Public Affairs Manager developed and deployed a public outreach plan for the public meeting. Figure 2-2 shows the general contents of the plan.

Crescenta Valley Water District Local Hazard Mitigation Plan

Greetings -

Crescenta Valley Water District wants to make sure that its services (water and sewer) are maintained during a disaster. CVWD is developing a FEMA compliant hazard mitigation plan that looks at ways to reduce or minimize the risk and impact from events such as earthquakes, fires, and floods to its facilities.

We are asking customers to participate in this survey to recognize how you understand CVWD mitigation and preparedness efforts.

Your feedback will be reviewed by a steering committee made up of Water District staff and community leaders. It will also help the District better communicate its efforts to minimize the risk of these hazards.

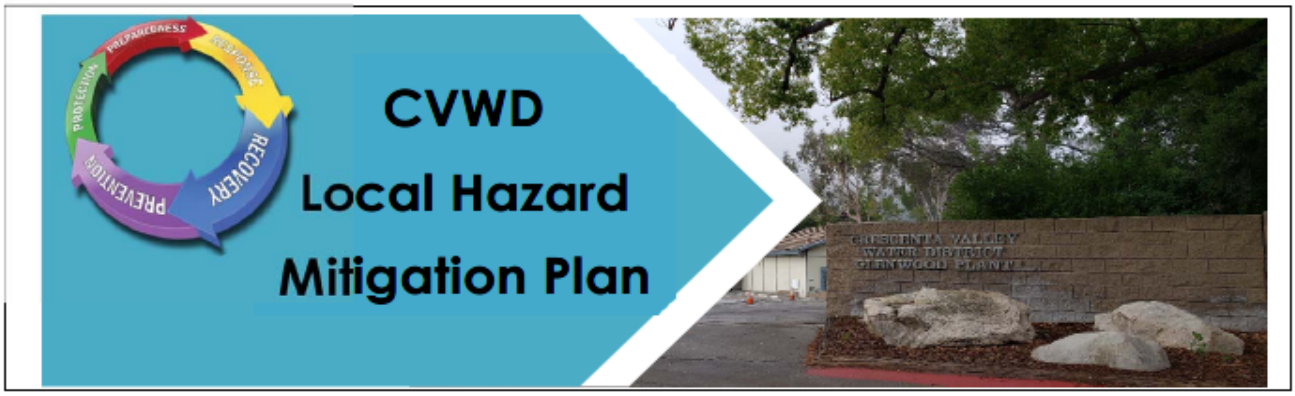
This effort is being funded by a grant and will comply with regulation including the Disaster Mitigation Act.

Thank you for your participation.

1. What natural hazard have you experienced or been affected by in the past 3 years? (Check all that apply)

- ☐ None
- ☐ Pandemic
- ☐ Drought
- ☐ Earthquake
- ☐ Flooding Landslide/ Debris Flow
- ☐ Severe Weather (wind, lightning, extreme cold or heat, winter storm, etc.)

Figure 2-1. Sample Page from Survey Distributed to the Public



PUBLIC OUTREACH PLAN for the April 21, 2021 Public Presentation

News Paper **Social Media** **Email blast** Constant Contact

Objective → Strategy → Development of deliverables → Distributtion of materials → Collect Data → Analyze Data → Summerize Findings

□	**Objective**	Develop customer interest and participation at the April 21st Public Presentation
□	**Strategy**	Brainstorm ideas to capture public attention and motivate them to attend the presentation. Develop tag line for the outreach campaign. We just had an earthquake – Do you know what your Water District is doing? It's the middle of the night and you have no water – Do you know how to contact your Water District? When a disaster strikes – Do you know where to go to get the most update information?
□	**Development of Materials**	Create resources for press releases, social medial posts, E-mail blasts, website posts and flyers
□	**Distribution of Materials**	Press release – 04/05/2020 Social Media Posts - 04/08/2020 E-Mail Blast - 04/12/2020 News Paper Ad - 04/15/2020
□	**Collect Data**	Conduct 2 quick surveys during Zoom Meeting. 1. Age demographics 2. How did you hear about this meeting
□	**Analyze Data**	Analyze which method was most successful in attracting customers to the meeting. Determine if there is any correlation between the success of the method and the age group.
□	**Summarize Findings**	Report to the Committee on the statistics of attendees and the most successful delivery method.

Figure 2-2. Public Outreach Plan for Public Meeting

2.4.5 Review of Draft Plan

A two-week public comment period from July 13 to July 27, 2021 gave the public an opportunity to review and comment on the proposed draft of the plan. The public comment period was noticed in the CV Weekly on July 15 and July 22 (see Figure 2-3). A virtual public meeting was held as part of the Board of Directors regular meeting on July 13 to provide an opportunity for open public comment. The draft mitigation plan was posted to the District's website and a public outreach plan similar to that used for the previous public meeting was deployed.

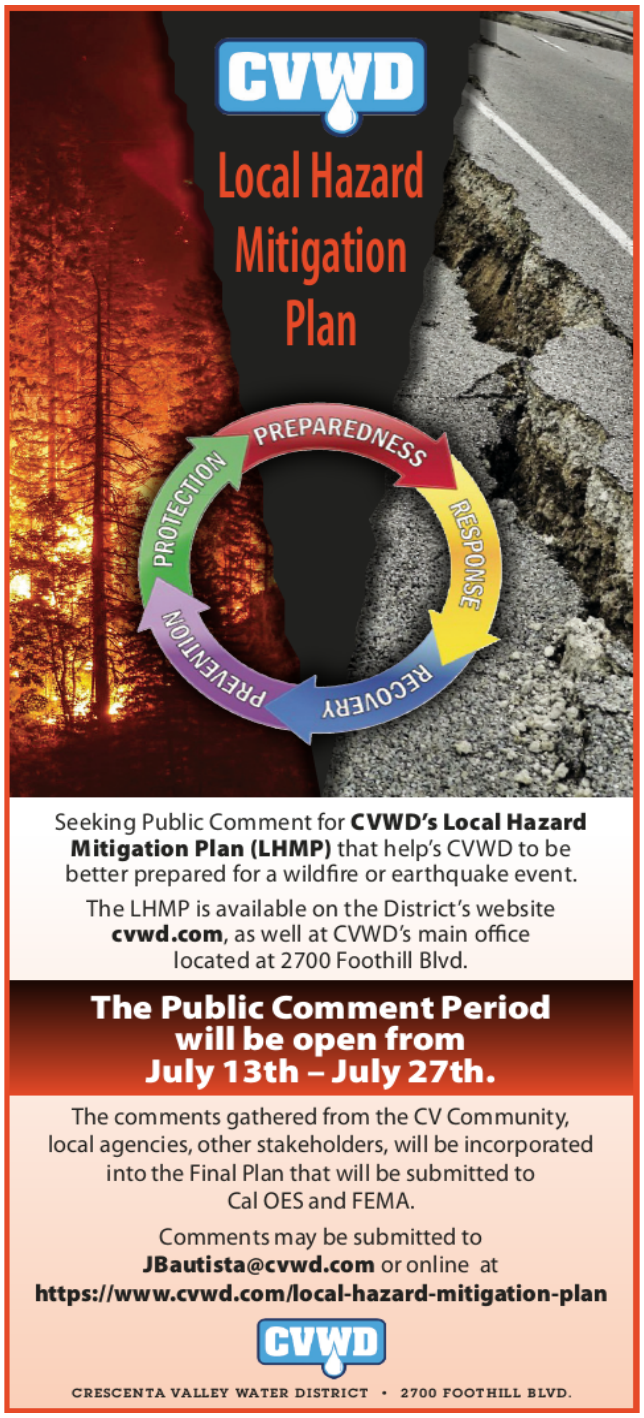


Figure 2-3. CV Weekly Public Notice for Final Public Comment period

2.4.6 Internet

At the beginning of the plan update process, a District hazard mitigation website was created to include information about the update process (https://www.cvwd.com/local-hazard-mitigation-plan; see Figure 2-4). Throughout the process, the website was used to keep the public informed on milestones and to solicit relevant input. The site's address was publicized in all press releases, mailings, surveys, and public meetings. Information on the plan development process, the Steering Committee, the survey, and phased drafts of the plan was made available to the public on the site throughout the process. The District intends to keep a website active after the plan's completion to keep the public informed about successful mitigation projects and future plan updates.

Figure 2-4. Sample Page from Hazard Mitigation Plan Website

2.4.7 Public Involvement Results

Event Attendance

Opportunity was provided for public comment during Steering Committee meetings. No written or oral public comment was received during these meetings.

Seventeen participants signed in to view the live stream of the April 21, 2021, virtual public meeting. Eighteen participants signed in to view the live stream of the July 13, 2021 virtual public meeting held during the public comment period. Appendix A includes a summary of these meetings.

Survey Results

Completed surveys were received from 201 respondents. Of these, 83.5 percent indicated that they have experienced a pandemic, and 59.2 percent indicated that they have been affected by drought. Some respondents (26.2 percent) said they have not experienced impacts from any non-natural hazards; 68.6 percent reported experience planned power outages and 13 percent indicated having experienced critical infrastructure failure. Survey results were shared with the Steering Committee. Detailed survey results are provided in Appendix A. Key results are summarized as follows:

- The hazards that the most respondents identified as being of extreme concern were, in order, wildfire, pandemic and earthquake.
- The majority of respondents believe that the best method to receive emergency preparedness information is from the internet, followed by TV news and schools.
- Asked what level of preparedness they believe the District has to continue providing water after a disaster, 38 percent rated the District's preparedness as average, above average or "very prepared"; 49 percent said they believe the District is only somewhat prepared; and 13 percent said they believe the District is not prepared at all.
- More than a third of respondents stated they had an average level of preparedness for hazard events (37 percent), followed by 32 percent with "just a little" preparedness, 17 percent not prepared at all, 11 percent with above-average preparedness, and 3 percent very prepared.
- If water service were temporarily disrupted, 41 percent of respondents said they could continue for one to three days without drinking water; 23.8 percent could continue for three to five days; 16.9 percent could continue for five to seven days; and 17.9 percent could continue for more than seven days

2.5 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 2-2 summarizes important milestones in the plan update process.

Table 2-2. Plan Development Chronology/Milestones

Date	Event	Description	Attendance
2020			
8/11	Organize Resources	• CVWD selects Tetra Tech as technical support consultant to facilitate development of the CVWD local hazard mitigation Plan	N/A
9/1	Organize Resources	• Project kickoff meeting with District staff, technical consultant, and other stakeholders.	9
9/10	Core Planning Team Call #1	• Goal setting • Hazards of concern • Data needs • Steering Committee makeup • Public outreach strategy	11
9/24	Core Planning Team Call #2	• Data sharing access • Finalize Steering Committee • Proposes Steering Committee Charter • Virtual meeting protocol • Public Outreach strategy	12
10/8	Core Planning Team Call #3	• Steering Committee status • Finalize draft Charter for the Steering Committee • Goal setting • Hazard types (natura vs. non-natural)	9

Date	Event	Description	Attendance
10/16	Public Outreach Strategy	• Hazard mitigation plan website set up on the District's website • https://www.cvwd.com/local-hazard-mitigation-plan	N/A
10/22	Core Planning team Call #4	• 1st Steering Committee Meeting Agenda items • Standard meeting date and time for Steering Committee meetings • Goal setting-continued • Public Outreach-website • Survey Options	10
10/28	Steering Committee Meeting #1	• Project Overview • Steering Committee Ground rules • Public Involvement Strategy • Defining "the Public" • Action Items	22
11/5	Core Planning Team Meeting #5	• Finalize survey content • Goal setting-continued • Asset inventory data needs • Local Hazards • Risk assessment methodology • Steering Committee Meeting # 2 agenda • County representative for the Steering Committee	11
11/17	Core Planning team Call #6	• Survey status • Critical Facilities definition • Demographics and Land use data • GIS Data needs	10
11/18	Steering Committee Meeting #2	• Planning Process-Old Business • Goal setting-approve core planning team recommended goals • Objectives preview • Hazards of concern • Critical Facilities/Infrastructure (Lifelines) • Public Outreach Strategy	22
12/2	Public Outreach	• Hazard Mitigation Survey deployed under the District's platform, "Constant Contact." Survey link was posted on the District's website and the survey link was e-mailed to the District's distribution list	N/A
12/3	Core Planning Team Call #7	• Steering Committee Meeting # 3 preparation • Public Outreach-Survey Status • Critical Asset inventory and hazard data • Finalize goals and objectives • Grant administration needs	12
12/15	Core Planning Team Call #8	• Action plan framing • Preliminary Survey Results • Critical Assets and Hazards • Replacement costs	10
12/16	Steering Committee Meeting #3	• Planning Process-Old Business • Finalize objectives • Hazard of concern Scenarios • Project Example-Stormwater capture • Public Outreach Strategy-Survey results status	18

Date	Event	Description	Attendance
2021			
1/7	Core Planning team Call #9	• Hazard analysis profile • Public Outreach strategy-status	12
1/14	Core Planning Team Call #10	• Hazard analysis • Critical Assets • Exposure summary • Public Outreach Strategy-status	12
1/20	Steering Committee Meeting #4	• Planning Process-Old Business • District Profile • Hazard profile content • Risk Assessment Results-Exposure • Public Outreach Strategy-Survey results status	19
2/11	Core Planning team Call #11	• Planning Process-Timeline check • Plan Maintenance strategy • Action plan prioritization • Action Plan-Schedule • Public Outreach Strategy-status	9
2/17	Steering Committee Meeting #5	• Planning Process-Old Business • Project timeline • Plan maintenance strategy • Risk assessment results, loss estimation • Public Outreach Plan-Flyer	20
3/11	Core Planning team Call #12	• Next Steps • Action Plan-benefit cost analysis • Public Outreach Strategy-status	9
3/17	Steering Committee Meeting #6	• Planning Process-Old Business • Preliminary action plan • Findings from the Survey	21
4/21	Public Outreach	• Public Meeting # 1. Virtual Format	17
6/30	Steering Committee Meeting #7	• Draft Plan & review • Public comment period • Plan submission to Cal OES and FEMA • Plan approval process • Plan adoption process	15
7/13	Public Outreach	• Initiation of Final Public Comment Period	N/A
7/13	Public Outreach	• Phase 2 Public Meeting (Virtual) held as part of the Board of Directors regular Meeting	18
7/27	Public Outreach	• Closure of the final public comment period	N/A
8/6	Plan Review	• Submittal of Draft plan to Cal OES	N/A
10/26	Plan Adopted by the District	• Plan is finalized with the Board's adoption	
11/12	Final Approval	• FEMA granted final approval of the adopted plan.	

3. DISTRICT PROFILE

The Crescenta Valley Water District is in the Crescenta Valley area of Los Angeles County in the foothills of the San Gabriel Mountains, between the San Fernando and San Gabriel valleys. CVWD provides water distribution and sewage collection within its boundaries to the unincorporated communities of La Crescenta, Montrose, and Verdugo City as well as a small portion of the City of La Cañada Flintridge. The District currently provides water to over 8,000 accounts representing a population of approximately 33,000. Figure 3-1 provides an overview of District information.

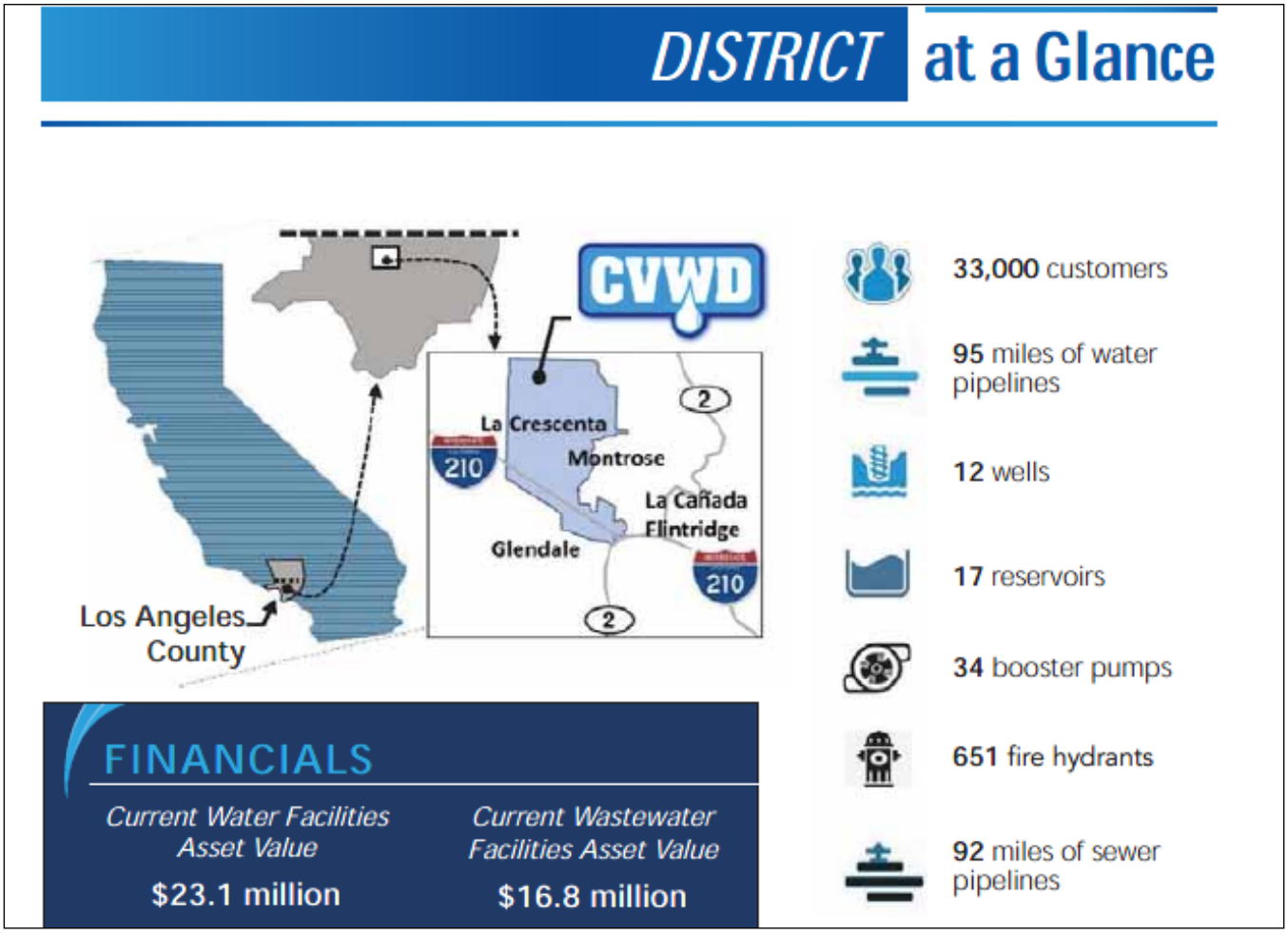


Figure 3-1. District at a Glance

3.1 DISTRICT STRUCTURE AND LEADERSHIP

CVWD is an independent special district, which operates under the authority of Division 12 of the California Water Code. CVWD has been providing water and wastewater services to residents since 1950. The District is governed by a five-member Board of Directors, elected at-large from within the District boundaries. The District General Manager administers day-to-day operations in accordance with policies and procedures established by the Board of Directors. CVWD employs a full-time staff of 27 employees. The Board of Directors' regularly scheduled meetings are on the second and fourth Tuesdays of each month. Meetings are publicly noticed, and customers are encouraged to attend. The Board of Directors adopted this plan after approval pending adoption was granted by FEMA, and the Director of Engineering will oversee its implementation.

3.2 FINANCIAL SUMMARY

The District Board of Directors adopts an operating and capital budget every year. The budget authorizes and provides the basis for reporting and control of financial operations and accountability for the District's enterprise operations and capital projects. The District budget and reporting are consistent with the accrual basis and the financial statement basis of accounting.

The Board of Directors has adopted an investment policy that conforms to state law, District ordinance and resolutions, prudent money management, and the "prudent person" standards. The objects of the District's investment policy are safety, liquidity, and yield.

It is the District's financial policy that all revenue for user charges and surcharges generated from District customers must support all District operations, including capital project funding in accordance with cost-of-service principles. Accordingly, water and wastewater rates are reviewed annually by District staff and periodically reviewed externally to ensure that revenues collected reflect the cost of providing services. Water and wastewater rates are charges imposed on customers for services and are the primary component of the District's revenue. Water and wastewater rates include a commodity (usage) charge and a fixed (readiness-to-serve) charge to all residential and commercial units in the District's service area.

3.3 DISTRICT HISTORY

A vote by local residents created the Crescenta Valley County Water District on December 14, 1950. The term "County" was officially deleted from the District's name in 1996. Organized under the provisions of Division 12 of the State of California Water Code, the District operates as a political subdivision of the State. CVWD receives its water from two main sources: wells drawing groundwater from the Verdugo Groundwater Basin and water imported from the Metropolitan Water District of Southern California (MWD) through the Foothill Municipal Water District (FMWD).

In the early 1950s, the District purchased the assets and consolidated the groundwater-source infrastructure of several small private water companies then in existence. Voters supported the District by approving two capital improvement bonds with a value of $1.35 million. Within a few years, with rapid growth in the Crescenta Valley and surrounding foothill communities, the local groundwater supply was not sufficient to meet the increasing demand.

By 1953, residents from La Crescenta to Altadena voted to form the FMWD to purchase and distribute imported water from MWD, which was formed by 13 Southern California cities in 1928 to import water from the Colorado

River. By 1955, the District was augmenting its local well water with MWD water from the Colorado River. In the 1960s, MWD increased its supply by also contracting for Northern California water with the completion of the State Water Project. Today's source of supply for CVWD customers fluctuates from 40 to 60 percent groundwater versus imported water.

In the 1970s, District officials were becoming aware of potential problems with private wastewater disposal systems (septic tanks) in the vicinity and potential impacts on the local groundwater supply. With federal funds available through the Clean Water Act, the District created two sewer assessment districts in 1979 and sold bonds for the construction of 64 miles of mainline sewer and 27 miles of house-connection laterals. Approximately 75 percent of the $35 million cost was satisfied with federal grant money and the remainder through direct assessment of local property owners. The project also included the purchase of treatment plant capacity from the City of Glendale and the construction of 7 miles of large-diameter sewer interceptor through the City of Glendale. All sewer system construction was completed in the mid-1980s.

3.4 SERVICE AREAS

3.4.1 Water Supply

The District pumps groundwater from the Verdugo Basin, which is beneath the District's service area, about 200 feet below the ground's surface. Water production out of the Verdugo Basin is highly dependent on replenishment from precipitation, which may take up to three years to fully infiltrate into the basin. District procurement of imported water is contracted through FMWD, which purchases 100 percent of its water from MWD. Figure 3-2 shows the District's water service area.

Upper Los Angeles River Area

The Upper Los Angeles River Area (ULARA) encompasses all the watershed and tributaries of the Los Angeles River and four groundwater basins, located above a point in the river designated by the Los Angeles County Department of Public Works as Gaging Station F-57C-R, near the junction of the Los Angeles River and the Arroyo Seco. ULARA encompasses 328,500 acres, which includes 122,800 acres of valley fill areas (these represent four groundwater basins), and 205,700 acres of tributary hills and mountains. ULARA is bounded on the north and northwest by the Santa Susana Mountains; on the north and northeast by the San Gabriel Mountains; on the east by the San Rafael Hills; and on the south by the Santa Monica Mountains (ULARA Watermaster, 2021).

Water rights in ULARA were first established by Superior Court Case No. 650079, signed March 14, 1968, which defined four groundwater basins: San Fernando, Sylmar, Verdugo, and Eagle Rock. The water supplies of these basins are separate and are replenished by deep percolation from rainfall, surface runoff, and a portion of the municipal-supply water that is delivered for use within these basins. The judgment is enforced by a court-appointed watermaster. It also created an administrative committee to advise with, request or consent to, and review actions of the watermaster. The committee consists of one voting member from each of five municipal water agencies: Los Angeles, Glendale, Burbank, San Fernando, and CVWD.

Insert Map

Figure 3-2. Potable Water System

Foothill Municipal Water District

The FMWD was incorporated in 1952 to help meet the water needs of the rapidly growing foothill communities. Water leaders and voters saw the need to supplement local groundwater with water imported by the MWD, of which FMWD became a member agency. FMWD is a wholesaler that serves retail agencies in the foothills of the San Gabriel Mountains in Los Angeles County, including CVWD, La Cañada Irrigation District, Las Flores Water Company, Lincoln Avenue Water Company, Liberty Utilities, Rubio Cañon Land & Water Association, and Valley Water Company.

Metropolitan Water District of Southern California

MWD is a public agency incorporated in 1928 to build the Colorado River Aqueduct, a facility that MWD still owns and operates. MWD's primary purpose is to provide a supplemental water supply for domestic and municipal uses at wholesale rates to its member agencies. MWD imports water from two sources: the Colorado River via the Colorado River Aqueduct; and Northern California via the California Aqueduct. MWD consists of 26 member agencies that include 14 cities, 11 municipal water districts, and one county water authority. It is governed by a 38-member board of directors made up from the member agencies.

MWD's service area comprises 5,200 square miles and includes portions of the counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura. Existing MWD facilities include a 242-mile-long Colorado River Aqueduct with five pumping plants, a distribution system utilizing eight functional reservoirs, five water treatment plants, 43 pressure control structures, 16 hydroelectric plants, and 830 miles of large diameter pipelines.

Emergency Interconnections

In the event of a water outage, CVWD can receive water from the City of Glendale, La Cañada Irrigation District, and Los Angeles Department of Water and Power through emergency water supply interconnections.

3.4.2 Wastewater

CVWD has owned and operated a wastewater collection system since sewers were constructed in the early 1980s. The installation of this collection system was mandated by the Los Angeles Region State Water Resources Control Board (Order No. 76-2). The District does not treat or dispose of this sewage but conveys the sewage in a large sewer pipe (interceptor) through the City of Glendale to the Los Angeles – Glendale Wastewater Reclamation Plant, which is adjacent to the Los Angeles River southwest of Glendale. The sewage undergoes treatment at the plant, with the treated effluent discharged to the Los Angeles River and the residual sludge transported by large interceptor lines to the Hyperion Wastewater Treatment Plant in Playa Del Rey for further processing and ultimate disposal into Santa Monica Bay. The wastewater service area is shown on Figure 3-3.

DISTRICT FACILITIES

This hazard mitigation plan assesses the potential risk that natural hazards pose to buildings, infrastructure and equipment owned by the District. Assessing risk requires an inventory of key facilities. The inventory created for this plan includes two parts: an overview count of specific types of assets that the District owns, and a listing of the estimated replacement value of key assets. All of the District's key assets—buildings, wells, pump, tanks, and pipelines—are defined for this plan as the District's critical facilities. Table 3-1 summarizes the District's critical assets and their estimated value.

Insert Map

Figure 3-3. Wastewater System

Table 3-1. Crescenta Valley Water District Assets

Asset	Count	Estimated Replacement Cost
General Structures		
Buildings	4	$8,180,000
Total	*4*	*$8,180,000*
Potable Water Structures		
Aeration Tower	2	$380,000
Emergency Interconnection	21	$1,575,000
Fitting	1,924	$2,886,000
Hydrant	695	$5,212,500
Interconnection	2	$606,250
Mixing Station	1	$510,000
Motor Control Center	21	$6,500,000
Potable Water Treatment Plant	10	$1,512,500
Potable Water Valve	2,279	$11,395,000
Pressure Reducing Station	7	$2,375,000
Reservoir	19	$47,405,000
Water Booster Pump Station	14	$13,175,000
Well	12	$31,500,000
Total	***5,007***	***$125,032,250***
Wastewater Structures		
Sewer Control Valve	3	$1,350,000
Sewer Fitting	6,482	$6,482,000
Sewer Flow Meter	1	$150,000
Sewer Manhole	1,270	$25,400,000
Sewer Wet Well	1	$20,000
Wastewater Lift Station	2	$1,700,000
Total	***7,759***	***$35,102,000***
Pipelines	**Miles**	
Potable Water Pipelines	95	$231,919,368
Wastewater Pipelines	68.9	$181,863,149
Total	*172.2*	*$413,782,517*
Total Value for All District Assets		**$582,096,767**

3.5 PHYSICAL CHARACTERISTICS

3.5.1 Topography

The District serves an area of approximately 4 square miles in relatively steep terrain ranging from 1,200 feet to almost 3,000 feet above sea level along the foothills of the San Gabriel Mountains.

3.5.2 Soils and Geology

The geologic setting of Los Angeles County is largely the result of the tectonic plate boundary between the North American and Pacific plates that runs along the northern edge of the county. The San Andreas Fault forms the boundary between these plates and bisects the state in a northwest to southeast direction. In the Los Angeles area, the fault bends to an east-west orientation before returning to its former course. Crustal forces resulting from this change in geometry are uplifting the San Gabriel Mountains. The San Gabriel Mountains experience a high rate of uplift that is being counteracted by high erosion rates. As a result, the county's valleys contain deep deposits of alluvial sediments. Local soils generally pose potential hazards, including erosion and topsoil loss due to wind and rainfall, and slope instability resulting from development.

The District service area occupies the west end of the Crescenta Valley and adjacent highlands to the south. The Crescenta Valley is the westernmost portion of the larger San Gabriel Valley and is set between the San Gabriel Mountains to the north and the Verdugo Mountains and San Rafael Hills to the south. Topography in the service area is dominated by dramatic alluvial fans along the San Gabriel range front. Consistent with this setting, slopes are steeper adjacent to the range front, decreasing southward toward the valley floor. The valley floor itself is fairly flat and slopes eastward toward the main San Gabriel Valley.

The District service area is situated on soils assigned to the Hanford and Vista-Amargosa soil associations. Lowland areas are underlain by Hanford soils; uplands are underlain by Vista-Amargosa soils (U.S. Soil Conservation Service 1969). The Hanford association consists of loam and sandy loam soils that are well drained, with slow runoff, slight erosion hazard (except where dry soils are subject to wind erosion), and moderately rapid subsoil permeability. Shrink-swell hazard (i.e., expansion potential) is typically low (U.S. Soil Conservation Service 1969).

The Vista-Amargosa association consists of thinner sandy loam soils that are well drained and exhibit moderately rapid subsoil permeability. Amargosa soils are excessively drained, with rapid runoff and moderately rapid subsoil permeability. Erosion hazard is high; Amargosa soils are prone to sheet and rill erosion and gullying. Shrink-swell hazard is low (U.S. Soil Conservation Service 1969).

3.5.3 Climate

In the District service area, the summers are warm, arid, and clear and the winters are long, cold, wet, and partly cloudy. Over the course of the year, the temperature typically varies from 41°F to 86°F and is rarely below 34°F or above 94°F (WeatherSpark, 2020). Table 3-2 summarizes key climate data in the District.

Table 3-2. Average Los Angeles County Climate Data

	Pasadena	San Gabriel Canyon
Period of record	1893-2016	1917-2016
Annual Average Minimum Temperature	51.0º F	52.8º F
Annual Average Maximum Temperature	76.8º F	78.2º F
Average Annual Mean Temperature	63.9º F	65.5º F
Average Annual Precipitation	20.24"	22.28"

Source: Western Region Climate Center, 2020

Most precipitation occurs from December through March. Precipitation during the summer is infrequent, and rainless periods of several months are common. Precipitation usually occurs as localized cloudbursts, mostly in the mountains and deserts after summer, and light to moderate rains in winter. Six to eight heavy rain events each year result in most of the total precipitation. In general, the quantity of precipitation increases with elevation.

Although the basic air flow above the area is from the west or northwest during most of the year, mountain chains deflect these winds so that, except for the immediate coast, wind direction is more a product of local terrain than of the prevailing circulation. Strong and sometimes damaging winds from the east or northeast occur when there is a strong high-pressure area to the east and an intense low-pressure area approaching the coast from the west. In southern California, these winds are called Santa Ana winds. Their air is typically very dry, and the winds are strong and gusty, sometimes exceeding 100 mph, particularly near the mouth of canyons oriented along the direction of airflow. These conditions occasionally lead to serious fire suppression problems and often result in the temporary closing of highways to campers, trucks, and light cars. These land and sea breezes are more pronounced in summer and impact air pollution levels.

The Greater Los Angeles Basin area is almost completely enclosed by mountains on the north and east. In addition, a vertical temperature structure (inversion) in the air along most of coastal California tends to prevent vertical mixing of the air. The geographical configuration and coastal location of the basin area permit a fairly regular daily reversal of wind direction—offshore at night and onshore during the day.

3.6 DEVELOPMENT PROFILE

The District's customer base is primarily residential, with some light commercial uses along Foothill Boulevard in La Crescenta and Honolulu Avenue in Montrose. Customer growth is steady, although the Crescenta Valley area is nearly built-out. Residential growth is occurring through increased housing density in the multiple-unit zoned areas (primarily Montrose) as well as limited in-fill housing development on random parcels in La Crescenta.

3.6.1 Current Land Use

As a service provider, the District possesses no land use authority. Such authority lies with the municipal governments that intersect the District's service area. However, a land use analysis can provide a gauge of service demand the District can face. Table 3-3 presents existing land uses in the CVWD service area, as listed in the District's 2006 Water Master Plan.

3.6.2 Development Trends

Future growth within the District's service area will impact the demand for its services. The following sections describe expected future development trends for the portions of Los Angeles County, City of Glendale, and City of La Canada Flintridge that interface with the District service area.

City of Glendale Land Use Element

The City of Glendale's Land Use Element supports the creation of higher density residential development and alternative forms of medium and high-density housing in areas best suited for such development based on accessibility, current development, community organization, transportation and circulation facilities, and economic feasibility. Higher density development may increase the demand on CVWD services.

Table 3-3. Land Use within the CVWD Service Area

Land Use	Planning Area	
	Area (acres)	% of total
Residential		
R-1, Single Family Residential	1,555.7	81.1%
R-2, Duplex Family Residential	51.7	2.7%
R-3, Multiple Family Residential	167.1	8.7%
Commercial/Industrial		
C-1, Restricted Small Commercial	27.0	1.4%
C-2, Neighborhood Commercial	62.7	3.3%
C-3, Retail Commercial	38.4	2.0%
Other		
IT, Institutional	8.7	0.4%
OS, Open Space	5.3	0.3%
PARK, Parks	2.2	0.1%
Total Service Area	**1,918.8**	**100%**

The City of Glendale is undertaking a visioning process in the Verdugo Wash, where most of CVWD's wells are located. The City is seeking a consultant to assist in developing a high level vision, including conceptual design, programming, and integration of the Verdugo Wash into the existing and anticipated land use framework as a linear park and spine of the City's pedestrian and bicycle infrastructure. This project has the potential for impacts on CVWD well locations.

City of La Cañada Flintridge General Plan

Development within the City of La Cañada Flintridge is guided by the city's general plan. Based upon the general plan's housing element, the city is largely built out, with only 106 net new units added between 2000 and 2014. However, recent population changes in the area have caused the city to strategize on bringing more mixed-use and senior housing to the community, as well as single-family infill and accessory dwelling units. Given these housing changes, CVWD expects to face greater demand for its services.

Crescenta Valley Town Council Land Use Committee

The Crescenta Valley Town Council's Land Use Committee has had several discussions on upcoming land use changes in the La Crescenta-Montrose area. At a meeting in February 2020, committee members discussed the Southern California Association of Governments' estimation that the area around Crescenta Valley needs 36,000 more housing units to be on track for state-required housing needs. Given that local and state legislation has focused on increasing housing in the county and state, including allowing the construction of accessory dwelling units, CVWD will likely have a larger customer base within the next few years, increasing the demand on its services and infrastructure.

Los Angeles County General Plan Housing Element Update

Los Angeles County is updating the Housing Element portion of its General Plan for 2021-2029. As part of this update, the County will provide for development of housing to meet projected future needs. The County has determined that for the 8-year housing cycle (2021-2029), unincorporated areas of Los Angeles County require 90,000 additional housing units.

The County is proposing that 1,200 of those units be provided within unincorporated La Crescenta and Montrose. The County is proposing to accomplish this by rezoning 33 lots in the Montrose area to a higher density. This means that the County is proposing to allow about 1,300 additional housing units in Montrose, clustered at the intersections of Florencita Avenue and Ocean View Boulevard and Florencita Avenue and Montrose Avenue.

A final recommendation is going to be voted on by the Planning Commission in August 2021. The Housing Element will then be voted on by the board of supervisors and sent to the state by the end of 2021. Once the rezoning plan is approved, changes will go into effect in 2024.

3.7 DEMOGRAPHICS

Some populations are at greater risk from hazard events because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly, women, children, ethnic minorities, renters, individuals with disabilities, and others with access and functional needs, all experience more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members can help to extend focused public outreach and education to these most vulnerable residents.

The following demographic profiles represent estimates of District demographics based on data from the U.S. Census American Community Survey data sets. Census data is communicated by census tracts and blocks that target municipal boundaries and other census designated places. These boundaries do not align with the District's service area boundaries, which encompasses the La Crescenta-Montrose Census Designated Place (CDP), a portion of the City of La Cañada Flintridge, and a portion of the City of Glendale.

3.7.1 Population Characteristics

Knowledge of the composition of the population and how the population changed in the past and will change in the future is needed for making informed decisions. Information about population is a critical part of planning because of direct correlation to land needs such as housing, industry, stores, public facilities and services, and transportation. Population demographics are not typically reported for special purpose districts by state and federal agencies because district boundaries typically do not align with Census tracks or blocks. Demographics for special purpose districts are often assessed based on the largest municipal population centers within the District's service area.

The population data sources used for this demographic profile were those for the City of La Cañada Flintridge and the La Crescenta-Montrose CDP. The American Community Survey's estimated 2019 population is 20,261 for La Cañada Flintridge and 19,689 for the La Crescenta-Montrose CDP (Census Bureau, 2019).

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population may signify economic decline. Table 3-4 shows the population in La Cañada Flintridge and Los Angeles County from 2000 to 2019.

Table 3-4. Annual Population Data

Year	La Cañada Flintridge	Los Angeles County	Year	La Cañada Flintridge	Los Angeles County
2000	20,318	9,519,330	**2010**	20,266	9,822,121
2001	20,491	9,590,080	**2011**	20,346	9,879,298
2002	20,696	9,679,212	**2012**	20,491	9,956,882
2003	20,832	9,756,914	**2013**	20,597	10,025,712
2004	20,912	9,806,944	**2014**	20,629	10,078,930
2005	20,892	9,816,153	**2015**	20,615	10,126,423
2006	20,562	9,798,609	**2016**	20,615	10,158,196
2007	20,412	9,780,808	**2017**	20,577	10,193,735
2008	20,313	9,785,474	**2018**	20,560	10,209,676
2009	20,249	9,801,096	**2019**	20,497	10,184,378

Source: California Department of Finance, Demographic Research Unit

Figure 3-4 shows the population change in La Cañada Flintridge from 2000 to 2019 compared to that of the State of California (California Department of Finance, 2020). Between 2000 and 2019, California's population grew by 17.1 percent while La Cañada Flintridge's population increased by 0.9 percent. The city and state both experienced peak population growth in 2002, with generally declining annual growth rates thereafter. The city's annual growth rate was negative in 2005 through 2009, 2015, and 2017 through 2019.

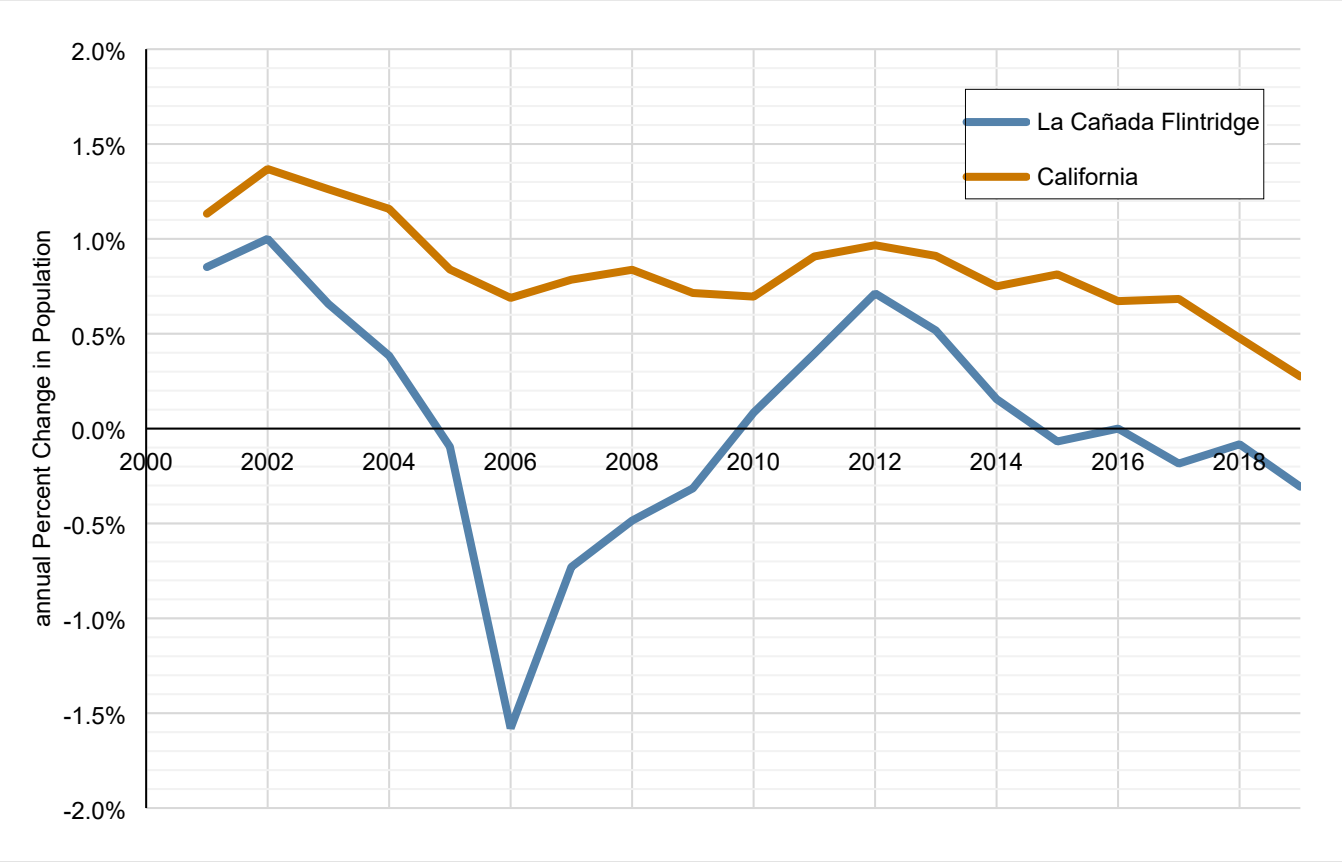


Figure 3-4. California and La Cañada Flintridge Population Growth

3.7.2 Age Distribution

As a group, elderly populations are more likely to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as "critical facilities" by emergency managers because they require extra notice to implement evacuation. Elderly customers living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for their basic needs. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

The overall age distribution is shown in Figure 3-5 for the La Crescenta Montrose CDP and the City of La Cañada Flintridge, based on the most recent 5-year estimates from the U.S. Census Bureau's American Community Survey (2015-2019). According to the Census data, 37 percent of the over-65 population in La Crescenta Montrose and 19.2 percent in the City of La Cañada Flintridge have disabilities of some kind; 7.4 percent (La Crescenta Montrose CDP) and 2.2 percent (City of La Cañada Flintridge) have incomes below the poverty line. Among children under 18 in the La Crescenta Montrose CDP, 4.9 percent are below the poverty line. Among children under 18 in the City of La Cañada Flintridge, 2.3 percent are below the poverty line.

3.7.3 Race, Ethnicity and Language

Research shows that racial and ethnic minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability (Office of Minority Health, 2008).

Figure 3-6 and Figure 3-7 show the U.S. Census 2019 racial distribution in the La Crescenta Montrose CDP and the City of La Cañada Flintridge, based on race categories defined by U.S. Office of Management and Budget standards. The Census Bureau also reports that 16.3 percent of the La Crescenta Montrose CDP and 10.0 percent of City of La Cañada Flintridge's population is of Hispanic origin, which indicates the heritage, nationality, lineage, or country of birth of the person or the person's parents or ancestors before arriving in the United States and may be any race.

According to the U.S. Census, 57.2 percent of families in the La Crescenta Montrose CDP speak English only at home. 42.8 percent of families speak a language other than English at home; the largest contingent of those families speak Asian and Pacific Island languages (20.6 percent).

According to the U.S. Census, 64.8 percent of families in the City of La Cañada Flintridge speak English only at home. 35.2 percent of families speak a language other than English at home; the largest contingent of those families speak Asian and Pacific Island languages (16.7 percent).

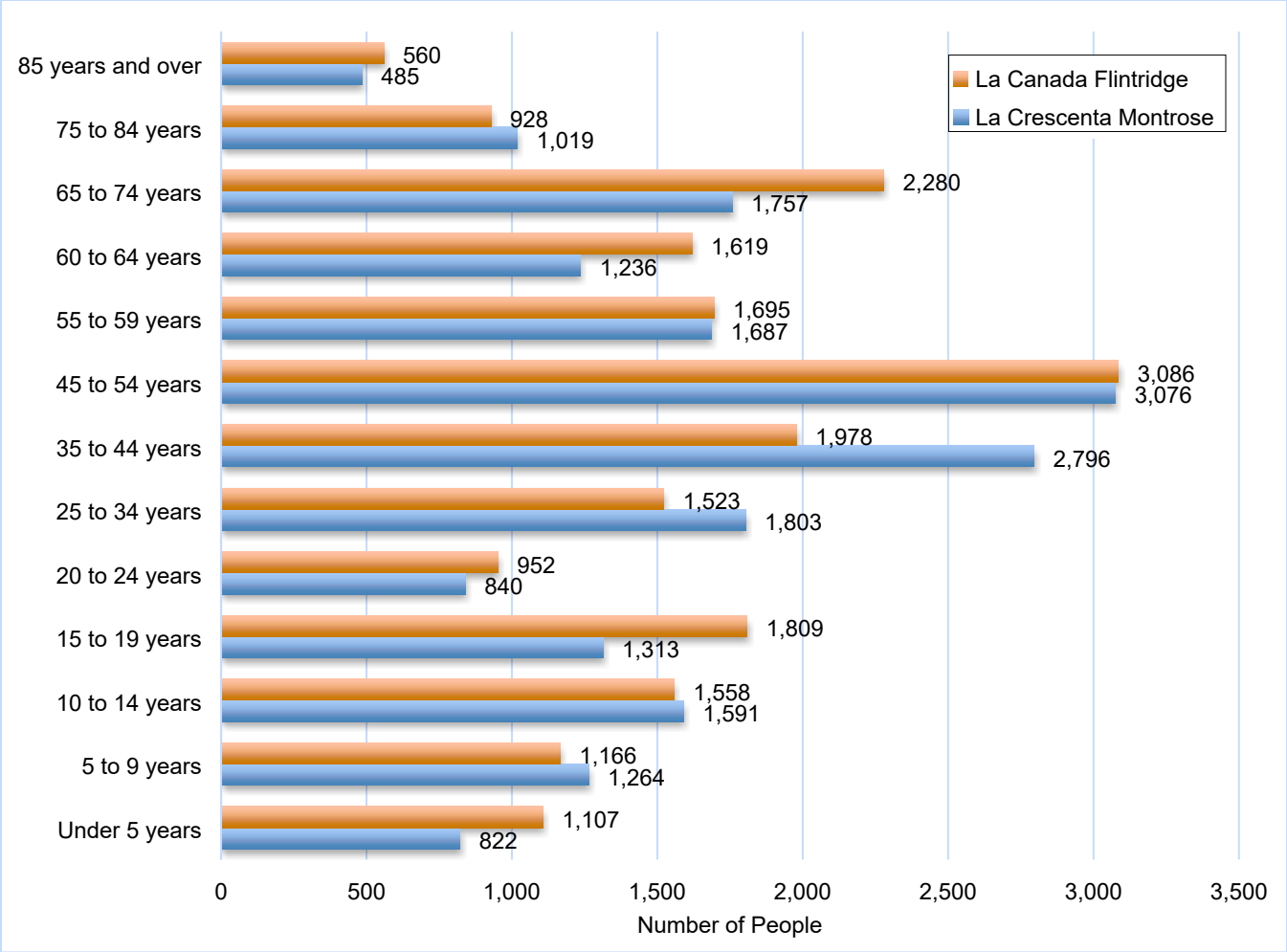


Figure 3-5. Age Distribution in the La Crescenta Montrose CDP

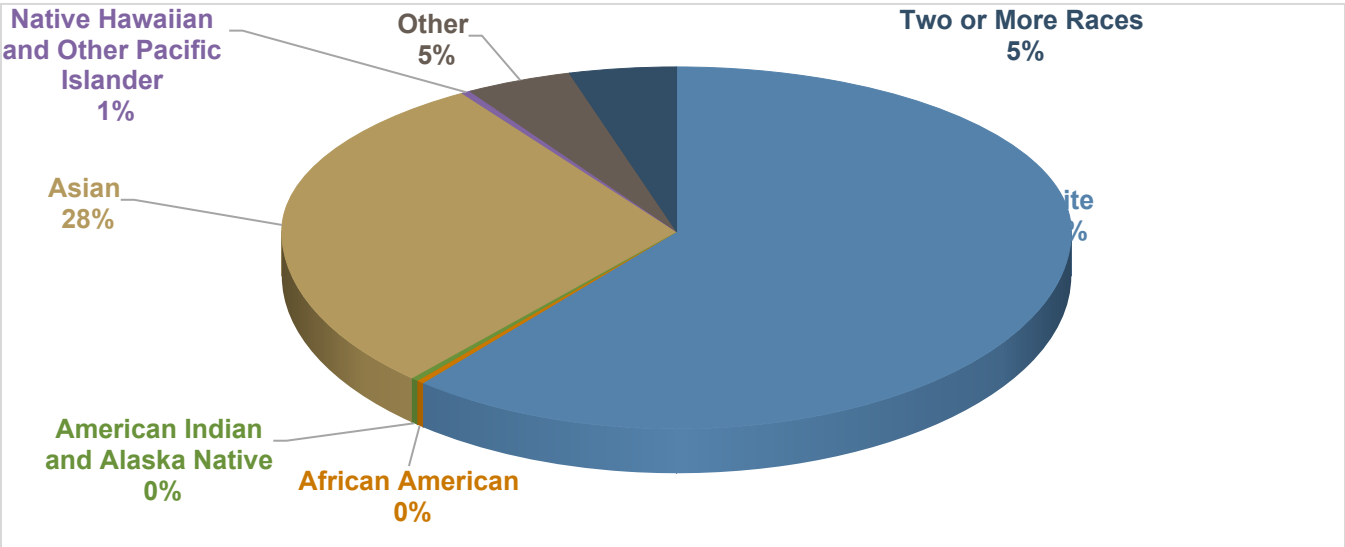


Figure 3-6. La Crescenta-Montrose CDP Race Distribution

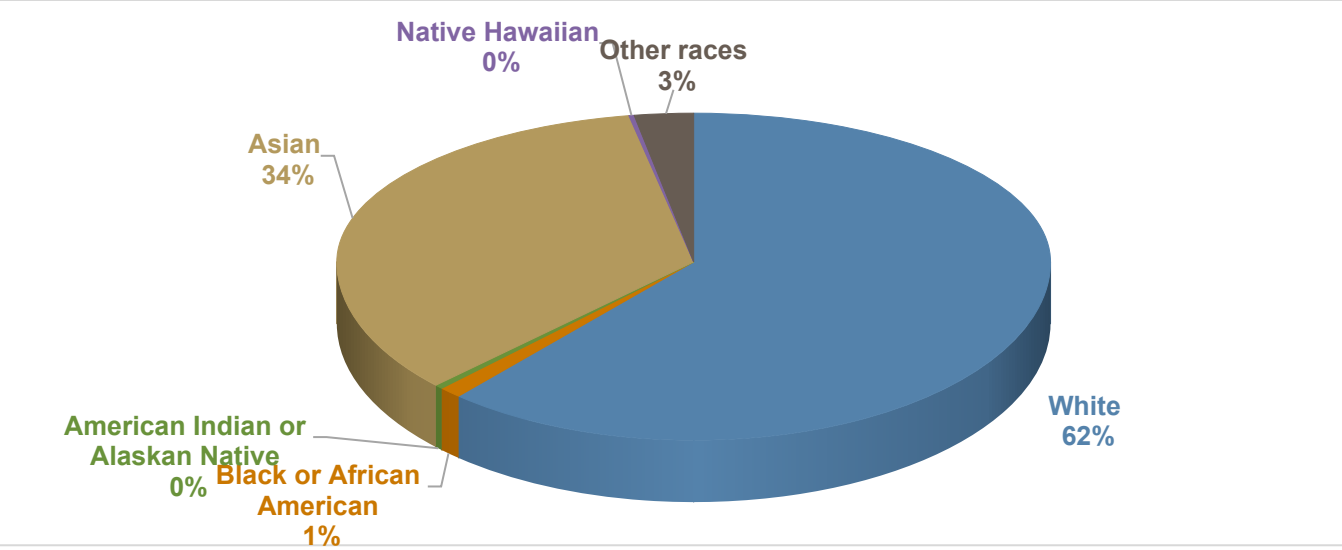


Figure 3-7. City of La Cañada Flintridge Race Distribution

3.7.4 Individuals with Disabilities or Access and Functional Needs

Individuals with disabilities are more likely to have difficulty responding to a hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. Emergency managers need to distinguish between functional and medical needs to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability gives emergency management personnel and first responders an opportunity to ensure that emergency plans and procedures include considerations for addressing the needs of that population.

According to the 5-year American Community Survey (2015-2019), there are 2,036 individuals in the La Crescenta Montrose CDP and 1,118 individuals in the City of La Cañada Flintridge with some form of disability. These individuals represent 10.3 percent and 5.5 percent of the total population respectively.

4. Relevant Laws, Ordinances, Programs and Capabilities

Existing laws, ordinances, plans and capabilities at the federal, state, and local level can support, or impact hazard mitigation initiatives identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process, as stated in 44 CFR, Section 201.6(b)(3). Pertinent federal, state, and local laws are described below.

4.1 Relevant Federal and State Agencies, Programs and Regulations

State and federal regulations and programs that need to be considered in hazard mitigation are constantly evolving. For this plan, a review was performed to determined which regulations and programs are currently most relevant to hazard mitigation planning for CVWD. The findings are summarized in Table 4-1 and Table 4-2. Short descriptions of each program are provided in Appendix B.

Table 4-1. Summary of Relevant Federal Agencies, Programs and Regulations

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
A Collaborative Approach for Reducing Wildfire Risks to Communities and the Environment	Wildfire Hazard	This strategy implementation plan prepared by federal and western state agencies outlines measures to restore fire-adapted ecosystems and reduce hazardous fuels.
Americans with Disabilities Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
America's Water Infrastructure Act (2018)	Infrastructure Improvements	This act provides for water infrastructure improvements throughout the country.
Civil Rights Act of 1964	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Clean Water Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Community Development Block Grant Disaster Resilience Program	Action Plan Funding	This is a potential alternative source of funding for actions identified in this plan.
Disaster Mitigation Act	Hazard Mitigation Planning	This is the current federal legislation addressing hazard mitigation planning.
Endangered Species Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
Federal Energy Regulatory Commission Dam Safety Program	Dam Failure Hazard	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
Federal Wildfire Management Policy and Healthy Forests Restoration Act	Wildfire Hazard	These documents mandate community-based collaboration to reduce risks from wildfire.
National Environmental Policy Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
National Dam Safety Act	Dam Failure Hazard	This act requires a periodic engineering analysis of most dams in the country
National Fire Plan (2001)	Wildfire Hazard	This plan calls for joint risk reduction planning and implementation by federal, state, and local agencies.
National Incident Management System	Action Plan Development	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards.
Presidential Executive Order 11988 (Floodplain Management)	Flood Hazard	This order requires federal agencies to avoid long and short-term adverse impacts associated with modification of floodplains.
Presidential Executive Order 11990 (Protection of Wetlands)	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable presidential executive orders.
U.S. Army Corps of Engineers Dam Safety Program	Dam Failure Hazard	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
U.S. Army Corps of Engineers Flood Hazard Management	Flood Hazard, Action Plan Implementation, Action Plan Funding	The Corps of Engineers offers multiple funding and technical assistance programs available for flood hazard mitigation actions.
U.S. Fire Administration	Wildfire Hazard	This agency provides leadership, advocacy, coordination, and support for fire agencies and organizations.
U.S. Fish and Wildlife Service	Wildfire Hazard	This service's fire management strategy employs prescribed fire throughout the National Wildlife Refuge System to maintain ecological communities.

Table 4-2. Summary of Relevant State Agencies, Programs and Regulations

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
AB 32: The California Global Warming Solutions Act	Action Plan Development	This act establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020.
AB 2242- Urban Water Management Planning Act	Drought Hazard	Requires an urban water management plan, among other things, to describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for average, single-dry, and multiple-dry water years.
AB 2800: Climate Change—Infrastructure Planning	Action Plan Development	This act requires state agencies to take into account the impacts of climate change when developing state infrastructure.
Alquist-Priolo Earthquake Fault Zoning Act	Earthquake Hazard	This act restricts construction of buildings used for human occupancy on the surface trace of active faults.
California Department of Forestry and Fire Protection (CAL FIRE)	Wildfire Hazard	CAL FIRE has responsibility for wildfires in areas that are not under the jurisdiction of the Forest Service or a local fire organization.

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
California Governor's Office of Emergency Services (Cal OES)	Emergency Management including Hazard Mitigation	Cal OES oversee emergency management compliance including the use of Standardized Emergency Management System and approval of submitted Hazard Mitigation Plans. Local governments must use this system to be eligible for state funding of response-related personnel costs.
California Department of Parks and Recreation	Wildfire Hazard	State Parks Resources Management Division has wildfire protection resources available to suppress fires on State Park lands.
California Department Water Resources	Flood Hazard	This state department is the state coordinating agency for floodplain management.
California Division of Safety of Dams	Dam Failure Hazard	This division monitors the dam safety program at the state level and maintains a working list of dams in the state.
California Environmental Quality Act	Action Plan Implementation	This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation.
California Fire Alliance	Wildfire Hazard	The alliance works with communities at risk from wildfires to facilitate the development of community fire loss mitigation plans.
California Fire Plan	Wildfire Hazard	This plan's goal is to reduce costs and losses from wildfire through pre-fire management and through successful initial response.
California Fire Safe Council	Wildfire Hazard	This council facilitates the distribution of National Fire Plan grants for wildfire risk reduction and education.
California Multi-Hazard Mitigation Plan	Hazard Mitigation Planning	Local hazard mitigation plans must be consistent with their state's hazard mitigation plan.
California Water-Use Efficiency Legislation	Hazard Mitigation Planning	Could be a program promoted by District outreach efforts.
Office of the State Fire Marshal	Wildfire Hazard	This office has a wide variety of fire safety and training responsibilities.
CA Governor Executive Order B-37-16	Making Water Conservation a Way of Life	Water Districts must conduct a "stress test," that is, examine the projected reliability of all their water supply resources over the next three years, and assume that water demand is high, and that precipitation levels are low. Results of this analysis could support the identification of projects for this hazard mitigation plan.
State Water Resources Control Board Order No. 2006-0003-DWQ Statewide General Waste Discharge Requirements for Sanitary Sewer Systems	Action Plan identification	The purpose of the order is to prevent sanitary sewer overflows or sewer spills by establishing a statewide Monitoring and Reporting Program and requiring each local or regional sewer agency to create and implement its own sewer system management plan based on the mandatory requirements of the order.

4.2 COUNTY, CITY OR OTHER DISTRICT

The following local plans provide information and guidance relevant to hazard mitigation planning for the District:

- Los Angeles County Emergency Operations Plan
- 2019 County of Los Angeles All-Hazards Mitigation Plan
- City of La Cañada Flintridge Hazard Mitigation Plan, 2019
- City of Glendale Natural Hazards Mitigation Plan, 2018
- Los Angeles County General Plan 2035-Safety Element

- City of La Cañada Flintridge General Plan-Safety Element
- Metropolitan Water District of Southern CA, Integrated Water Resources Plan
- Metropolitan Water District of Southern CA, Urban Water Management Plan
- Metropolitan Water District of Southern CA, Water Surplus and Drought Management Plan
- Metropolitan Water District of Southern CA, Long Term Conservation Plan

4.3 DISTRICT CORE CAPABILITIES

The Planning Team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs, and policies, and evaluates its capacity to carry them out. It presents a suite of tools to support the District's implementation of the hazard mitigation plan.

The capability assessment identifies potential gaps in core capabilities and filling those gaps may eventually become actions in the plan. Assessment findings were shared with the Steering Committee in the development of the action plan shown in Chapter 18. If the review identified an opportunity to add or expand a capability, then doing so has been identified as a mitigation action. The District views each core capability to be fully adaptable as needed to meet the best interests of the District. This adaptability is an overarching District capability that is acknowledged by this reference.

4.3.1 Ordinances and Plans

Resolution No. 681

Resolution No. 681gives authority to the General Manager to implement a color-coded water conservation alert system. This is Phase II of the goal to reduce the risk and severity of water shortage, a result of increased demands, consecutive years of below normal precipitation in the Verdugo Basin watersheds, and the potential of reduced water allotments. The current color-coded system is described in Section 7.3.5.

Resolution No. 682

Resolution No. 682 authorizes the General Manager to implement a water conservation program as Phase I of the goal to reduce water use to below pre-drought water usage and reduce the risk and severity of water shortage. This resolution prohibited or had stringent restrictions for several water usages for all Crescenta Valley Water District customers, including:

- Water hose usage
- Overspray and runoff
- Fountains, similar structures
- Leaks
- Irrigating times
- Hand watering
- Windy and rainy days
- Vehicle washing
- Swimming pools
- Construction water restrictions
- Fire hydrants
- Drinking water upon request
- Hotels/Motels
- Reporting waste of water
- Pre-rinse spray valve

The District also urges the following water conservation practices to its customers:

- Reduce the amount of turf and install new drought tolerant landscaping, low-water using trees and plants, and efficient irrigation systems including but not limited to evapotranspiration (ET) controllers, drip irrigation, and "high efficiency sprinkler heads".
- Wash only full loads of dishes or clothes in automatic washers, and do not allow indoor faucets to run continuously.
- Turn off water system when leaving property unoccupied for an extended period of time.

2020 Strategic Plan

In October 2019, the CVWD Board of Directors adopted the 2020 Strategic Plan. CVWD and other water providers throughout California face a growing number of issues that directly impact the cost of providing reliable service. These issues include escalating energy costs, expanding regulatory costs, rising imported water costs, growing cumulative costs of deferred facility maintenance, increasing construction costs, a changing climate, and declining revenues due to conservation measures mandated by the state.

This new reality requires better planning and execution. A vision statement expands upon CVWD's mission to define what CVWD strives toward. During the planning process, the Board and staff established the following vision statement for the District: ***Secure sustainable water supplies and ensure infrastructure reliability, while furthering our commitment to accountability, transparency, and cost-effectiveness.***

CVWD developed this 2020 Strategic Plan to serve as a blueprint for future success. Transparency, partnership, and commitment are the guiding principles that define the connections between the District's customers, Board, and employees.

In order to develop a comprehensive plan capable of meeting the District's mission and vision, Effective Utility Management was identified as the preferred planning tool to determine strategy, goals, and objectives. The planning group, consisting of CVWD's Board and staff, conducted a self-assessment to gauge need and performance. Based on the results, the areas of concern were prioritized as follows:

1. Water Resource Sustainability
2. Infrastructure Strategy & Performance
3. Water Quality
4. Financial Viability
5. Customer Satisfaction
6. Stakeholder Understanding
7. Employee Leadership & Development
8. Enterprise Resiliency
9. Operational Optimization
10. Community Sustainability

As part of the Effective Utility Management process, CVWD will continue to measure success and adapt to fully execute the Strategic Plan. A Strategic Plan Update is scheduled in 2023 as part of our dedication to make this a living document.

2015 Urban Water Management Plan

The 2015 update of the CVWD Urban Water Management Plan was prepared consistent with Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act, which requires such plans for every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. These plans must be filed with the California Department of Water Resources (DWR) every five years describing and evaluating reasonable and practical efficient water uses, reclamation, and conservation activities.

The total water demand for the 32,385 people served by CVWD in 2015 was over 3,600 acre-feet of potable water. On average, 60 percent of CVWD's source water is local groundwater supply in the Basin. The majority of CVWD's groundwater wells are located along the Verdugo Wash, south of Honolulu Avenue. The remaining 40 percent of CVWD's source water is imported water supplied by FMWD, which is a member agency to MWD. The sources of imported water supplies include the Colorado River and the State Water Project. MWD's 2015 Integrated Water Resources Plan update describes the core water resource strategy, which will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2020 through 2040.

CVWD is in the design phase of a wellhead treatment facility for Well No. 2. Installing the ARoNite biological nitrate removal treatment system will allow CVWD to reactivate Well No. 2, thereby aiding in groundwater recovery. When completed, this treatment facility will increase CVWD's ability to pump its adjudicated rights within the Verdugo Basin, utilize a local water source, reduce CVWD's dependence on imported water from MWD purchased through FMWD, and reduce nitrates levels in the groundwater pumped from the Basin.

CVWD is working towards the development of the Crescenta Valley County Park Multiuse Project. This Project will allow CVWD to increase groundwater storage in the Basin by the installation and maintenance of underground infiltration galleries underneath portions of the existing park. This will be accomplished by utilizing the existing Los Angeles County flood control channels, Verdugo Wash, and surface flow within the Crescenta Valley to divert storm water during the rainy season into underground infiltration basins within the recreational areas. The project will potentially increase the local groundwater supply by an annual average of 340 acre-feet per year, thus enhancing CVWD's groundwater resource and reducing dependence on imported supplies. Also, through the process of capture, treatment, and reuse of storm water and dry weather flow, the project could potentially reduce the pollutant load from contaminating the Los Angeles River.

CVWD is able to receive up to 2.2 cubic feet per second or 1.9 million gallons per day through an emergency interconnection with the City of Los Angeles Department of Water and Power, and can provide an emergency water supply to FMWD and its sub-agencies. As funding permits, CVWD plans to rehabilitate its older groundwater wells with new technologies over the 10-year period starting in 2015. The existing wells are between 55 to 80 years old and have reached the end of their useful life. CVWD's current program is to perform at least two well rehabilitations a year, which include cleaning the well casing with chemical treatment and installation of a liner to extend the life of the well.

Sewer System Management Plan

The 2019 Sewer System Management Plan supplements CVWD's operations and maintenance program and goals by providing high-level, consolidated guidelines and procedures for all aspects of the District's sewer system management. The Sewer System Management Plan will contribute to the proper management of the collection system and assist the District in minimizing the frequency and impacts of sewer system overflows by providing guidance for appropriate maintenance, capacity management, and emergency response.

Rainfall History

Crescenta Valley Water District has been tracking rainfall for Los Angeles County Public Works Water Resources Department since 1962. Staff have presented this historical rainfall information in a report that breaks the amounts down by month, year, and decade for each rain year (October 1 – September 30) from 1962 to present. The decade from 2010 – 2019 had an average yearly rainfall of 17.99 inches, compared to 26.31 inches from 1962 – 1969 and 22.39 inches between 1970 – 1979.

4.3.2 Financial Capabilities

Assessing a jurisdiction's fiscal capability provides an understanding of the ability to fulfill the financial needs associated with hazard mitigation projects. This assessment identifies both outside resources, such as grant-funding eligibility, and local jurisdictional authority to generate internal financial capability, such as through fees. An assessment of fiscal capabilities is presented in Table 4-3.

Table 4-3. Fiscal Capability

Financial Resources	CVWD Accessible or Eligible to Use?
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	No
User Fees for Water, Sewer, Gas or Electric Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	No
State-Sponsored Grant Programs	Yes
Los Angeles County Sponsored Grant Programs	Yes
Federal-Sponsored Grant Programs	Yes

4.3.3 Administrative and Technical Capabilities

Administrative and technical capabilities focus on the availability of personnel resources responsible for implementing all the facets of hazard mitigation. An assessment of administrative and technical capabilities is presented in Table 4-4.

Table 4-4. Administrative and Technical Capability

Staff/Personnel Resources	Available?	Department/Agency/Position
Planners or engineers with knowledge of water supply infrastructure	Yes, 5	Engineering Department
Planners or engineers with an understanding of natural hazards	Yes, 5	Engineering Department
Staff with training in benefit/cost analysis	Yes, 2	Engineering Department
Personnel skilled or trained in GIS applications	Yes, 2	Engineering Department
Scientist familiar with natural hazards in local area	No	
Emergency manager	Yes, 2	Engineering Department
Grant writers	Yes, 1	Engineering Department

4.3.4 Public Outreach Capabilities

Regular engagement with the public on issues regarding hazard mitigation provides an opportunity to directly interface with community members. Assessing this outreach and education capability illustrates the connection between the government and community members, which opens a two-way dialogue that can result in a more

resilient community based on education and public engagement. An assessment of education and outreach capabilities is presented in Table 4-5.

Table 4-5. Education and Outreach Capability

Criterion	Response
Do you have a public information officer or communications office?	Yes, Christy Colby
Do you have personnel skilled or trained in website development?	No
Do you have hazard mitigation information available on your website? • **If yes, briefly describe.**	Yes https://www.cvwd.com/local-hazard-mitigation-plan
Do you use social media for hazard mitigation education and outreach? • **If yes, briefly describe.**	Yes Website, Facebook, Nixle
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • **If yes, briefly describe.**	Crescenta Valley Fire Safety Council a non-profit volunteer organization whose mission is preparing for and recovering from forest fires and other natural disasters; Neighbors Helping Neighbors.
Do you have any other programs already in place that could be used to communicate hazard-related information? • **If yes, briefly describe.**	Yes The Los Angeles County Hazard Mitigation Plan website provides a good source of information for the general population within the CVWD service area (https://lacounty.gov/emergency/county-of-los-angeles-all-hazards-mitigation-plan/)
Do you have any established warning systems for hazard events?	Yes
• **If yes, briefly describe.**	Email to customers through Everbridge

4.4 OPPORTUNITIES FOR INTEGRATION

As this core capability assessment has identified, the District has a high degree of core capability with its existing plans, programs, and core capacities for funding, administrative and technical and public outreach. Each of these capabilities represents an opportunity for future plan integration with the Hazard Mitigation Plan. The District recognized that this Plan includes valuable information that can inform, support, or enhance future updates to the core capabilities identified in this assessment. These capabilities include:

- Future updates to the District's Strategic Plan.
- Future updates to the Sewer System Management Plan
- Future updates to the Urban Water Management Plan
- Future updates to the Water Master Plan
- Future Wastewater Master Plan

The District is fully committed to plan integration where feasible and valuable, as evidenced by the identification of plan integration in the action plan provided in Chapter 18.

Part 2. RISK ASSESSMENT

5. HAZARDS OF CONCERN

5.1 HISTORY OF HAZARD EVENTS IN THE PLANNING AREA

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without federal assistance. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses, and public entities. Table 5-1 lists declared hazard events whose effective area included the District service area (declared events within Los Angeles County). Such a declaration does not necessarily indicate that any District assets were damaged by the event.

Table 5-1. Presidential Disaster Declarations with Affected Area Including the District Service Area

Type of Event	Date	Disaster Declaration	Counties Impacted[a]
Wildfires	10/16/2020	DR-4569	Fresno, Los Angeles, Madera, Mendocino, Napa, San Bernardino, San Diego, Shasta, Siskiyou, Sonoma
COVID-19 Pandemic	03/22/2020	DR-4482	All California Counties
Wildfires	11/12/2018	DR-4407	Butte, Los Angeles, Ventura
Wildfires, Mudflows, and Debris Flows	01/02/2018	DR-4353	Los Angeles, San Diego, Santa Barbara, Ventura
Severe Winter Storms, Flooding, and Mudslides	03/16/2017	DR-4305	Alameda, Calaveras, Contra Costa, El Dorado, Inyo, Kern, Los Angeles, Mendocino, Modoc, Mono, Napa, Orange, Sacramento, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Trinity, Tuolumne, Yolo
Severe Winter Storms, Flooding, and Debris and Mud Flows	03/08/2010	DR-1884	Calaveras, Imperial, Los Angeles, Riverside, San Bernardino, Siskiyou
Wildfires	11/18/2008	DR-1810	Los Angeles, Orange, Riverside, Santa Barbara
Wildfires	10/24/2007	DR-1731	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Ventura
Severe Freeze	03/13/2007	DR-1689	Fresno, Imperial, Kern, Kings, Los Angeles, Madera, Merced, Monterey, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare, Ventura
Severe Storms, Flooding, Landslides, and Mud and Debris Flows	04/14/2005	DR-1585	Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura
Severe Storms, Flooding, Debris Flows, and Mudslides	02/04/2005	DR-1577	Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Ventura
Wildfires	10/27/2003	DR-1498	Los Angeles, Riverside, San Bernardino, San Diego, Ventura

Type of Event	Date	Disaster Declaration	Counties Impacted[a]
Severe Winter Storms and Flooding	02/09/1998	DR-1203	Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, Fresno, Glenn, Humboldt, Kern, Lake, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Orange, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Ventura, Yolo, Yuba
Severe Winter Storms, Flooding, Landslides, Mud Flows	03/12/1995	DR-1046	Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, Yuba
Severe Winter Storms, Flooding, Landslides, Mud Flows	01/10/1995	DR-1044	Alameda, Amador, Butte, Colusa, Contra Costa, Del Norte, El Dorado, Glenn, Humboldt, Kern, Kings, Lake, Lassen, Los Angeles, Madera, Marin, Mendocino, Modoc, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Bernardino, San Diego, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Solano, Sonoma, Sutter, Tehama, Trinity, Ventura, Yolo, Yuba
Northridge Earthquake	01/17/1994	DR-1008	Los Angeles, Orange, Ventura
Fires, Mud & Landslides, Soil Erosion, Flooding	10/28/1993	DR-1005	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura
Severe Winter Storm, Mud & Landslides, Flooding	02/03/1993	DR-979	Alpine, Contra Costa, Del Norte, Fresno, Humboldt, Imperial, Lassen, Los Angeles, Madera, Mendocino, Modoc, Monterey, Napa, Orange, Plumas, Riverside, San Bernardino, San Diego, Santa Barbara, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tulare, Ventura
Fire During a Period of Civil Unrest	05/02/1992	DR-942	Los Angeles
Snowstorm, Heavy Rain, High Winds, Flooding, Mudslide	02/25/1992	DR-935	Kern, Los Angeles, Orange, San Bernardino, Ventura
Severe Freeze	02/11/1991	DR-894	Alameda, Butte, Colusa, Fresno, Glenn, Imperial, Kern, Los Angeles, Madera, Marin, Mendocino, Merced, Monterey, Napa, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tehama, Tulare, Ventura, Yolo, Yuba
Fires	06/30/1990	DR-872	Los Angeles, Riverside, San Bernardino, Santa Barbara
Severe Storms, High Tides, Flooding	02/05/1988	DR-812	Los Angeles, Orange, San Diego, Santa Barbara, Ventura
Earthquake & Aftershocks	10/07/1987	DR-799	Los Angeles, Orange
Coastal Storms, Floods, Slides, Tornadoes	02/09/1983	DR-677	Alameda, Butte, Colusa, Contra Costa, Del Norte, Glenn, Humboldt, Kern, Kings, Lake, Los Angeles, Marin, Mariposa, Mendocino, Merced, Monterey, Napa, Orange, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Ventura, Yolo, Yuba
Brush, Timber Fires	11/27/1980	DR-635	Los Angeles, Orange, Riverside, San Bernardino
Severe Storms, Mudslides, Flooding	01/08/1980	DR-615	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Santa Cruz, Ventura

Type of Event	Date	Disaster Declaration	Counties Impacted[a]
Coastal Storms, Mudslides, Flooding	02/15/1978	DR-547	Inyo, Kern, Kings, Los Angeles, Mono, Monterey, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare, Ventura
San Fernando Earthquake	02/09/1971	DR-299	Los Angeles
Forest, Brush Fires	09/29/1970	DR-295	Alameda, Kern, Los Angeles, San Bernardino, San Diego, Ventura
Severe Storms, Flooding	01/26/1969	DR-253	Amador, Contra Costa, El Dorado, Fresno, Humboldt, Inyo, Kern, Kings, Los Angeles, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Sierra, Solano, Sonoma, Stanislaus, Tehama, Tulare, Tuolumne, Ventura, Yuba
Fire	11/16/1961	DR-119	Los Angeles

a. All declarations include Los Angeles County

5.2 HAZARDS IDENTIFIED FOR RISK ASSESSMENT

The Steering Committee considered the full range of natural hazards that could impact the planning area and then identified the hazards that present the greatest concern. The process incorporated review of state and local hazard planning documents, as well as local, state, and federal information on the frequency, magnitude and costs associated with hazards that have impacted or could impact the planning area. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used. Based on the review, this plan update addresses the following hazards of concern:

- Drought
- Earthquake
- Flood
- Landslide (including debris flows)
- Severe weather
- Wildfire
- Climate Change

6. RISK ASSESSMENT METHODOLOGY

The risk assessments in this hazard mitigation plan describe the risks associated with each identified hazard of concern. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard**—The following information is given for each hazard:
  - A summary of past events that have impacted the planning area
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity estimates
  - Warning time likely to be available for response.
- **Determine exposure to each hazard**—Exposure was determined by overlaying hazard maps with an inventory of CVWD's structures, facilities, and systems to determine which of them would be exposed to each hazard.
- **Assess the vulnerability of exposed facilities**—Vulnerability of CVWD's exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as GIS and FEMA's hazard-modeling program called Hazus were used to perform this assessment for the flood and earthquake hazards. Outputs similar to those from Hazus were generated for other hazards, using maps generated by the Hazus program.

6.1 RISK ASSESSMENT TOOLS

6.1.1 Mapping

National, state, county, and district databases were reviewed to locate available spatially based data relevant to this planning effort. Maps were produced using geographic information system (GIS) software to show the spatial extent and location of hazards when such datasets were available. These maps are included in the hazard profile chapters of this document.

6.1.2 Hazus

Overview

In 1997, FEMA developed the standardized Hazards U.S., or Hazus, model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes, floods, and tsunamis.

Hazus is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, community lifelines, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data to be readily updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates the review of mitigation plans to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

Levels of Detail for Evaluation

Hazus provides default data for inventory and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. The Level 3 protocol requires detailed engineering and geotechnical information to customize the analysis for the planning area.

6.2 RISK ASSESSMENT APPROACH

6.2.1 Hazard Profile Development

Hazard profiles were developed for CVWD through web-based research and review of previously developed reports and plans, including state and local hazard mitigation plans. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists, and others.

6.2.2 Exposure and Vulnerability

Earthquake

A Level 2 Hazus analysis was performed to assess earthquake exposure and vulnerability for five scenario events and one probabilistic event within CVWD's service area:

- A Magnitude-6.89 event on the Northridge fault with an epicenter 20 miles west-northwest of La Crescenta.
- A Magnitude-6.95 event on the Puente Hills fault with an epicenter 8 miles south-southeast of La Crescenta.
- A Magnitude-6.71 event on the Raymond fault with an epicenter 9.5 miles southeast of La Crescenta.
- A Magnitude-7.16 event on the Sierra Madre fault with an epicenter 14 miles east of La Crescenta.
- A Magnitude-6.9 event on the Verdugo fault with an epicenter in La Crescenta.
- The standard Hazus 100-year probabilistic event.

Flood, Landslides, Severe Weather, and Wildfire

Historical datasets were not adequate to model future losses for most of the hazards of concern. However, areas and inventory susceptible to some of the hazards of concern were mapped by other means to evaluate exposure. A qualitative analysis was conducted for these hazards using the best available data and professional judgment.

Drought

Most of the risk assessment methodologies used for this plan focus on damage to structures. Because drought does not impact structures, the assessment for this hazard was more limited and qualitative than the assessment for the other hazards of concern.

6.3 SOURCES OF DATA USED IN MODELING AND EXPOSURE ANALYSES

6.3.1 Structure and Pipelines Cost Data

Replacement cost is the cost to replace an entire structure with one of equal quality and utility. Replacement costs for structures and pipelines were provided by the District. Hazard exposure analyses were conducted for all structures in the District's system. Hazus was used to determine damage to pipelines and to the following structures: potable water treatment plants, reservoirs, water booster pump stations, wells, wastewater lift stations, and administrative buildings.

The Hazus earthquake module calculates the economic loss to pipelines using the number of leaks and the number of breaks multiplied by cost to repair each leak or break. Default cost-to-repair values included in Hazus were updated with the following information provided by the District:

- Cost to repair a pipeline leak: $5,000
- Cost to repair a pipeline break: $15,000

Hazus default values for pipeline restoration time also were updated with information provided by the District:

- Number of fixed breaks per day per worker:
  - 0.11 for pipes 20 inches or more in diameter
  - 0.25 for pipes less than 20 inches in diameter
- Number of fixed leaks per day per worker:
  - 0.25 for pipes 20 inches or more in diameter

  - 0.5 for pipes less than 20 inches in diameter
- Number of workers available to fix leaks and breaks: 7 workers.

6.3.2 Hazus Data Inputs

Earthquake ShakeMaps and probabilistic data prepared by the USGS were used for the analysis of the earthquake hazard. A National Earthquake Hazard Reduction Program (NEHRP) soils map from the California Department of Conservation, Los Angeles County's liquefaction zones data, and susceptibility to deep-seated landslides data from the California Geological Survey were also integrated into the Hazus model.

6.3.3 Other Local Hazard Data

Locally relevant information on hazards was gathered from a variety of sources:

- **Landslide**—Susceptibility to deep-seated landslides data were provided by the California Geological Survey. Areas categorized as very high and high susceptibility (Categories X, XI, VIII, and VII) were used in the exposure analysis.
- **Severe Weather**—No severe weather area datasets in GIS format were identified for the District.
- **Wildfire**—Fire severity zone data were acquired from California Department of Forestry and Fire Protection (CAL FIRE). The very high fire severity zone category was used in the exposure analysis.

6.3.4 Data Source Summary

Table 6-1 summarizes the data sources used for the risk assessment for this plan.

Table 6-1. Hazus Model Data Documentation

Data	Source	Date	Format
Structure and pipeline data	CVWD	2021	Digital (GIS)
Replacement costs for structures and pipelines	CVWD	2021	Digital (tabular)
ShakeMap – Northridge M6.89	USGS	2017	Digital (GIS)
ShakeMap – Puente Hills (LA) M6.95	USGS	2017	Digital (GIS)
ShakeMap – Raymond M6.71	USGS	2017	Digital (GIS)
ShakeMap – Sierra Madre M7.16	USGS	2017	Digital (GIS)
ShakeMap – Verdugo M6.9	USGS	2017	Digital (GIS)
NEHRP soils	California Department of Conservation	2008	Digital (GIS)
Liquefaction zones	Los Angeles County (via City of Los Angeles GIS portal)	2016	Digital (GIS)
Susceptibility to deep-seated landslides	California Geological Survey	2011	Digital (GIS)
Very High Fire Hazard Severity Zones in Local Responsibility Areas	California Department of Forestry and Fire Protection	2007	Digital (GIS)
Fire Hazard Severity Zones for State Responsibility Areas	California Department of Forestry and Fire Protection	2007	Digital (GIS)

6.4 LIMITATIONS

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from

incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent, and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice the District has to prepare for a specific hazard event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, the District will collect additional data to assist in estimating potential losses associated with other hazards.

7. DROUGHT

7.1 GENERAL BACKGROUND

Drought is a normal phase in the climactic cycle of most geographical regions. According to the National Drought Mitigation Center, drought "originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector." Drought is the result of a significant decrease in water supply relative to what is "normal" in a given location.

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple of months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered to be long-term. A region may experience a long-term circulation pattern that produces drought but have short-term changes in this pattern that result in wet spells. Likewise, a long-term wet circulation pattern may be interrupted by short-term weather spells that result in a drought.

Drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.

7.1.1 Drought Definitions

There are four generally accepted operational definitions of drought (National Drought Mitigation Center, 2006):

- **Meteorological drought** is an expression of precipitation's departure from normal over some period of time. Meteorological measurements are the first indicators of drought. Definitions are usually region-specific and based on an understanding of regional climatology. A definition of drought developed in one part of the world may not apply to another, given the wide range of meteorological definitions.
- **Agricultural drought** occurs when there is not enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.
- **Hydrological drought** refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and less water in streams, rivers, lakes, and reservoirs, so hydrological measurements are not the earliest indicators of drought. After precipitation has been reduced or deficient over an extended period of time, this shortage is reflected in declining surface and subsurface water levels.
- **Socioeconomic drought** occurs when a physical water shortage starts to affect people, individually and collectively. Most socioeconomic definitions of drought associate it with the supply and demand of an economic good.

The National Drought Mitigation Center recommends that decision makers adopt an operational definition of drought for their own circumstances, incorporating local data such as grazing conditions or stream flow at a nearby gauge.

7.1.2 Monitoring Drought

The National Oceanic and Atmospheric Administration has developed several indices to measure drought impacts and severity and to map their extent and locations:

- The ***Crop Moisture Index*** measures weekly short-term drought to quantify drought impacts on agriculture during the growing season. Figure 7-1 shows this index for the week ending July 4, 2020.
- The ***Palmer Z Index*** measures monthly short-term drought. Figure 7-2 shows this index for June 2020.
- The ***Palmer Drought Severity Index*** measures the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during a given month is dependent on the current weather patterns plus the cumulative patterns of previous months. Weather patterns can change quickly from a long-term drought pattern to a long-term wet pattern, and the Palmer Drought Index can respond fairly rapidly. Figure 7-3 shows this index for June 2020.
- The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop and it takes longer to recover from them. The ***Palmer Hydrological Drought Index*** quantifies long-term hydrological effects. The index responds more slowly to changing conditions than the Palmer Drought Index. Figure 7-4 shows this index for June 2020.
- While the Palmer indices consider precipitation, evapotranspiration and runoff, the ***Standardized Precipitation Index*** considers only precipitation. In the Standardized Precipitation Index, an index of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The Standardized Precipitation Index is computed for time scales ranging from one month to 24 months. Figure 7-5 shows the 24-month Standardized Precipitation Index map for July 2018 to June 2020.

7.1.3 Defined Drought Stages

During critically dry years, the California State Water Resources Control Board can mandate water entitlements on water right holders to address statewide water shortages. Table 7-1 shows the state drought management program stages mandated to water right holders.

Table 7-1. State Drought Management Program

Drought Stage	State Mandated Customer Demand Reduction	Rate Impacts
Stage 0 or 1	<10%	Normal rates
Stage 2	10 to 15%	Normal rates; Drought surcharge
Stage 3	15 to 20%	Normal rates; Drought surcharge
Stage 4	>20%	Normal rates, Drought surcharge

Source: NOAA, NWS. 2020

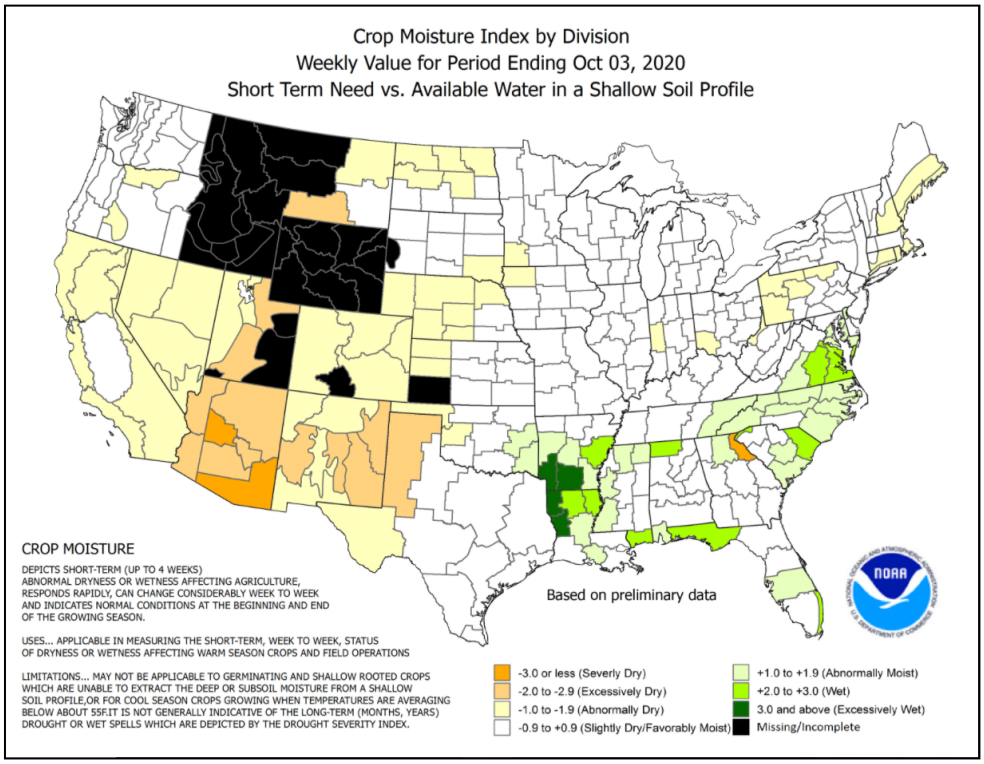


Figure 7-1. Crop Moisture Index for Week Ending October 3, 2020

Source: NOAA, NWS. 2020a

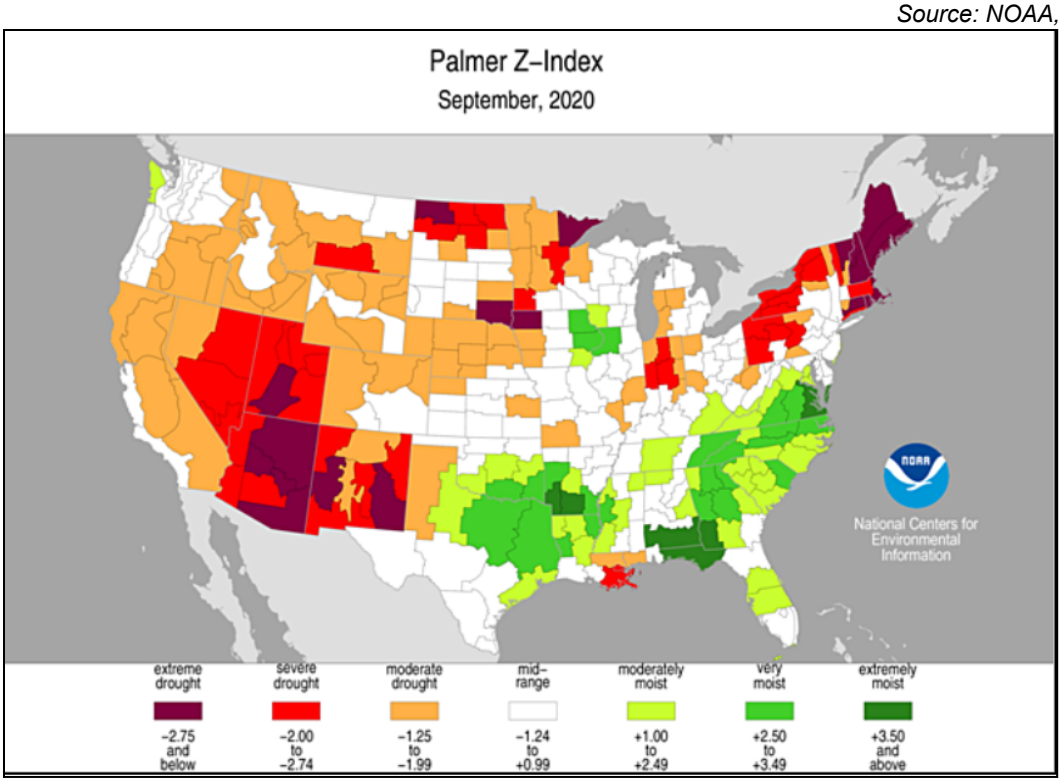


Figure 7-2. Palmer Z Index Short-Term Drought Conditions (September 2020)

Source: NOAA, NWS. 2020b

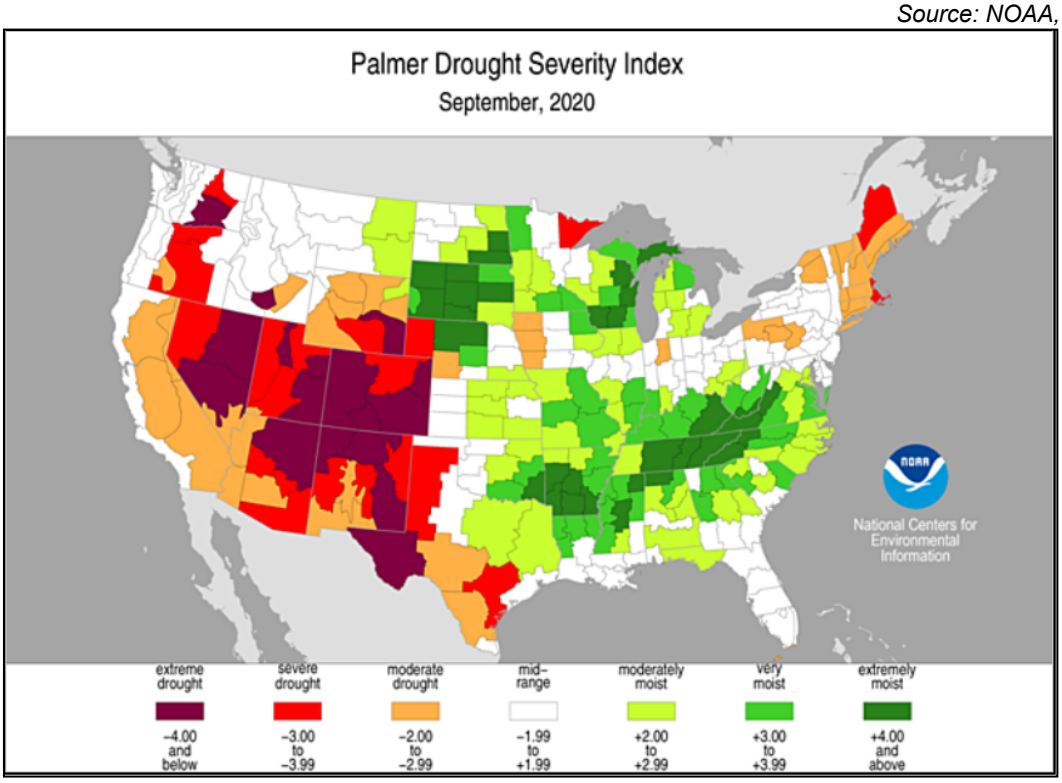


Figure 7-3. Palmer Drought Severity Index (September 2020)

Source: NOAA, NWS. 2020c

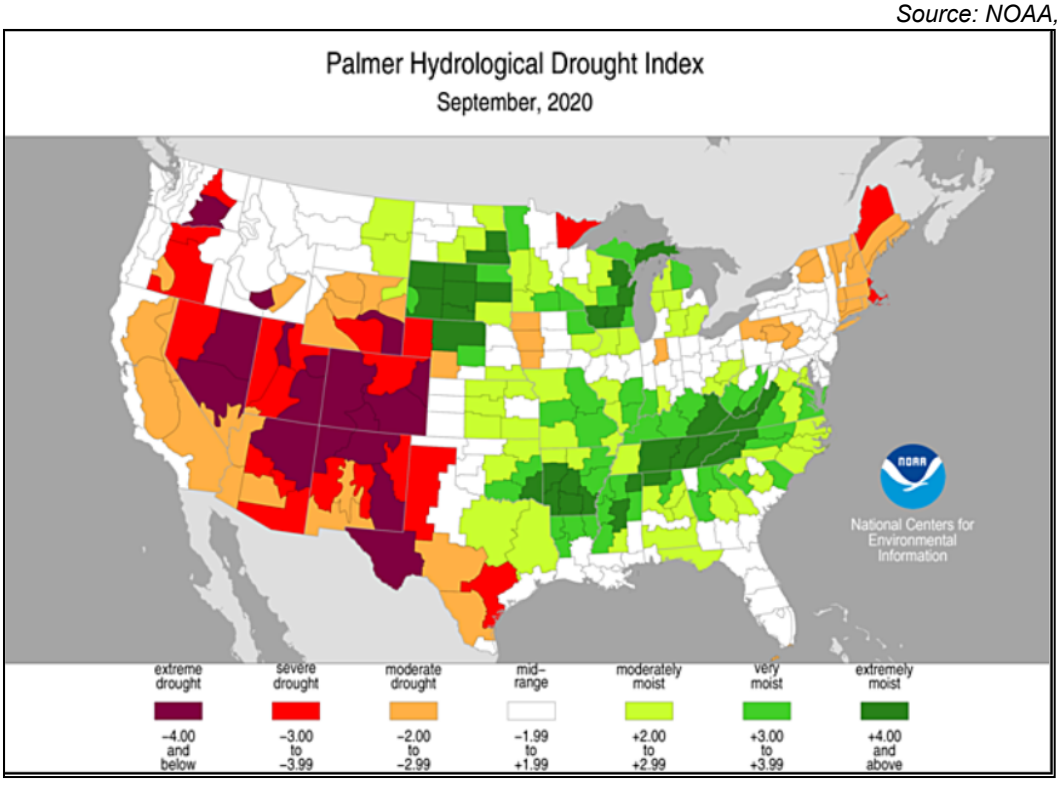


Figure 7-4. Palmer Hydrological Drought Index (September 2020)

Source: NOAA, NWS. 2020d

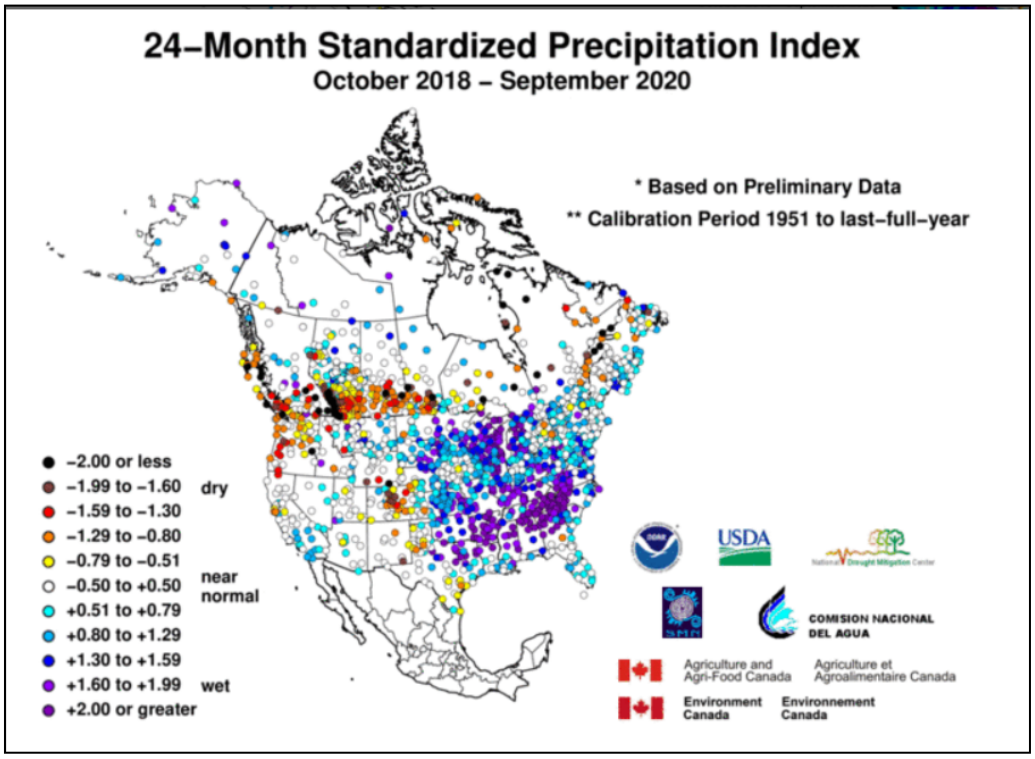


Figure 7-5. 24-Month Standardized Precipitation Index (October 2018 – September 2020)

7.1.4 Secondary Hazards

The secondary hazard most associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends.

7.2 LOCAL WATER SUPPLY

Over the last 10 years, local groundwater has supplied 55 percent of CVWD's source water. Most of CVWD's groundwater wells are along the Verdugo Wash, south of Honolulu Avenue. The remaining 45 percent of CVWD's source water is supplied by Foothill Municipal Water District (FMWD), which is a member agency of MWD. The sources of imported water supplies include the Colorado River and the State Water Project. MWD's 2015 Integrated Water Resources Plan update describes the core water resource strategy, which will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2020 through 2040.

It is required that every urban water supplier assess the reliability to provide water service to its customers under normal, dry, and multiple dry water years. MWD's 2020 Urban Water Management Plan finds that MWD is able to meet full service demands of its member agencies with existing supplies from 2020 through 2040 during normal years, single dry year, and multiple dry years. CVWD is therefore capable of meeting the water demands of its customers in normal, single dry, and multiple dry years between 2025 and 2045.

CVWD completed construction of a new wellhead treatment facility for its Well No. 2 in 2019. The installation of the ARoNite biological nitrate removal treatment system allows CVWD to utilize Well No. 2, which had been out

of service since 1976, thereby aiding in groundwater recovery. This treatment facility will increase CVWD's ability to pump its adjudicated rights within the Verdugo Basin, utilize a local water source, reduce CVWD's dependence on imported water from MWD purchased through FMWD, and reduce nitrates levels in the groundwater pumped from the Basin.

CVWD is working toward the development and installation of the Crescenta Valley County Park Stormwater Capture Project. This Project will allow CVWD to increase groundwater storage in the Basin by installation and maintenance of underground infiltration galleries underneath portions of the existing park. This will be accomplished by utilizing the existing Los Angeles County flood control channel, Verdugo Wash, and surface flow within the Crescenta Valley to divert storm water during the rainy season into underground infiltration basins within the recreational areas. The project will potentially increase the local groundwater supply by an annual average of 500 acre-feet per year, thus enhancing CVWD's groundwater resource and reducing dependence on imported supplies. Also, through the process of capture, treatment, and reuse of storm water and dry weather flow, the project could potentially reduce the pollutant load from contaminating the Los Angeles River.

Through an emergency interconnection with the City of Los Angeles Department of Water and Power, CVWD is able to receive up to 2.2 cubic feet per second or 1.9 million gallons per day and to provide an emergency water supply to FMWD and its sub-agencies.

As funding permits, CVWD plans to rehabilitate its older groundwater wells with new technologies over the next 10-year period. The existing wells are between 55 to 80 years old and have reached the end of their useful life. CVWD's current program is to perform at least two well rehabilitations a year, which include cleaning the well casing with chemical treatment and installation of a liner to extend the life of the well (CVWD, 2015).

7.3 HAZARD PROFILE

7.3.1 Past Events

Statewide Droughts

The California Department of Water Resources has state hydrologic data back to the early 1900s (CA DWR, 2017). The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920, 1922 to 1924 and 1928 to 1934. The following sections describe additional prolonged periods of drought in California since then, all of which impacted Los Angeles County to some degree.

1976 to 1977 Drought

California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California to that time, with the previous winter recorded as the fourth driest. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. Only 37 percent of the average Sacramento Valley runoff was received, with just 6.6 million acre-feet recorded. A federal disaster declaration was declared, but the declaration did not apply to Los Angeles County.

1987 to 1992 Drought

California received precipitation well below average levels for four consecutive years. During this drought, only 56 percent of average runoff for the Sacramento Valley was received, totaling just 10 million acre-feet. By February 1991, all 58 counties in California were suffering from drought conditions. Urban areas as well as rural and agricultural areas were impacted.

2007 to 2009 Drought

The governor issued an Executive Order that proclaimed a statewide drought emergency on June 4, 2008, after spring 2008 was the driest spring on record and snowmelt runoff was low. On February 27, 2009, the governor proclaimed a state of emergency for the entire state as the severe drought conditions continued widespread impacts and the largest court-ordered water restriction in state history (at the time).

2012 to 2017 Drought

California's latest drought set several records:

- The period from 2012 to 2014 ranked as the driest three consecutive years for statewide precipitation.
- 2014 set new climate records for statewide average temperatures and for record-low water allocations in the State Water Project and federal Central Valley Project.
- 2013 set minimum annual precipitation records for many communities.

On January 17, 2014, the governor declared a state of emergency for drought throughout California. This declaration followed release of a report that stated that California had had the least amount of rainfall in its 163-year history. Californians were asked to voluntarily reduce their water consumption by 20 percent. Drought conditions worsened into 2015. On April 1, 2015, following the lowest snowpack ever recorded, the governor announced actions to save water, increase enforcement to prevent wasteful water use, streamline the state's drought response, and invest in new technologies to make California more drought resilient. The governor directed the State Water Resources Control Board to implement mandatory water reductions in cities and towns across California to reduce water usage by 25 percent on average. The Crescenta Valley Water District's Retail Zone met its requirement to reduce its water usage by 36 percent.

The drought ended with a wet water year of 2017 — the second-wettest year on record in terms of statewide runoff, and wettest year of record in the Sacramento River Basin. Responding to the wet conditions, Executive Order B-40-17 in April 2017 terminated the statewide drought proclamation (California DWR, 2020).

Drought Impact Reporter

The National Drought Mitigation Center developed the Drought Impact Reporter in response to the need for a national drought impact database for the United States. Information comes from a variety of sources: on-line, drought-related news stories and scientific publications, members of the public who visit the website and submit a drought-related impact for their region, members of the media, and members of relevant government agencies.

The Drought Impact Reporter contains information on 2 impacts from droughts that specifically affected Los Angeles County from January 1970 through December 2020. The following are the categories and reported number of impacts (note that some impacts have been assigned to more than one category):

- Agriculture—34
- Business and Industry—11
- Energy—3
- Fire—30
- Plants and Wildlife—41
- Relief, Response, and Restrictions—87
- Society and Public Health—62
- Tourism and Recreation—9
- Water Supply and Quality—131

7.3.2 Location

Drought is a regional phenomenon. A drought that affects the planning area would affect the entirety of the area simultaneously and has the potential to adversely affect the local economy. Moreover, since the District relies on water imported from areas outside its region, droughts in Northern California or the basin states of the Colorado River could impact the District's water supply as well. In 2019, 48% of Crescenta Valley Water District's water was supplied by Foothill Municipal Water District (FMWD). Surface water supplied from FMWD has its origins in the State Water Project in Northern California and the Colorado River Aqueduct in Lake Havasu (CVWD, 2019). There is no clear way to map or define the extent and location of a drought, therefore any mapping for this hazard is very large scale, and risk assessments are qualitive in nature.

7.3.3 Frequency

Historical drought data for the planning area indicate there have been four significant multi-year droughts in the last 20 years (2000 to 2020). For approximately 12 of the last 20 years, Los Angeles County has been included in various levels of drought. This equates to a drought every 1.5 years on average, or a 60 percent chance of a drought in any given year. As temperatures increase, the probability of future droughts will likely increase as well.

7.3.4 Severity

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to property, as do other natural disasters. Nationwide, the impacts of drought occur in the following categories: agriculture; business and industry; energy; fire; plants and wildfire; relief, response, and restrictions; tourism and recreation; and water supply and quality sectors. The National Drought Mitigation Center uses three categories to describe likely drought impacts:

- **Economic Impacts**—These impacts of drought cost people or businesses money (i.e., farmers' crops are destroyed; water supply is too low, and money must be spent on irrigation or to drill new wells; businesses that sell boats and fishing equipment are not able to sell their goods; water companies must spend money on new or additional water supplies). Economic impacts on the District also could result if the regions from which the District receives its imported water were to be impacted by droughts to the point that they could not provide water to the District.

- **Environmental Impacts**—Plants and animals depend on water, just like people. When a drought occurs, their food supply can shrink, and their habitat can be damaged.
- **Social Impacts**—These impacts affect people's health and safety. Social impacts include public safety, health, conflicts between people when there is not enough water to go around, and changes in lifestyle.

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts.

Drought generally does not affect groundwater sources as quickly as surface water supplies, but groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Droughts can affect groundwater storage as reserves are drawn down in anticipation of drought impacts. Such conjunctive use assists in drought resilience, but groundwater basins may take years to replenish the water that was stored. Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when stream flows are lowest.

7.3.5 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions. Scientists do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depend upon interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

CVWD has developed a color-coded water conservation alert system that it will deploy under various stages of drought conditions that impact the service area. The 5 categories response are defined as follows (see Figure 7-6):

- Blue: STANDARD—Foothill can meet all Member Agency demands. Standard water conservation applies as defined in the District's rules and regulations. Outdoor watering is recommended to be no more than three days per week.
- Green: INCREASED—Some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.
- Yellow: EXTRAORDINARY—Metropolitan Water District of Southern California is pulling water from most of its storage programs to meet demand or the District's Groundwater Supplies have been reduced. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday, before 9:00 am and after 5:00 pm, for a period of no more than 7 minutes per station.

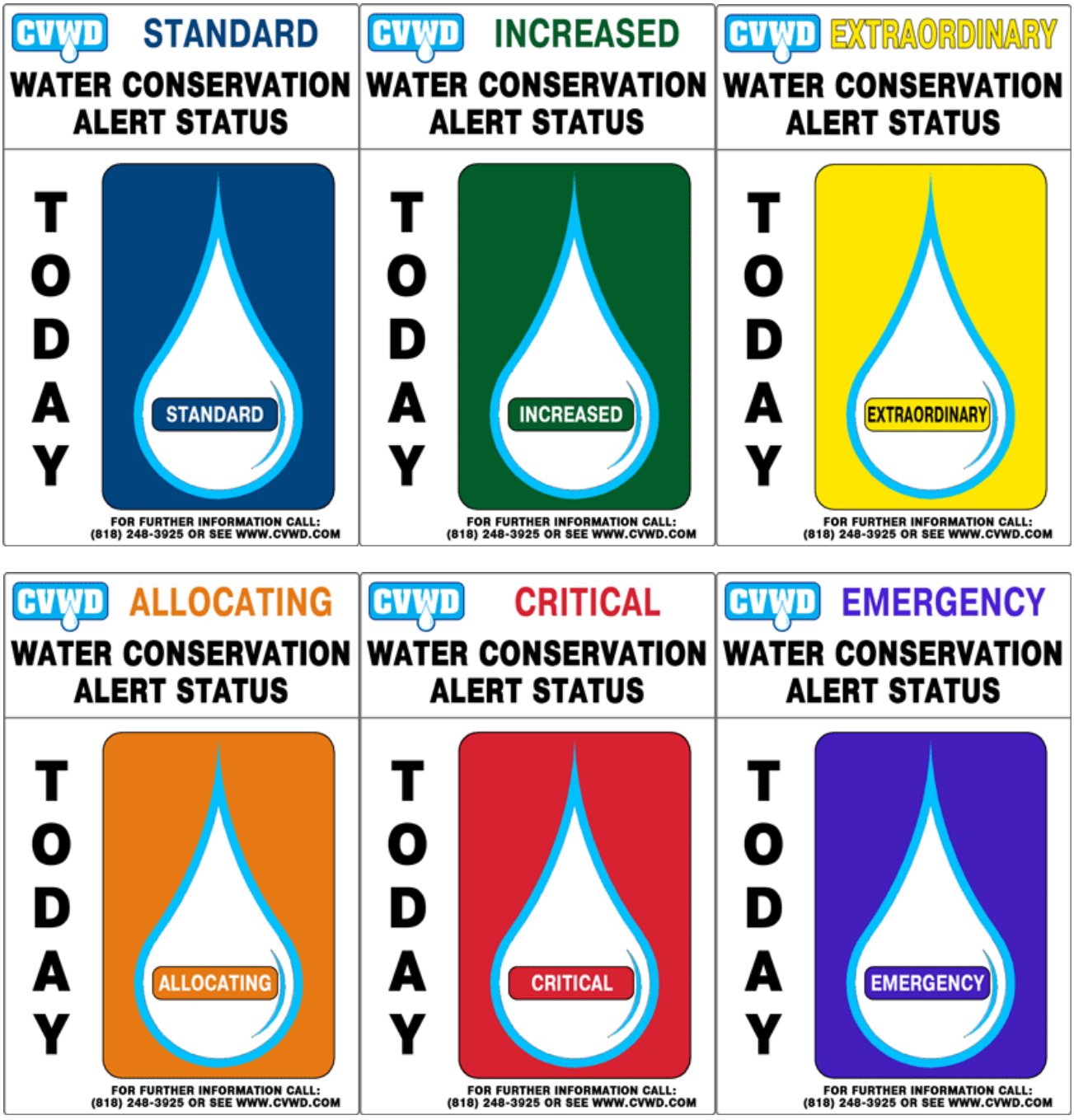


Figure 7-6. Water Conservation Alter System

- Orange: ALLOCATING—Metropolitan Water District of Southern California has implemented its allocation plan to its member agencies or the State of California has imposed mandatory water restrictions or reductions. Customers are requested to minimize indoor water use and severely limit outdoor water use as follows:
  - Residential and commercial landscape irrigation is limited to no more than two days per week. Outdoor irrigation will be permitted only on Tuesday and Saturday, before 9:00 am and after 5:00 pm.

  - The filling, refilling, or adding of water to indoor and outdoor pools, wading pools, or spas is prohibited.
  - The use of water to clean, maintain, fill, or refill decorative fountains or similar structures is prohibited.
  - Vehicle washing only at car wash with re-circulating system.
  - Fix leaks within 48 hours.
- Red: CRITICAL—Water supplies are reduced drastically. Customers are requested to minimize indoor water use and curtail all outdoor water use. Fix any leaks within 24 hours.
- Purple: EMERGENCY—Water supplies are only available for health and safety needs.

7.4 EXPOSURE AND VULNERABILITY

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to the ability to produce goods and provide services. Drought can affect a wide range of economic, environmental, and social activities. The vulnerability of an activity to the effects of drought usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand.

All CVWD assets would be exposed to some degree to the impacts of moderate to extreme drought conditions. No structures will be directly affected by drought conditions, though droughts can have significant impacts on landscapes. However, these impacts are not considered critical in planning for impacts from the drought hazard. Wells may need to be shut down in prolonged droughts if groundwater stores are depleted such that the wells cannot produce. Other CVWD critical facilities, including pipes and tanks, would not be impacted by drought conditions.

7.5 DEVELOPMENT TRENDS

While droughts typically do not impact physical structures and assets, they could impact the supply of water. The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2020, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by the Los Angeles County, the City of La Cañada Flintridge or the City of Glendale, depending upon the location of the asset.

7.6 SCENARIO

An extreme, multiyear drought associated with record-breaking rates of low precipitation and high temperatures—such as the most recent drought across the State of California——is the worst-case scenario. Combinations of low precipitation and high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout the planning area, increasing the need for water.

7.7 ISSUES

The Planning Team has identified the following drought-related issues:

- The application of the Drought Monitor can be a flawed characterization of when a region is coming or going out of drought, unrelated to actual water supply conditions
- Identification and development of alternative water supplies such as the capture and storage of stormwater runoff
- Utilization of groundwater recharge techniques to stabilize the groundwater supply
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods
- Public education on water conservation

8. EARTHQUAKE

8.1 GENERAL BACKGROUND

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

California is seismically active because of movement of the North American Plate, on which everything east of the San Andreas Fault sits, and the Pacific Plate, which includes coast communities west of the fault. The planning area is on the Pacific Plate, which is constantly moving northwest past the North American Plate, at a relative rate of movement of about 2 inches per year.

Geologists have found that earthquakes tend to reoccur along faults, which are zones of weakness in the earth's crust. The stress in a fault zone is not guaranteed to be released after an earthquake. Another earthquake could still occur. In fact, relieving stress on one part of a fault may increase the stress in another part.

Active faults have experienced displacement in historical time. However, inactive faults, where no such displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. An example of a fault zone that has been reactivated is the Foothills Fault Zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California (now known as the Cleveland Hills Fault). The State Division of Mines and Geology indicates that increased earthquake activity throughout California may cause movement along currently inactive fault systems.

8.1.1 Earthquake Classifications

Earthquakes are typically classified in one of two ways: By the amount of energy released, measured as magnitude; or by the impact on people and structures, measured as intensity.

Magnitude

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude is commonly expressed by ratings on the moment magnitude scale (M_w), the most common scale used today (USGS, 2017a). This scale is based on the total moment release of the earthquake (the product of the distance a fault moved, and the force required to move it). The scale is as follows:

- Great—Mw > 8
- Major—Mw = 7.0 – 7.9
- Strong—Mw = 6.0 – 6.9
- Moderate—Mw = 5.0 – 5.9
- Light—Mw = 4.0 – 4.9
- Minor—Mw = 3.0 – 3.9
- Micro—Mw < 3

Intensity

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale as well as the perceived shaking and damage potential for structures are shown in Table 8-1. The modified Mercalli intensity scale is generally represented visually using shake maps, which show the expected ground shaking at any given location produced by an earthquake with a specified magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. A shake map shows the variation of ground shaking in a region immediately following significant earthquakes (for technical information about shake maps see USGS, 2018).

Table 8-1. Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA[a] (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II-III	Weak	None	None	0.17% – 1.4%
IV	Light	None	None	1.4% – 3.9%
V	Moderate	Very Light	Light	3.9% – 9.2%
VI	Strong	Light	Moderate	9.2% – 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% – 34%
VIII	Severe	Moderate/Heavy	Heavy	34% – 65%
IX	Violent	Heavy	Very Heavy	65% – 124%
X – XII	Extreme	Very Heavy	Very Heavy	>124%

a. PGA measured in percent of g, where g is the acceleration of gravity
Sources: USGS, 2008; USGS, 2010

8.1.2 Ground Motion

Earthquake hazard assessment is also based on expected ground motion. During an earthquake when the ground is shaking, the ground also experiences acceleration. The peak acceleration is the largest rate of increase in velocity recorded by a particular station during an earthquake. Estimates are developed of the annual probability that certain ground motion accelerations will be exceeded; the annual probabilities can then be summed over a time period of interest.

The most commonly mapped ground motion parameters are horizontal and vertical peak ground accelerations (PGA) for a given soil type. PGA is a measure of how hard the earth shakes, or accelerates, in a given geographic area. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. PGA is measured in multiples of "g" (the acceleration due to gravity) or expressed as a percent

acceleration force of gravity (%g). These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code and the California State Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage "short period structures" (e.g. single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges).

8.1.3 Liquefaction and Soil Types

Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people.

A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. Table 8-2 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

Table 8-2. NEHRP Soil Classification System

NEHRP Soil Type	Description	Mean Shear Velocity to 30 meters (m/s)
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 meters thick)	

Soil liquefaction maps are useful tools to assess potential damage from earthquakes. In general, areas with NEHRP Soils D, E and F are also susceptible to liquefaction. If there is a dry soil crust, excess water will sometimes come to the surface through cracks in the confining layer, bringing liquefied sand with it, creating sand boils. This is a vital need for assessing seismic risk within the planning area. Liquefaction data tracks with where NEHRP soil data is available.

8.1.4 USGS Earthquake Mapping Programs

ShakeMaps

The USGS Earthquake Hazards Program produces maps called ShakeMaps that map ground motion and shaking intensity following significant earthquakes. ShakeMaps focus on the ground shaking caused by the earthquake,

rather than on characteristics of the earthquake source, such as magnitude and epicenter. A ShakeMap shows the extent and variation of ground shaking immediately across the surrounding region following significant earthquakes. Such mapping is derived from peak ground motion amplitudes recorded on seismic sensors, with interpolation where data are lacking based on estimated amplitudes. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. In addition to the maps of recorded events, the USGS creates the following:

- Scenario ShakeMaps of hypothetical earthquakes of an assumed magnitude on known faults
- Probabilistic ShakeMaps, based on predicted shaking from all possible earthquakes over a 10,000-year period. In a probabilistic map, information from millions of scenario maps are combined to make a forecast for the future. The maps indicate the ground motion at any given point that has a given probability of being exceeded in a given timeframe, such as a 100-year (1-percent-annual chance) event.

National Seismic Hazard Map

National probabilistic maps of earthquake shaking hazards have been produced since 1948. The USGS last updated its National Seismic Hazard Maps in 2018, incorporating the best available seismic, geologic, and geodetic information on earthquake rates and associated ground shaking. The map produced for this update include maps of the PGA expected at various probability levels of different NEHRP soil types. Figure 8-1 shows the peak ground acceleration with 10 percent probability of exceedance in 50 years. This level of ground shaking has been used for designing buildings in high seismic areas.

Source: USGS, 2021

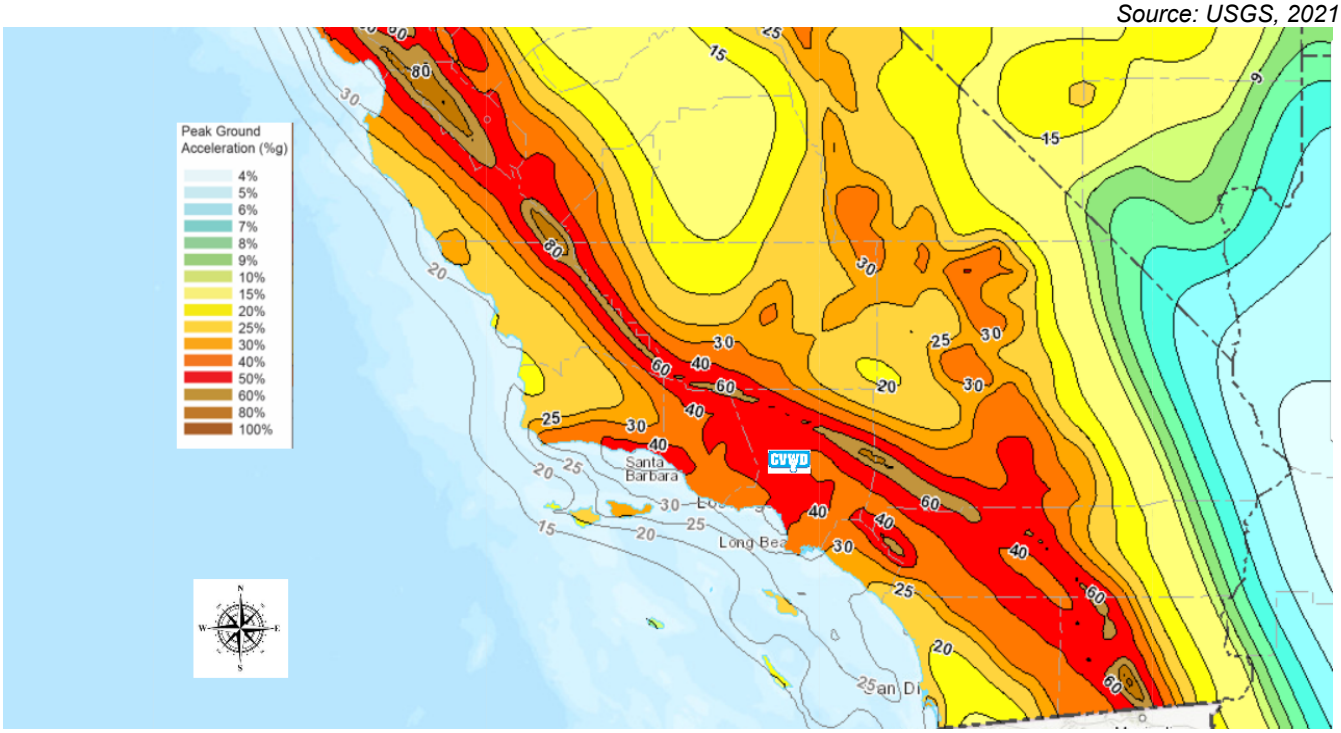


Figure 8-1. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years in Southern California

The National Seismic Hazard Maps provide information essential to creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning used in the U.S. Scientists frequently revise these maps to reflect new information and knowledge.

Buildings, bridges, highways, and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better, with less damage and disruption. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes (Brown et al., 2001).

8.1.5 Secondary Hazards

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often because of loss of cohesion in clay-rich soils. Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people. Earthen dams and levees are highly susceptible to seismic events and the impacts of their eventual failures can be considered secondary risks for earthquakes.

Additionally, fires can result from gas lines or power lines that are broken or downed during the earthquake. Fires may be difficult to control if the water lines feeding fire hydrants are also broken.

8.2 HAZARD PROFILE

8.2.1 Past Events

Los Angeles County has been included in three FEMA declaration for earthquakes: the 1994 Northridge Earthquake (DR-1008); the 1987 Whittier Narrows earthquake (DR-799); and the 1971 San Fernando earthquake (DR-299). Table 8-3 lists earthquakes of magnitude 5.0 or greater within a 100-mile radius of the planning area.

The most recent damaging earthquake affecting Southern California was the Ridgecrest event, which included one strong earthquake (M6.4, July 4, 2019) and one major earthquake (M7.1 July 5, 2019). Maximum shaking was estimated to be MMI IX (violent) at the epicenter and MMI VII (very strong) over a surrounding region that included the city of Ridgecrest, which has a population of 28,000. Shaking was widely felt throughout California, including light to moderate ground shaking in Los Angeles and weak shaking in the San Francisco Bay Area (Southern California Seismic Network, 2019). Damage estimates for the Ridgecrest earthquakes exceeded $1 billion according to the U.S. Geological Survey. Long stretches of Highway 178 were visibly cracked (CEA, 2019).

The most recent damaging earthquake event affecting Los Angeles County was the 1994 Northridge Earthquake. At 4:31 a.m. on January 17, a moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures. Fifty-seven people were killed, and more than 1,500 people seriously injured. For days afterward, thousands of homes and businesses were without electricity, tens of thousands had no gas, and nearly 50,000 had little or no water.

Table 8-3. Earthquakes Magnitude 5.0 or Larger Within 100-Mile Radius of the Planning Area

Date	Magnitude	Epicenter Location
07/23/1923 Los Angeles Earthquake	6.0	3 miles north of Loma Linda, CA
02/18/1926 Channel Islands Earthquake	5.5	3 miles from Santa Cruz Island, CA
3/10/1933 Long Beach Earthquake	6.4	3 miles south of Huntington Beach, CA
03/25/1937 Oasis Earthquake	6.0	10 miles west southwest of Oasis, CA
12/04/1948 Desert Hot Springs Earthquake	6.0	10 miles east of Desert Hot Springs, CA
12/26/1951 San Clemente Island Earthquake	5.8	7 miles north northeast of San Clemente Island, CA
02/09/1971 Agua Dulce Sequence	6.6, 5.8, 5.8	6 miles south southwest of Agua Dulce, CA
07/08/1986 Morongo Valley Earthquake	6.0	4 miles south southwest of Morongo Valley, CA
10/01/1987 Rosemead Earthquake	5.9	1 mile south southwest of Rosemead, CA
02/28/1990 Claremont Earthquake	5.5	4 miles north northeast of Claremont, CA
06/28/1991 Sierra Madre Earthquake	5.8	8 miles north northeast of Sierra Madre, CA
04/23/1992 Thousand Palms Earthquake	6.1	11 miles north northeast of Thousand Palms, CA
06/28/1992 Landers Earthquake	7.3	In Landers, CA
06/28/1992 Yucca Valley Earthquake	5.8	2 miles northeast of Yucca Valley, CA
06/28/1992 Joshua Tree Earthquake	5.7	1 mile south southwest of Joshua Tree, CA
06/28/1992 Big Bear Lake Earthquake	5.5	7 miles south southeast of Big Bear Lake, CA
06/28/1992 Big Bear City Earthquake	6.3	4 miles south southeast of Big Bear City, CA
06/29/1992 Yucca Valley Earthquake	5.7	2 miles east southeast of Yucca Valley, CA
01/17/1994 Northridge Earthquake	6.7	1 mile south-southwest of Northridge
01/17/1994 Granada Hills Earthquake	5.9	Half-mile east northeast of Granada Hills, CA
01/17/1994 Simi Valley Earthquake	5.0	4 miles north northeast of Simi Valley, CA
10/16/1999 Running Springs Earthquake	5.6	4 miles east northeast of Running Springs, CA
07/29/2008 Chino Hills Earthquake	5.4	2 miles southwest of Chino Hills, CA
07/2019 Ridgecrest Sequence	6.4 and 7.1	Ridgecrest, CA

Source: Southern California Earthquake Data Center, 2020

Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. Of 66,500 buildings inspected, nearly 4,000 were severely damaged and over 11,000 were moderately damaged. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, and earthquake-triggered liquefaction and dozens of fires caused additional severe damage. This extremely strong ground motion resulted in record economic losses.

8.2.2 Location

Faults

Earthquakes are considered a major threat to Los Angeles County due to the proximity of several fault zones, notably including the Sierra Madre Fault Zone and the Verdugo Fault Zone. A significant earthquake along one of these major fault zones could cause substantial casualties, extensive damage to buildings, roads and bridges, fires, and other threats to life and property. The effects could be aggravated by aftershocks and by secondary effects such as fire, landslide, and dam failure. A major earthquake could be catastrophic in its effect on the population and could exceed the response capability of the local communities and even the state.

Large faults as shown in Figure 8-2 that could affect the planning area include the Sierra Madre Fault, the Verdugo Fault, the Puente Hills Fault, the Northridge Fault, and the Raymond Fault. Information on these fault zones is provided in the following sections.

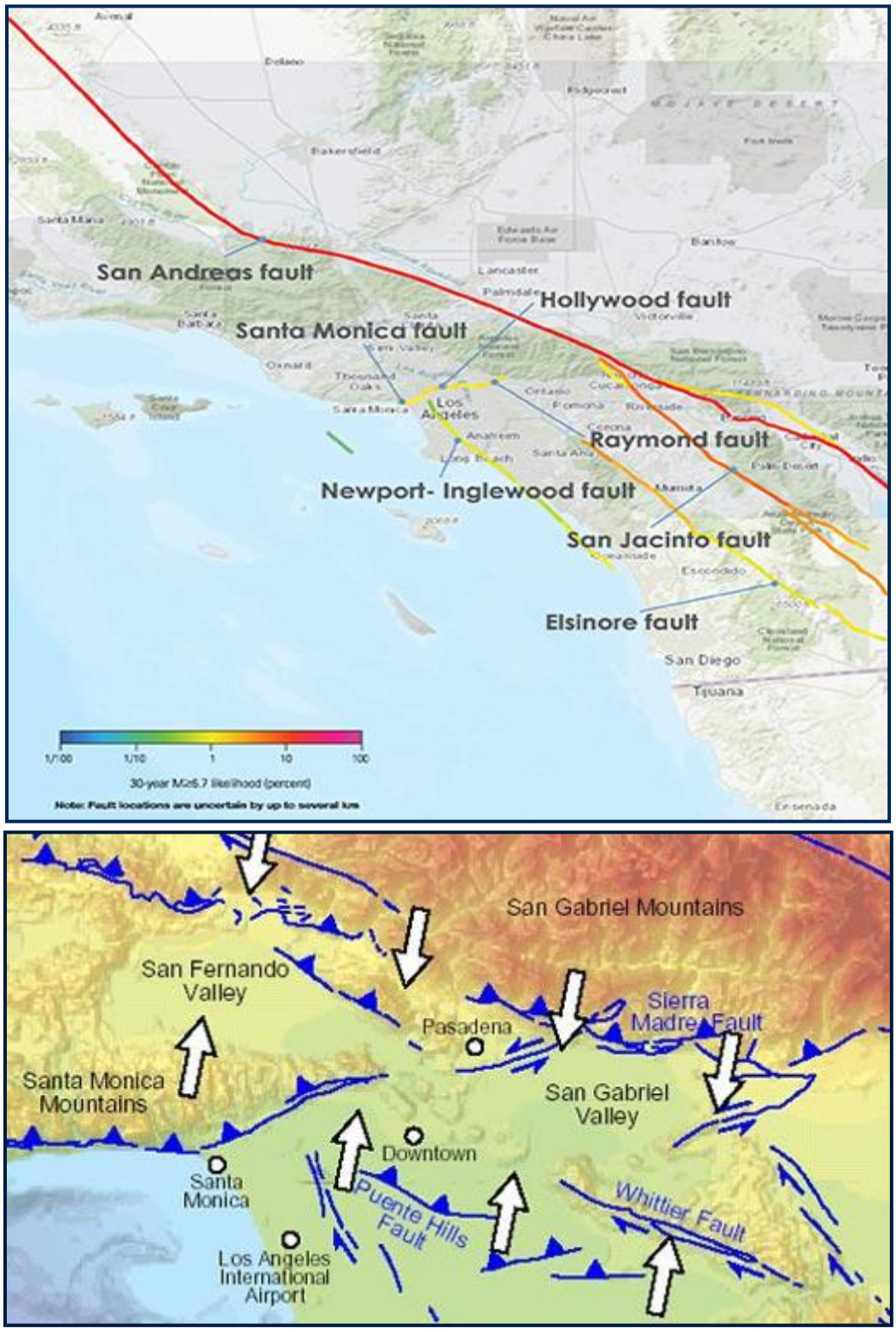


Figure 8-2. Earthquake Fault Zones in Los Angeles County

Sierra Madre Fault Zone

The Sierra Madre fault forms the southern tectonic boundary of the San Gabriel Mountains in the northern San Fernando Valley. This fault consists of a system of faults approximately 75 miles in length. Individual segments range up to 16 miles in length and display a reverse sense of displacement and dip to the north. The most recently active portions of the zone include the Mission Hills, Sylmar, and Lakeview segments, which produced an earthquake in 1971 of magnitude 6.4. Tectonic rupture along the Lakeview Segment during the San Fernando Earthquake of 1971 produced displacements of approximately 2½ to 4 feet upward and southwestward. Experts believe that the Sierra Madre fault zone can produce an earthquake of up to magnitude 7.3.

Verdugo Fault

The Verdugo Fault is a reverse fault that runs for 21 kilometers along the Verdugo Mountains, between Verdugo Wash on the southeast and Big Tujunga Wash on the northwest. The fault displays a reverse motion. According to Weber, et. al., (1980) 2 to 3-meter-high scarps were identified in alluvial fan deposits in the Burbank and Glendale areas. Further to the northeast, in Sun Valley, a fault was reportedly identified at a depth of 40 feet in a sand and gravel pit. Although considered active by the Los Angeles County, Department of Public Works (Leighton, 1990), and the United States Geological Survey, the fault is not designated with an Earthquake Fault Zone by the California Geological Survey. Experts have estimated that the Verdugo Fault can produce a maximum 6.9 magnitude earthquake.

Puente Hills Fault

The Puente Hills Fault, also known as the Puente Hills thrust system, is an active geological fault that is in the Los Angeles Basin in California. The thrust fault was discovered in 1999 and runs about 25 miles in three discrete sections from the Puente Hills region in the southeast to just south of Griffith Park in the northwest. The fault is known as a blind thrust fault, as the fault plane does not extend to the surface. Large earthquakes on the fault are relatively infrequent but computer modeling has indicated that a major event could have substantial impact in the Los Angeles area (Shaw et al., 2002). The fault is now thought to be responsible for the 1987 Whittier Narrows earthquake, causing 8 deaths, 200 injuries, and between $213-358 million in damages. The frequency of a major rupture in the Puente Hills Fault is on the order of once per several thousand years. Geologists have determined that the fault has ruptured at least four times in the past 11,000 years. The magnitudes of such earthquakes are considered to have been 7.2 to 7.5. The highest magnitude in that range would be about fifteen times stronger than the 1994 Northridge earthquake in terms of energy release.

Northridge Fault

The surface trace of the Northridge thrust forms a ridge to the south of its trace and is roughly paralleled by both the Santa Clara River and California State Highway 126, from the town of Piru to the coast, just southeast of Ventura. The Northridge thrust continues offshore out to a point about 20 kilometers due south of Santa Barbara, for a total length of 90 kilometers. The offshore segment is associated with a definite zone of active seismicity, though the only known Holocene surface rupture is found well onshore, between the towns of Bardsdale and Fillmore. At its eastern end, the Northridge thrust becomes progressively more difficult to trace, and appears to be overthrust by the Santa Susana fault, thus becoming a blind thrust fault. Indeed, the fault associated with the 1994 Northridge earthquake is probably part of the Northridge fault system, as it shares many of the characteristics of this fault. This blind thrust fault is known either as the **Pico Thrust**, named for the Pico Anticline (a geologic fold the fault is creating), or as the Oak Ridge, due to the fault's ridge formation. The probable magnitudes on this fault are between 6.5 and 7.5.

Raymond Fault

The Raymond Fault runs for 26 kilometers near San Marino, Arcadia, and South Pasadena, dipping at about 75 degrees to the north. There is evidence that at least eight surface-rupturing events have occurred along this fault in the last 36,000 years. The exact nature of the slip along the Raymond fault has been a subject of debate for quite some time. The fault produces a very obvious south-facing scarp along much of its length, and this has made many favor reverse-slip as the predominant sense of fault motion. However, there are also places along this scarp where left-lateral stream offsets of several hundred meters can be seen. The matter will not be conclusively resolved until the Raymond fault ruptures at the surface, but some new light was shed on the debate in late 1988, when the Pasadena Earthquake occurred. Apparently located on the Raymond fault, the motion of this quake was predominantly left-lateral, with a reverse component only about 1/15th the size of the lateral component. If the Raymond fault is primarily a left-lateral fault, it could be responsible for transferring slip southward from the Sierra Madre fault zone to other fault systems. Experts estimate that the Raymond Fault can produce an earthquake between magnitude 6.0 and 7.0.

Susceptible Areas

Although the intensity of an earthquake is not likely to vary significantly across the planning area, impacts can vary based on local soil characteristics. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. NEHRP soil classifications in the planning area relative to the water system facilities and wastewater system facilities are shown on Figure 8-3 and Figure 8-4, respectively. Risk is similarly increased in areas of mapped liquefaction susceptibility. These areas are shown relative to the water system facilities and wastewater system facilities on Figure 8-5 and Figure 8-6, respectively.

8.2.3 Frequency

California experiences hundreds of earthquakes each year, most with minimal damage and magnitudes below 3.0. Earthquakes that cause moderate damage to structures occur several times a year. According to the USGS, a strong earthquake measuring greater than 5.0 occurs every two to three years and major earthquakes of more than 7.0 occur once a decade. The State Hazard Mitigation Plan indicates that in the next 30 years there is over a 99 percent probability of a magnitude 6.7 earthquake in California and a 94 percent probability of a magnitude 7.0 earthquake.

The Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) predicts the probability of an earthquake of Magnitude 6.7 or greater over the next 30 years as shown in Figure 8-7. The UCERF3 also defined the following recurrence intervals for the five deterministic earthquake scenarios used for the risk assessment in this hazard mitigation plan:

- Sierra Madre M7.16 = 1,620.95 years
- Verdugo M6.90 = 4,337.10 years
- Raymond M6.71 = 1,174.42 years
- Puente Hills M6.95 = 3,094.92 years
- Northridge M6.89 = 1,460.41 years

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Figure 8-3. Potable Water System - NEHRP Soil Class

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Figure 8-4. Wastewater System - NEHRP Soil Class

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Figure 8-5. Potable Water System - Liquefaction

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Figure 8-6. Wastewater System - Liquefaction

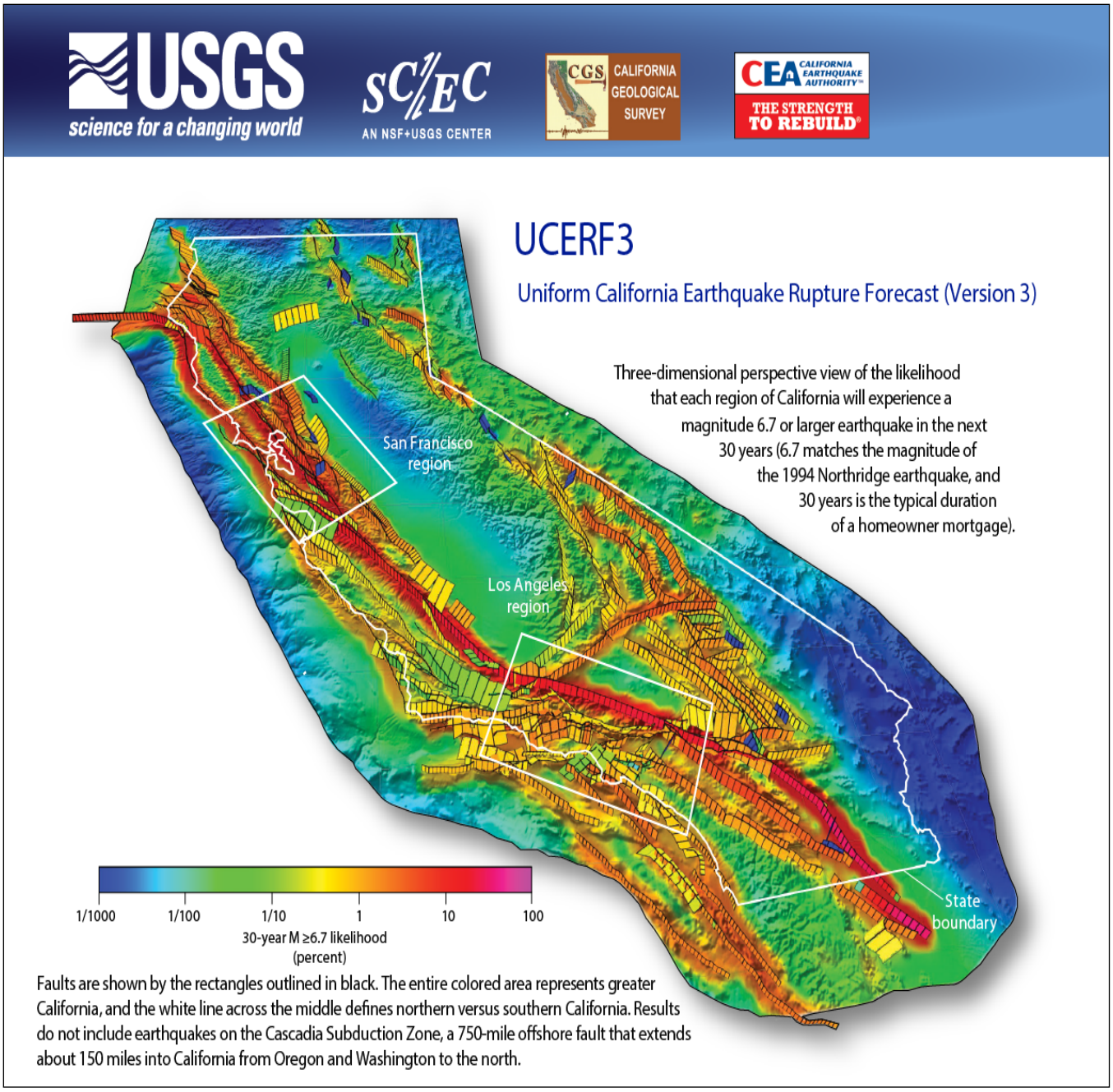

Figure 8-7. UCERF3 Forecast for Magnitude 6.7 or Larger Earthquake in the Next 30 Years.

8.2.4 Severity

Potential Earthquake Intensity in the Planning Area

USGS probabilistic mapping is an indication of potential earthquake intensity in an area. Figure 8-1 shows the intensity with a 10-percent exceedance chance in 50 years in Southern California. For the District service area, this PGA is in the approximate range of 0.3g.

Potential Damage

Earthquakes can last from a few seconds to over five minutes; they may also occur as a series of tremors over several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris as the shocks shake buildings and other structures. Soil liquefaction can undermine building and road foundations.

Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides, or releases of hazardous material, compounding their disastrous effects. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people.

The severity of a seismic event is directly correlated to the stability of the ground close to the event's epicenter. A poorly built structure on a stable site is far more likely to survive a large earthquake than a well-built structure on an unstable site. Thorough geotechnical site evaluations should be the rule of thumb for new construction in the planning area until creditable soils mapping becomes available.

8.2.5 Warning Time

There is no current reliable way to predict the day or month that an earthquake will occur at any given location. Los Angeles County residents are being encouraged to download MyShake, the new statewide cell phone app from Earthquake Early Warning California that is powered by ShakeAlert and builds on lessons learned from the City of Los Angeles's two-year ShakeAlert pilot to deliver earthquake early warning alerts to people across L.A. County. ShakeAlertLA was retired on December 31, 2020. The MyShake app—developed by the UC Berkeley Seismology Lab, sponsored by the State of California Office of Emergency Services—is the first app powered by ShakeAlert® to provide statewide earthquake early warning alerts. The app is one of the delivery modes of the California Earthquake Early Warning System. MyShake is available in both English and Spanish.

8.3 EXPOSURE

The risk assessment for earthquake determined District assets that lie within mapped liquefaction areas or areas of high-risk NEHRP soils (soil classes C and D). Table 8-4 and Table 8-5 summarize the number of structures and the length of pipeline, respectively, within each of these hazard areas. Figure 8-8 and Figure 8-9 show these results as the percent of total planning area facilities of each type for potable water and wastewater systems, respectively.

Table 8-4. Number of District Structures Exposed to the Earthquake Hazard

	Total Structures	Number of Structures in Earthquake Hazard Areas		
		NEHRP Class C Soils	NEHRP Class D Soils	Mapped Liquefaction Areas
Potable Water Structures				
Building	4	0	4	1
Aeration Tower	2	1	1	2
Debris Basin	13	5	8	1
Emergency Interconnection	21	4	17	5
Fitting	1,924	176	1,748	206
Hydrant	695	60	635	58
Interconnection	8	2	6	2
Mixing Station	1	0	1	0
Motor Control Center	21	6	15	6
Pipeline Crossing	26	6	20	2
Potable Water Treatment Plant	10	3	7	2
Potable Water Valve	2,279	200	2,079	192
Pressure Reducing Station	7	1	6	0
Reservoir	19	8	11	2
Water Booster Pump Station	14	5	9	2
Well	12	0	12	8
Total	**5,056**	**477**	**4,579**	**489**
Wastewater Structures				
Sewer Control Valve	3	0	3	0
Sewer Fitting	6,482	620	5,862	206
Sewer Flow Meter	1	0	1	0
Sewer Manhole	1,270	114	1,156	112
Sewer Wet Well	1	0	1	0
Wastewater Lift Station	2	0	2	0
Wastewater Treatment Plant	1	0	1	1
Total	**7,760**	**734**	**7,026**	**319**

Table 8-5. Length of District Pipeline Within Earthquake Hazard Areas

	Total Length of Pipe (feet)	Length of Pipe in Earthquake Hazard Areas (feet)		
		NEHRP Class C Soils	NEHRP Class D Soils	Mapped Liquefaction Areas
Potable Water Pipelines				
Brittle (asbestos cement, concrete, cast iron, welded steel with gas-welded joints, and pre-1935 steel with unknown joint type)	538,793	47,616	491,177	49,333
Ductile (ductile iron, PVC, welded steel pipes with arc-welded joints, and post-1934 steel with unknown joint type)	6,899	120	6,779	698
Total	**545,692**	**47,736**	**497,956**	**50,031**
Wastewater Pipelines				
Brittle (clay, concrete)	356,466	28,027	328,438	33,330
Ductile (plastic)	7,261	1,155	6,106	757
Total	**363,727**	**29,182**	**334,544**	**34,087**

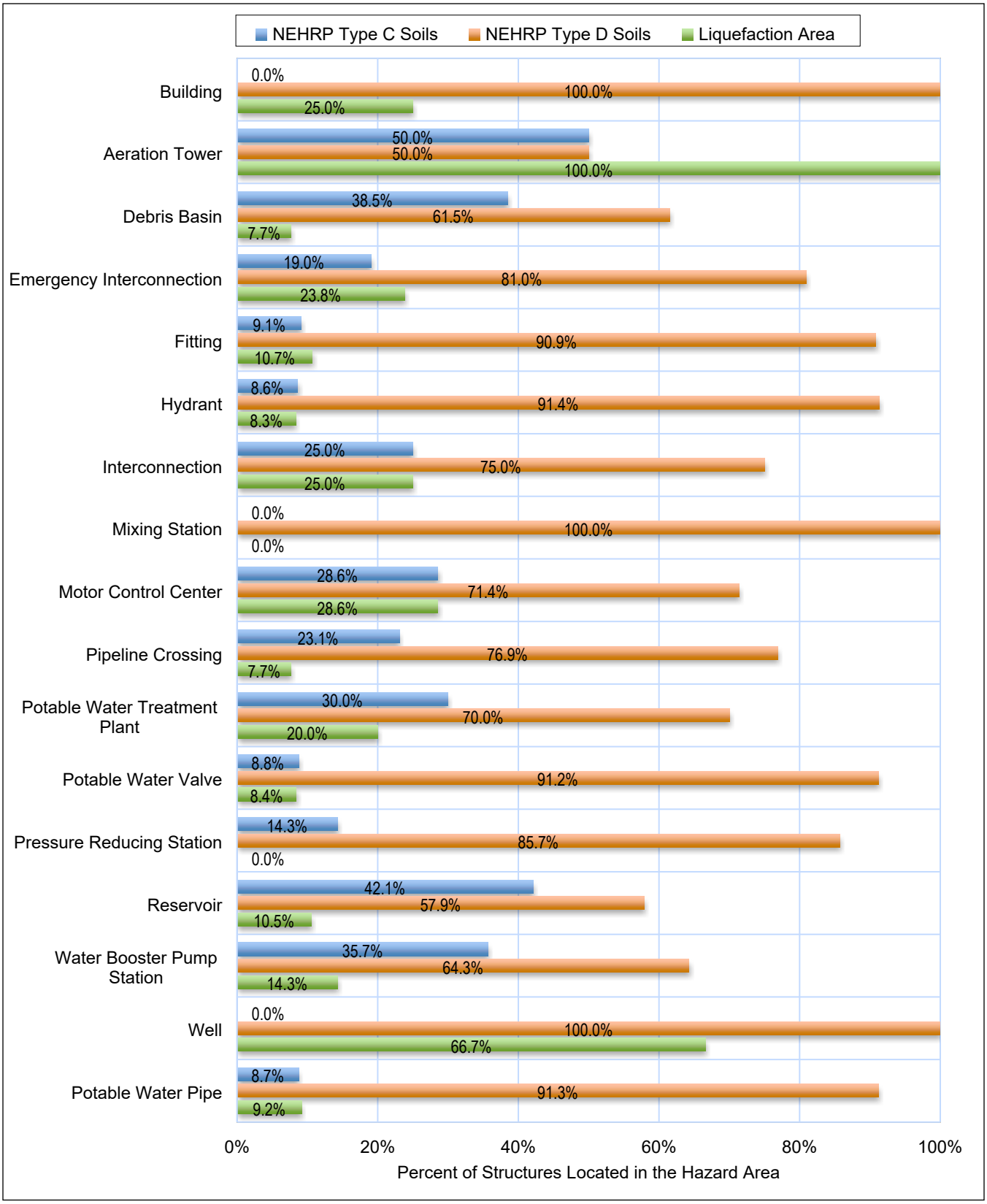

Figure 8-8. Percent of District Potable Water Structures Exposed to the Earthquake Hazard

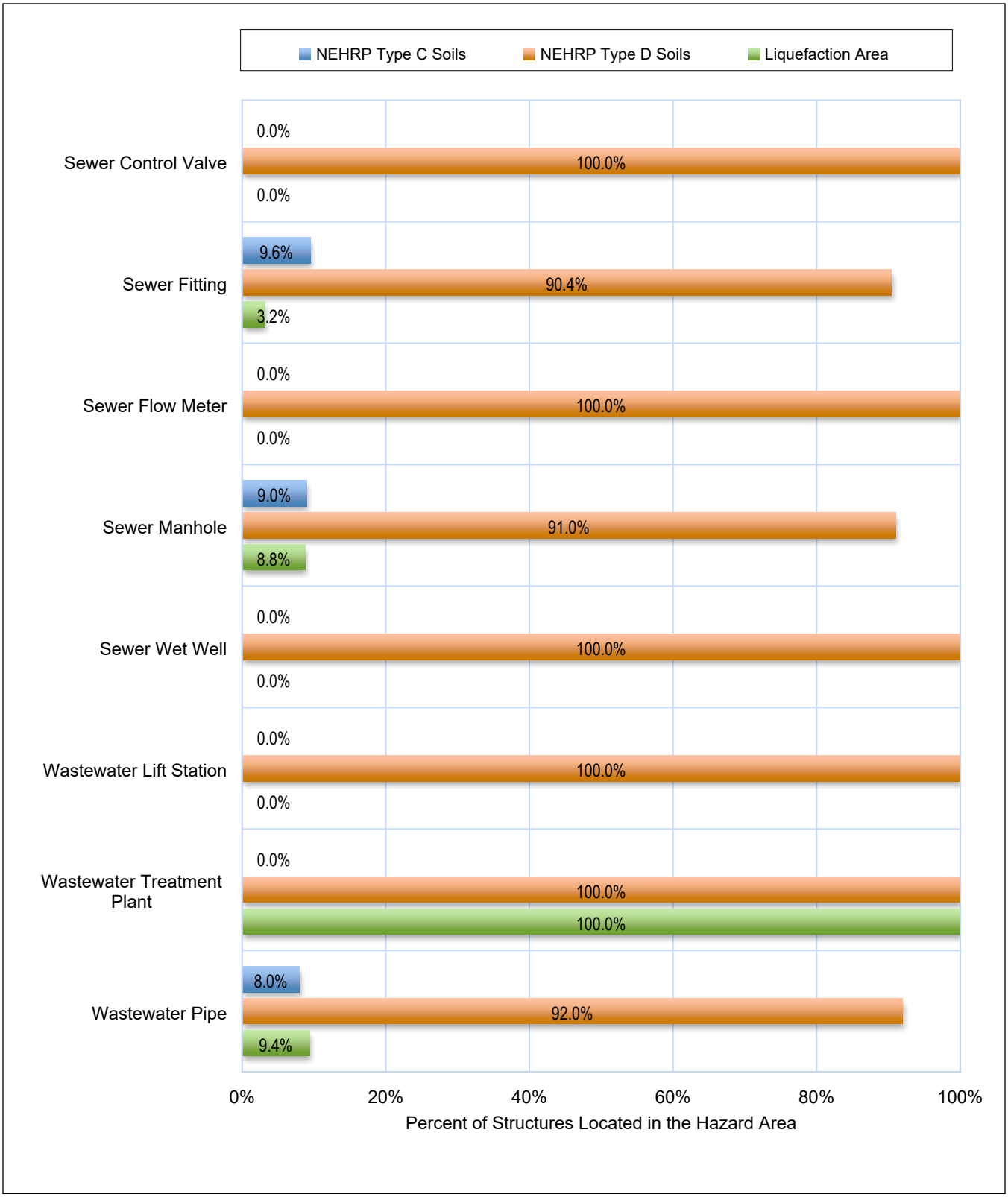

Figure 8-9. Percent of District Wastewater Structures Exposed to the Earthquake Hazard

8.4 VULNERABILITY

8.4.1 Scenarios Evaluated

After reviewing potential impact data provided by USGS ShakeMaps for the region, the Steering Committee identified the following earthquake scenarios to analyze for this assessment:

- A Magnitude-7.16 event on the Sierra Madre fault with an epicenter approximately 14 miles east of La Crescenta. (see Figure 8-10 and Figure 8-11)
- A Magnitude-6.9 event on the Verdugo fault with an epicenter located within La Crescenta. (see Figure 8-12 and Figure 8-13)
- A Magnitude-6.95 event on the Puente Hills fault with an epicenter approximately 8 miles south-southeast of La Crescenta. (see Figure 8-14 and Figure 8-15)
- A Magnitude-6.89 event on the Northridge fault with an epicenter approximately 20 miles west-northwest of La Crescenta. (see Figure 8-16 and Figure 8-17)
- A Magnitude-6.71 event on the Raymond fault with an epicenter approximately 9.5 miles southeast of La Crescenta. (See Figure 8-18 and Figure 8-19)
- The standard Hazus 100-year probabilistic event (see Figure 8-20 and Figure 8-21)

8.4.2 Level of Damage to Structures

Hazus classifies the vulnerability of structures to earthquake damage in five categories: no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a vulnerability category to each district asset. The estimates of damage level were then used to estimate the dollar cost of damage to structures and their contents. Detailed results for each facility are provided in Appendix C. Table 8-6 summarizes the results for structures.

Table 8-6. Earthquake Scenario Loss Estimates for District Structures

	Average Probability of Damage to Structure					
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage	Total Damage
Potable Water Facilities						
Sierra Madre M7.1	8.07%	27.65%	28.75%	23.93%	11.58%	$42,287,519
Verdugo M6.9	5.76%	24.97%	33.16%	24.69%	11.40%	$44,298,868
Puente Hills M6.95	7.68%	27.26%	31.90%	24.77%	8.37%	$39,328,636
Northridge M6.89	48.65%	29.30%	12.72%	7.86%	1.45%	$11,550,512
Raymond M6.71	41.50%	30.58%	15.19%	10.60%	2.10%	$15,357,719
100-Year Probabilistic	54.84%	19.28%	12.85%	10.63%	2.38%	$15,294,107
Wastewater Facilities						
Sierra Madre M7.1	23.30%	39.56%	21.69%	12.43%	3.01%	$357,502
Verdugo M6.9	12.12%	39.66%	32.35%	12.84%	3.01%	$375,478
Puente Hills M6.95	8.75%	36.80%	38.12%	13.30%	3.02%	$367,494
Northridge M6.89	56.40%	29.10%	4.28%	8.16%	2.04%	$178,033
Raymond M6.71	30.78%	37.06%	17.58%	11.70%	2.85%	$267,366
100-Year Probabilistic	59.33%	20.79%	8.09%	9.44%	2.34%	$198,536

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Figure 8-10. Potable Water System - Sierra Madre M7.1 Earthquake Scenario

Insert Map

Figure 8-11. Wastewater System - Sierra Madre M7.16 Earthquake Scenario

Insert Map

Figure 8-12. Potable Water System - Verdugo M6.9 Earthquake Scenario

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Figure 8-13. Wastewater System - Verdugo M6.9 Earthquake Scenario

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Figure 8-14. Potable Water System - Puente Hills M6.95 Earthquake Scenario

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Figure 8-15. Wastewater System - Puente Hills M6.95 Earthquake Scenario

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Figure 8-16. Potable Water System - Northridge M6.89 Earthquake Scenario

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Figure 8-17. Wastewater System - Northridge M6.89 Earthquake Scenario

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Figure 8-18. Potable Water System - Raymond M6.71 Earthquake Scenario

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Figure 8-19. Wastewater System - Raymond M6.71 Earthquake Scenario

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Figure 8-20. Potable Water System - 100-Year Probabilistic Earthquake Scenario

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Figure 8-21. Wastewater System - 100-Year Probabilistic Earthquake Scenario

8.4.3 Level of Damage to Pipelines

For pipelines, Hazus estimates earthquake damage in several categories: number of repairs needed (leaks and breaks), days required to implement repairs, and economic loss. Table 8-7 summarizes the results for pipelines.

Table 8-7. Earthquake Scenario Loss Estimates for District Pipelines

Earthquake Scenario	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
Potable Water Pipelines							
Sierra Madre- M7.16	168.7	49.9	218.6	48.2	28.5	76.7	$1,592,008
Verdugo M6.9	143.3	46.5	189.8	40.9	26.6	67.5	$1,414,099
Puente Hills-M6.95	72.7	27.9	100.6	20.8	16.0	36.7	$782,375
Northridge-M6.89	17.4	5.7	23.1	5.0	3.2	8.2	$172,249
Raymond- M6.71	25.8	9.1	34.9	7.4	5.2	12.6	$265,379
100-Year Probabilistic	18.2	6.3	24.5	5.2	3.6	8.8	$185,378
Wastewater Pipelines							
Sierra Madre- M7.16	108.4	31.8	140.3	31.0	18.2	49.2	$1,019,510
Verdugo M6.9	93.6	30.8	124.5	26.8	17.6	44.4	$930,592
Puente Hills-M6.95	49.7	19.8	69.5	14.2	11.3	25.5	$545,426
Northridge-M6.89	11.2	3.5	14.7	3.2	2.0	5.2	$107,913
Raymond- M6.71	21.3	8.5	29.7	6.1	4.8	10.9	$233,037
100-Year Probabilistic	12.2	4.5	16.6	3.5	2.6	6.0	$127,972

8.4.4 Time to Return Structures to Functionality

Hazus estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, Hazus may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The analysis of CVWD structures was performed for all modeled earthquake scenarios for each individual facility found to be damaged. Detailed results for each facility are provided in Appendix C. Table 8-8 summarizes the results for structures.

8.5 DEVELOPMENT TRENDS

The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by the County of Los Aneles, the Cities of Glendale and La Cañada Flintridge, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. Applications of these codes and standards to any new or redeveloped District assets will reduce the risk of potential impacts from earthquakes.

Table 8-8. Time to Return Structures to Functionality

	% Functionality					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Potable Water Facilities						
Sierra Madre M7.1	36.46	58.88	67.44	70.56	77.33	87.57
Verdugo M6.9	33.58	57.46	66.82	70.12	77.17	87.76
Puente Hills M6.95	36.12	59.83	69.56	72.82	79.55	89.34
Northridge M6.89	69.46	85.14	91.34	92.87	94.70	97.36
Raymond M6.71	64.19	81.33	88.49	90.57	93.25	96.98
100-Year Probabilistic	70.39	83.29	88.51	90.27	92.51	96.07
Wastewater Facilities						
Sierra Madre M7.1	38.72	72.18	85.07	87.08	91.83	98.38
Verdugo M6.9	29.02	65.60	83.93	86.75	91.57	98.38
Puente Hills M6.95	25.80	61.75	82.80	86.27	91.05	98.32
Northridge M6.89	66.50	86.55	90.20	91.30	94.18	98.75
Raymond M6.71	45.43	74.22	85.13	87.70	91.98	98.40
100-Year Probabilistic	67.27	83.38	88.57	89.93	93.13	98.53

8.6 SCENARIO

With the abundance of fault exposure in southern California, the potential scenarios for earthquake activity are many. An earthquake does not have to occur within the planning area to have a significant impact on the people, property, and economy of the planning area.

Any seismic activity of 6.0 or greater on faults within the planning area would have significant impacts throughout the planning area. Potential warning systems could give approximately 40 seconds notice that a major earthquake is about to occur. This would not provide adequate time for preparation. Earthquakes of this magnitude or higher would lead to massive structural failure of property on NEHRP C, D, E, and F soils. Levees and revetments built on these poor soils would likely fail, representing a loss of critical infrastructure. These events could cause secondary hazards, including landslides and mudslides that would further damage structures. River valley hydraulic-fill sediment areas are also vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction would occur in water-saturated sands, silts, or gravelly soils.

8.7 ISSUES

Important issues associated with an earthquake include the following:

- The District has numerous critical assets with a high degree of vulnerability to earthquake.
- Approximately 10% of the District's potable water facilities and 4% of its wastewater facilities are exposed to potential impacts from liquefaction.
- The average damage from the scenario earthquakes represents 22% of the replacement cost of all identified critical assets for the District.
- On the average, the District would take up to 3 days following a scenario event to restore at least 70% functionality of its critical potable water and wastewater facilities.

- On average, the District would need to perform up to 78 pipeline repairs (leaks and breaks) resulting in up to 28 days of functional down time to make those repairs. The average cost to make these repairs is estimated to be $600,000.
- Based on the modeling of critical facility performance performed for this plan, a high number of facilities in the planning area are expected to have complete or extensive damage from scenario events. These facilities are prime targets for structural retrofits.
- The District should consider the enhancement continuity of operations plans to use the information on risk and vulnerability contained in this plan.
- Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.
- Earthquakes could trigger other natural hazard events such as dam failures and landslides, which could severely impact the planning area.

9. FLOOD

9.1 GENERAL BACKGROUND

9.1.1 River Flooding

River flooding occurs when a river rises to overflow its natural banks due to causes such as prolonged, general rainfall, locally intense thunderstorms, snowmelt, or ice jams.

Measuring Floods on Rivers

River flooding is measured using a discharge probability, which is the probability that a certain river discharge (flow) will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for different discharge levels. The flow that historical data show to have a 1 percent chance of being equaled or exceeded in any given year is called the 1-percent-annual-chance flood (commonly called the 100-year flood). Also called the "base flood," this flood event is a regulatory standard used in assessing flood risk, regulating new development, and setting requirements for purchasing flood insurance.

Discharge probabilities have an inverse relationship to river flows—that is, a lower probability indicates a higher flow. The 0.2-percent-annual chance flood represents (commonly called the 500-year flood) a higher river flow than a 1-percent-annual-chance flood. These probabilities reflect statistical averages only; it is possible for two or more low-probability floods to occur in a short time period. The probabilities also can vary along a single river: the same storm event can cause a 1-percent-annual-chance flood at one location on a river and only a 10-percent-annual-chance flood at a point further upstream or downstream.

River Floodplains

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon. When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce, and residential development.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also

provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

Floodplains can support ecosystems that are rich in plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive, and larger species enter a rapid breeding cycle. Opportunistic feeders (particularly birds) move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick growing compared to non-riparian trees.

Floodplain Mapping

The extent of the floodplain during a 1-percent-annual-chance flood is called the special flood hazard area and is used as a regulatory boundary by many agencies. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

Effects of Human Activities

Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

9.1.2 Urban Flooding

Drainage facilities in urbanized areas consists of series of pipes, roadside ditches, and channels. Urban flooding occurs when these conveyance systems lack the capacity to convey rainfall runoff to nearby creeks, streams, and rivers. As drainage facilities are overwhelmed, roads and transportation corridors become conveyance facilities. The key factors that contribute to urban flooding are rainfall intensity and rainfall duration. Topography, soil conditions, urbanization and groundcover also play an important role.

Urban floods can be a great disturbance of daily life in urban areas. Roads can be blocked, and people may be unable to go to work or school. Economic damage can be high, but the number of casualties is usually limited, because of the nature of the flood. On flat terrain, the flow speed can be low, and people may still be able drive through the flood. The water may rise relatively slowly and usually does not reach life endangering depths.

Urban floods can occur suddenly as flash floods after a brief but intense downpour. In these cases, they can move rapidly, end suddenly, and occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body). Although the duration of these events is usually brief, the damage they cause can be severe. It is this type of flooding that provides the greatest risk to CVWD facilities.

9.1.3 Secondary Hazards

The most problematic secondary hazard for riverine flooding is bank erosion, which in some cases can be more harmful than actual flooding. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers, or storm sewers.

9.2 HAZARD PROFILE

Low-lying areas near the coast are prone to flooding. In Los Angeles County, this includes the ports of Los Angeles and Long Beach, as well as Marina del Rey. Other low-lying areas prone to flooding from heavy rains include communities in the Santa Monica Mountains Coastal Zone and in the Antelope Valley. Communities in the lower reaches of rivers are also at risk of flooding from breaches in upstream levees during heavy storms. This includes communities near the Los Angeles and San Gabriel Rivers (Los Angeles County, 2021). Although there is a countywide flood control system, the system is often inadequate for dealing with runoff from major storms.

Flooding in the planning area is typically caused by high-intensity, short-duration (1 to 3 hours) storms concentrated on a stream reach with already saturated soil. Flooding is predominantly confined within traditional riverine valleys. Locally, some natural or manmade levees separate channels from floodplains and cause independent overland flow paths. Occasionally, railroad, highway, or canal embankments form barriers, resulting in ponding or diversion of flows. Some localized flooding not associated with stream overflow can occur where there are no drainage facilities to control flows or when runoff volumes exceed the design capacity of drainage facilities.

9.2.1 Principal Flooding Sources

In Southern California, most flooding is the result of heavy precipitation over one or two days. Short streams and steep watersheds emptying onto lowlands that may be heavily populated produce large volumes of water in short periods, and damage is often severe. The problem is sometimes compounded by the denuding of large areas of watershed by fire during the previous season.

The Federal Emergency Management Agency (FEMA) has created Flood Insurance Rate Maps to show areas at high risk of flooding. High risk areas have at least a 1% annual chance of flooding. These areas are also called “a 100-year floodplain”. Similarly, an area that has at least a 0.2% annual chance of flooding is also called “a 500-year floodplain.” Properties within the 100-year floodplain are required to have flood insurance as a prerequisite for federally backed mortgages; properties within the 500-year floodplain are not required to have flood insurance to qualify for federally backed mortgages. The CVWD service area has no areas mapped by FEMA as 100-year of 500-year floodplain.

Heavy rains in areas affected by wildfire can result in mud and debris flows. As wildfire season lengthens and extends into California's wet season when begins in October, heavy rains that follow wildfires are becoming more common. These post-wildfire rains may create a new hazard as they wash debris from damaged and destroyed properties, burnt vegetation, and soil from landscapes down canyons.

These mudflows are more likely to occur after wildfires because hillsides are more likely to erode; vegetation roots that held the soil on hillsides in place are no longer present. As an example, during the Station Fire in 2009, CVWD experienced these cascading effects of wildfire and heavy rains in the form of mudflows after the devastating fire (Los Angeles County, 2009).

9.2.2 Past Events

Los Angeles County has experienced seven flooding events since 1969 for which federal disaster declarations were issued, as summarized in Table 9-1. Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Many flood events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for flooding. The sections below describe significant recent flood events in Los Angeles County.

Table 9-1. History of Flood Events

Date	Declaration #	Type of event
1/18 – 1/23/2017	DR-4305	Severe winter storms, flooding, and mudslides
1/5 – 3/20/1993	DR-979	Severe storm, winter storm, mud & landslides, flooding
2/10 – 2/18/1992	DR-935	Snowstorm, heavy rain, high winds, flooding, and mudslide
1/17 – 1/22/1988	DR-812	Severe storms, high tides, and flooding
1/8/1980	DR-615	Severe storms, mudslides, and flooding
2/15/1978	DR-547	Coastal storms, mudslides, and flooding
1/26/1969	DR-253	Severe storms and flooding

Source: FEMA, 2020

January 18 – 23, 2017 Winter Storms

A series of storms pounded Southern California, dropping about 4 inches of rain on Los Angeles. Flash flood watches and warnings were in effect for swaths of greater Los Angeles and across Southern California where multiple roads were closed Sunday or blocked by fallen trees. Traffic was diverted off Interstate 110 south of downtown Los Angeles because of water flowing across lanes. The 710 Freeway was also closed because of flooding (Associated Press, 2017).

January – March 1993 Winter Storms

From January 6 to February 28, 1993, a series of storms produced 20 to 40 inches of rain over much of the southern California coastal and mountain areas and more than 52 inches at some stations in the San Bernardino Mountains. These storms, which coincided with a reappearance of weak "El Nino" conditions, were driven by an atmospheric low-pressure system off the coast of northern California and Oregon. In southern California, precipitation intensified because a high-pressure area that extended over Alaska, the Gulf of Alaska, and the Western States concentrated this low-pressure system farther south than usual and held it in place just offshore. Tropical moisture was supplied to the arriving storms from the southern jet stream, which crossed the coast from

the southwest at about the latitude of San Diego (USGS, 1993). Floods during this period caused $14 million in damages to Los Angeles County (US Deadly Events, 2020).

February 10 – 18, 1992 Storm

During February 1992, a series of relatively warm storms passed eastward across southern California, yielding intense precipitation that triggered widespread landslides, flooding, property damage, and loss of life. These storms were triggered by an intense low-pressure system off northern California that deepened as its eastward progress was initially blocked by a high-pressure ridge across western North America. Debris flows occurred where cumulative precipitation exceeded 12 inches and when sustained intensities exceeded an inch per hour. Stream response was rapid, particularly in urban areas where impermeable surfaces and storm drains fed concrete stream channels. Some streams saw recurrence intervals for peak discharge of between 8 and 24 years (Taylor and Francis Online, 2020).

January 17 – 22, 1988 Severe Storms

In January 1988, a winter storm swept away miles of sand, leaving in its place a swath of destruction along the shore. Breakers 25 feet high pounded a 135-mile stretch of coast from Santa Barbara to San Diego counties. High tides combined with 20-foot waves and strong winds to whisk away as much as 10 feet of sand from beachfront homes north of Laguna Beach. The storm was blamed for eight deaths and $68 million in property damage in Southern California, including $16 million in Redondo Beach (Armstrong and Flick, 1989). Orange, Los Angeles, and San Diego Counties were declared emergency areas (Los Angeles Times, 1993).

January 8, 1980 Severe Storms

Flooding was caused by two severe storms in January 1980 that soaked soils, decreased unfilled reservoir capacities, and caused extensive damage along coastal streams of Southern California (USGS, 1991).

February 15, 1978 Coastal Storms

During February 8 – 10, 1978, heavy rains fell on the southern San Joaquin Valley and Los Angeles Basin and surrounding mountains. The resultant flooding, flash flooding, and mudslides caused widespread damage and 20 deaths. Property damage from the storm totaled $43 million in the Los Angeles area and $40 million in the southern San Joaquin Valley—the latter mostly due to flooding of agricultural lands. Eight counties, including Orange, were declared federal disaster areas (NWS, 1978).

January 26, 1969 Severe Storms

Intense floods in central and southern California due to storms that occurred between January 18 and February 25 caused severe damage over a large area. The major flood-affected area includes the basins of many streams that have their sources in the central and south-coastal ranges, in the southern part of the San Joaquin Valley, and the southern Sierra Nevada foothills from the Kern River basin on the south to the Mariposa Creek basin north of Fresno (USGS, 1975).

Historical Flooding in Los Angeles County

Flood events that occurred between 1914 and 1934 were some of the most economically devastating floods the Los Angeles area historically experienced. The damages are estimated to have cost over $1.1 billion in 2020

dollars. These flood events prompted the Federal Government to allocate funds in the Flood Control Act of 1936 to assist Los Angeles County in developing and expanding flood control infrastructure, including channelizing 52 miles of the Los Angeles River (LAR). Construction of the channel occurred between 1936 and 1959 (Army Corps of Engineers, 2021).

9.2.3 Location

The April 26, 2018, Los Angeles County Digital Flood Insurance Rate Maps are FEMA's official delineation of special flood hazard areas for all of Los Angeles County. Based on these maps, no portion of the CVWD service area has any mapped 100-year or 500-year floodplain. While there are occurrences of urban drainage flooding within the service area, there are no available maps of the extent and/or location of this type of flooding. With no available spatial data on extent and location of the flood hazard, all components of this hazard profile are qualitative. Figure 9-1 shows the FEMA Mapped Special Flood Hazard Areas within LA County near the CVWD service area.

9.2.4 Frequency

Los Angeles County has experienced seven flood events that triggered a federal disaster declaration since 1969, and average of one such flood event every 7.4 years. Records show that that the County can expect to experience some degree of localized flooding annually. For the risk ranking scenario in this plan, the District chose to assign a probability value of "high" (an event to likely occur within 25 years) as the appropriate frequency probability for the flood hazard. This is representative of the probability for the urban drainage flooding that can occur within the CVWD service area.

9.2.5 Severity

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak discharges. For urban drainage flooding, slope (gradient) and impervious surfaces can increase the velocities of surface water flows. As an illustration of the power of water, 6 inches of flood water moving at a velocity of 3 Ft/Sec or greater can mover a standard sized passenger vehicle.

9.2.6 Warning Time

The warning time that a community has to take action to protect lives and property from a flooding threat is a function of the time between the first predictions of heavy rainfall, the first rainfall, and the first occurrence of flooding. Each watershed has unique qualities that affect its response to rainfall. A hydrograph, which is a graph or chart of stream flow in relation to time (see Figure 9-2), is a useful tool for examining a stream's response to rainfall. Once rainfall starts falling over a watershed, runoff begins, and the stream begins to rise. Water depth in the stream channel (stage of flow) will continue to rise in response to runoff even after rainfall ends. Eventually, the runoff will reach a peak and the stage of flow will crest. At this peak, the stream stage remains at a constant level until it begins to fall and eventually subside to a level below flooding stage. The length of time that floodwaters remain above flood stage is an important characteristic of the flood hazard.

Insert Map

Figure 9-1. Surrounding FEMA Flood Zones

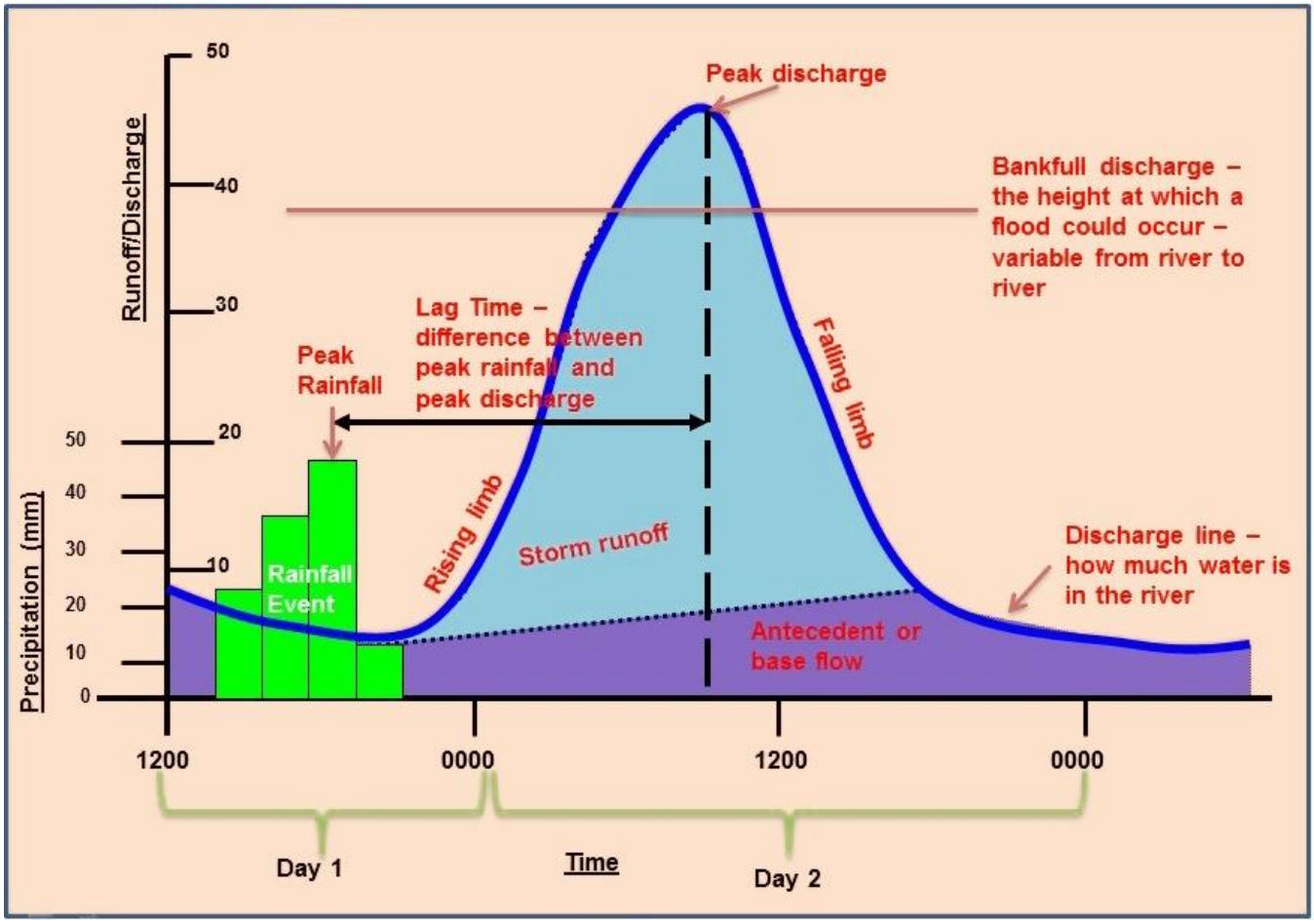


Figure 9-2. Example Hydrograph

Serious flooding usually occurs with warning due to the sequential pattern of meteorological conditions needed to cause serious flooding. Warning times for river and stream floods can be between 24 and 48 hours. Flash flooding can be less predictable, but communities can be warned of the potential for flash flooding to occur.

Within the Greater Los Angeles County Basin, the Los Angeles County Flood Control District and U.S. Army Corps of Engineers share a joint responsibility in managing flood risk. The Flood Control District is the main regional agency able to address large regional drainage needs and uses available funds to operate and maintain the existing flood control facilities and systems that transect the various cities. During years of heavy rainfall, the existing flood control system has largely prevented serious flooding that once plagued the Los Angeles area many years ago. The District's municipal flood protection and water conservation system is one of the largest in the world and includes 14 major dams and reservoirs, 487 miles of open channels, 162 debris dams, 2,919 miles of underground storm drain and more than 80,000 catch basins. The District boundaries encompass 2,752 square miles, 6 major watersheds and 85 cities. Planning efforts to rehabilitate flood control facilities also considers other potential beneficial uses of those facilities which include environmental ecosystem restoration, enhancement of water quality, and recreation amenities.

Warning Notification Systems within CVWD

CVWD currently uses the platform Nixle to provide alerts to customers about any service disruptions. Alert LA County is a free mass notification system for Los Angeles County residents and businesses. The Sheriff's Department uses Alert LA County to contact residents if there is an emergency or disaster in the community. The system sends shelter-in-place instructions, evacuation, and other emergency messages. It has accessibility features for people with disabilities and others with access and functional needs. Users can also select your preferred language for notifications (Los Angeles County, 2021).

9.3 EXPOSURE AND VULNERABILITY

None of the CVWD service area or District critical assets are exposed or vulnerable to any mapped flood hazard. However, the absence of mapped flood inundation areas does not mean there is no flood risk. While District assets that are sub-terranean (pipes) are not typically considered too vulnerable to flooding, they can be exposed by erosion and scour caused by high velocity stormwater flows. Above ground assets can become inundated by flood waters and become inoperable, especially assets that rely of electricity to operate (wells, pump stations, treatment facilities, etc.). Power interruption associated with flooding could be s significant source of vulnerability for CVWD assets.

9.4 DEVELOPMENT TRENDS

The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by Los Angeles County , the City of La Cañada Flintridge, or the City of Glendale, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. The County and cities of La Cañada Flintridge and Glendale also participate in the National Flood Insurance Program (NFIP) and have adopted floodplain management standards pursuant to that program's requirements. Applications of these codes and standards to any new or redeveloped District assets will reduce the risk of potential impacts from flood.

9.5 SCENARIO

The major flooding causes in the District are short-duration, high-intensity storms that would cause urban stormwater runoff that exceed the capacity of the stormwater management infrastructure within the CVWD service area. Water courses in the service area can flood in response to a succession of intense winter rainstorms, usually between early November and late March. A series of such weather events can cause severe flooding in the District due to the large percentage of impervious area and the age and capacity of the drainage system. The worst-case scenario is a series of storms that flood numerous drainage basins in a short time. The debris basins upstream of the District service area could be overtopped if they are full of debris and sediments, acting like small dam failure events. This could overwhelm response and floodplain management capabilities within the District. Major roads could be blocked, preventing critical access to District assets by District personnel, resulting in interruption of critical functions. In the case of multi-basin flooding, floodplain management resources would not be able to make repairs quickly enough to restore critical facilities and infrastructure.

9.6 ISSUES

The Planning Team has identified the following flood-related issues relevant to the planning area:

- There is currently no extent/location flood hazard mapping available for the CVWD service area from any source.
- Debris basins in the District service area could overtop if they become filled with debris and sediment.
- Due to the lack of flood hazard mapping, the understanding of the risk from urban drainage flooding within the CVWD service area is low.
- Planning tools whose use depends on flood hazard mapping are less effective due to the deficiencies in the currently available mapping.
- There needs to be a sustained effort to gather historical damage data, such as high-water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- Indirect impacts from flooding outside the CVWD service area such as power interruption could impact District operations.
- Residents need to continue to be educated about flood preparedness and the resources available during and after floods ("*If it can rain, it can flood*").
- The potential impact of climate change on flood conditions needs to be better understood.

10. LANDSLIDE AND DEBRIS FLOW

10.1 GENERAL BACKGROUND

Ground saturation by water, steepening of slopes by erosion or construction, alternate freezing and thawing, and earthquake shaking are all factors that contribute to landslides. These factors can all be exacerbated following wildfires that denature hillsides and bake the soils, making them prone to debris flows. Landslides are typically associated with periods of heavy rainfall or rapid snow melt. Rain-saturated hill slopes and increased groundwater pressure on porous hillsides are triggering agents of slope failure. In areas burned by forest and brushfires, a lower threshold of precipitation may initiate landslides.

10.1.1 Landslide and Debris Flow Types

Landslides are commonly categorized by the type of initial ground failure. The most common is the shallow colluvial slide, occurring particularly in response to intense, short-duration storms. The largest and most destructive are deep-seated slides, although they are less common than other types.

Debris flows—sometimes referred to as mudslides or mud flows—are rivers of rock, earth, organic matter, and other soil materials saturated with water. Debris flows develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud. The consistency of debris flows ranges from watery mud to thick sludge that can carry large items such as boulders, trees, and cars. Debris flows from many sources can combine into channels that, with the addition of water, sand, mud, boulders, trees, and other materials, can become greatly more destructive. The debris carried by a debris flow has the potential to spread over a broad area, wreaking havoc in developed communities.

A debris avalanche is a fast-moving debris flow that travels faster than about 10 miles per hour (mph). Speeds of more than 20 mph are not uncommon, and speeds of more than 100 mph, although rare, can occur. Debris avalanches can travel many miles from their source, picking up large objects in their path and they can have many times the hydraulic force of water due to the mass of material included in them. They can be among the most destructive events in nature.

Landslides also include the following:

- Rock Falls—Blocks of rock that fall away from a bedrock unit without a rotational component
- Rock Topples—Blocks of rock that fall away from a bedrock unit with a rotational component
- Rotational Slumps—Blocks of fine-grained sediment that rotate and move down slope

- Transitional Slides—Sediments that move along a flat surface without a rotational component
- Earth Flows—Fine-grained sediments that flow downhill and typically form a fan structure
- Creep—A slow-moving landslide often only noticed through crooked trees and disturbed structures
- Block Slides—Blocks of rock that slide along a slip plane as a unit down a slope

10.1.2 Landslide and Debris Flow Modeling

Two characteristics are essential to conducting an accurate risk assessment of the landslide hazard:

- The type of initial ground failure that occurs, as described above
- The post-failure movement of the loosened material ("run-out"), including travel distance and velocity

All current landslide models—those in practical applications and those more recently developed—use simplified hypothetical descriptions of landslide behavior to simulate the complex behavior of actual flow. The models attempt to reproduce the general features of the moving mass of material through measurable factors, such as base shear, that define a system and determine its behavior. Due to the lack of experimental data and the limited current knowledge about the behavior of the moving flows, landslide models use simplified parameters to account for complex aspects that may not be defined. These simplified parameters are not related to specific physical processes that can be directly measured, and there is a great deal of uncertainty in their definition. Some, but not all, models provide estimates of the level of uncertainty associated with the modeling approach.

Run-out modeling is further complicated because the movement of materials may change over the course of a landslide event, depending on the initial composition, the extent of saturation by water, the ground shape of the path traveled and whether there is additional material incorporated during the event.

10.1.3 Landslide and Debris Flow Causes

Landslides are caused by a combination of geological and climate conditions, as well as the encroaching influence of urbanization. In general, landslides are most likely during periods of higher than average rainfall. The ground must be saturated prior to the onset of a major storm for significant landslide to occur. Water is involved in nearly all cases; and human influence has been identified in more than 80 percent of reported slides. The following human-caused factors can contribute to landslide: change in slope of the terrain, increased load on the land, shocks, and vibrations, change in water content, groundwater movement, frost action, weathering of rocks, and removing or changing the type of vegetation covering slopes.

Excavation and Grading

Slope excavation is common in the development of home sites or roads on sloping terrain. Grading can result in some slopes that are steeper than the pre-existing natural slopes. Since slope steepness is a major factor in landslides, these steeper slopes can be at an increased risk for landslides. The added weight of fill placed on slopes can also result in an increased landslide hazard. Small landslides can be fairly common along roads, in either the road cut or the road fill. Landslides occurring below new construction sites are indicators of the potential impacts stemming from excavation.

Drainage and Groundwater Alterations

While permeable soils soak up rain and irrigation water, proper grading and drainage systems can collect water to protect slopes from oversaturation and slippage. Water flowing through or above ground is often the trigger for landslides. Any activity that increases the amount of water flowing into landslide-prone slopes can increase landslide hazards. Broken or leaking water or sewer lines can be especially problematic, as can water retention facilities that direct water onto slopes. Even lawn irrigation and minor alterations to small streams in landslide prone locations can result in damaging landslides. Drainage can be affected naturally by the geology and topography of an area. Development that results in an increase in impervious surface impairs the ability of the land to absorb water and may redirect water to other areas. Channels, streams, flooding, and erosion on slopes all indicate potential slope problems. Road and driveway drains, gutters, downspouts, and other constructed drainage facilities can concentrate and accelerate flow. Ground saturation and concentrated velocity flow are major causes of slope problems and may trigger landslides.

Changes in Vegetation

Following major brushfires, federal or state agencies typically seed denuded areas with wild plant seeds. This encourages vegetation growth, thereby stabilizing the barren soil and protecting the watershed from erosion. Areas that have experienced wildfire and land clearing for development may have long periods of increased landslide hazard.

10.1.4 Landslide and Debris Flow Management

While small landslides and flows are often a result of human activity, the largest are often naturally occurring phenomena with little or no human contribution. The sites of large landslides and debris flows are typically areas of previous landslide movement that are periodically reactivated by significant precipitation or seismic events. Such naturally occurring landslides can disrupt roadways and other infrastructure lifelines, destroy private property, and cause flooding, stream bank erosion and rapid stream channel migration.

Landslides and debris flows can create immediate, critical threats to public safety. Engineering solutions to protect structures on or near large active landslides are often expensive. In spite of their destructive potential, landslides can serve beneficial functions to the natural environment. They supply sediment and large wood to stream channel networks and can contribute to stream complexity and dynamic channel behavior critical for aquatic and riparian ecological diversity. Effective landslide management should include the following elements:

- Continuing investigation to identify natural landslides, understand their mechanics, assess their risk to public health and welfare, and understand their role in ecological systems
- Regulation of development in or near existing landslides or areas of natural instability through codes and ordinances.
- Preparation for emergency response to landslides to facilitate rapid, coordinated action among local, state, and federal agencies, and to provide emergency assistance to affected or at-risk residents
- Evaluation of options including landslide stabilization or structure relocation where landslides are identified as a threat to critical public structures or infrastructure

10.1.5 Secondary Hazards

Landslides are not generally known to result in secondary hazards. A landslide that blocks a river or stream does have the potential to cause flooding due to channel relocation.

10.2 HAZARD PROFILE

10.2.1 Past Events

Table 10-1 lists known landslide events that occurred in the vicinity of the planning area between 1970 and December 2020.

10.2.2 Location

The best predictor of where landslides might occur is the location of past landslides. These can be recognized by their distinctive topographic shapes, which can remain in place for thousands of years. Landslides recognizable in this fashion range from a few acres to several square miles. Most show no evidence of recent movement and are not currently active. A small portion of them may become active in any given year. Ancient dormant landslide sites can be reactivated by earthquakes or by exceptionally wet weather. Also, because they consist of broken materials and frequently involve disruption of groundwater flow, these dormant sites are vulnerable to construction-triggered sliding. As development has spread into the hillsides, unstable soil and erosion often contributes to landslides.

Factors that characterize landslide hazard areas include significant slope, weak rocks, and heavy rains. California's state geologist maps hazardous landslide areas for use by municipalities in planning and decision-making on grading and building permits. This program focuses on urban areas that experience heavy rainfall and that exhibit significant slopes and weak rocks. Figure 10-1 and Figure 10-2 show mapped landslide hazard areas.

10.2.3 Frequency

Landslides are often triggered by other natural hazards such as earthquakes, heavy rain, floods, or wildfires, so landslide frequency is often related to the frequency of these other hazards. According to the National Centers for Environmental Information storm events database and the Southern California Earthquake Data Center, the planning area has been impacted by earthquakes, wildfires, and/or severe storms at least once every other year since 1960, representing an annual probability of 50 percent. Given the preponderance of steep slopes and the frequency of contributory sources to landslides in the planning area, the probability of future occurrence can be considered equal to this 50-percent annual probability. Until better data is generated specifically for landslide hazards, this frequency is appropriate for the purpose of ranking risk.

Table 10-1. Landslide Events in and near the District Planning Area

Event Date	Event Type	FEMA Number	Description
12/6/2018	Debris Flow		Heavy rain over the Woolsey Fire burn scar resulted in a significant mud and debris flow across the Pacific Coast Highway. California Highway Patrol (CHP) reported Highway 1 (the Pacific Coast Highway) was closed around Leo Carrillo Beach due to a mud and debris flow.
1/9/2018	Debris Flow		In Burbank, heavy rain produced a significant debris flow which overflowed a debris basin. In all, three cars and one recreational vehicle were destroyed.
1/18 – 1/23/2017	Severe winter storms, flooding, and mudslides	4305	Storms flooded roads, triggered mudslides, and submerged vehicles.
1/17- 2/6/2010	Severe Winter Storms, Flooding, and Debris and Mud Flows	1884	A rainstorm triggered a mudslide along Ocean View Boulevard in the La Canada Flintridge burn area and others throughout the region.
10/21/2007 – 3/31/2008	Wildfires, Flooding, Mud Flows, and Debris Flows	1731	
2/16 – 2/23/2005	Severe Storms, Flooding, Landslides	1585	
12/27/2004- 01/11/2005	Severe Storms, Flooding, Debris Flows, and Mudslides	1577	
10/21/2003 – 3/31/2004	Wildfires, Flooding, Mud Flow and Debris Flow	1498	
2/13 – 4/19/1995	Severe Winter Storms, Flooding, Landslides,	1046	
1/3 – 2/10/1995	Severe Winter Storms, Flooding, Landslides, Mudflows	1044	
1/17/1994	Northridge Earthquake	1008	The earthquake caused more than 11,000 landslides throughout the region. The landslides led to several deaths.
10/26/1993 – 4/22/1994	Fires, Mud/Landslides, Flooding, Soil Erosion	1005	
1/5 – 3/20/1993	Severe Winter Storm, Landslides, & Flooding	979	
2/10 – 2/18/1992	Rain/Snow/Windstorms, Flooding, Mudslides	935	
10/1 – 11/20/1987	Earthquake and Aftershocks	799	
1/21 – 3/30/1983	Coastal Storms, Floods, Slides and Tornadoes	677	
1/08/1980	Severe Storms, Mudslides, Flooding	615	
2/15/1978	Coastal Storms, Mudslides and Flooding	547	Water and debris flowing down canyons led to 21 deaths and $50 million in damage.
2/9/1971	San Fernando Earthquake	299	

Sources: FEMA 2021; California Department of Conservation, Division of Mines and Geology 2021; NOAA, 2021

Insert Map

Figure 10-1. Potable Water System - Susceptibility to Deep-Seated Landslides

Insert Map

Figure 10-2. Wastewater System - Susceptibility to Deep-Seated Landslides

10.2.4 Severity

Landslides destroy property and infrastructure and can take the lives of people. They can pose a serious hazard to properties on or below hillsides. Landslides directly damage structures in two ways: disruption of structural foundations caused by differential movement/deformation of the ground upon which the structure sits, and the physical impact of debris moving down-slope against structures located in the debris flow's path. As a landslide breaks away from a slope, it deforms the ground into an undulating surface broken up by fissures and scarps. This deformation distresses foundations and structures situated on top of a landslide by settlement, cracking, and tilting. This can occur slowly, over years, or rapidly within days or hours. A water-saturated, fast-moving debris flow can destroy all in its path, collapsing walls and shifting structures off their foundations.

Slope failures in the United States result in an average of 25 lives lost per year and an annual cost to society of about $1.5 billion. Landslides and debris flows cause millions of dollars in cumulative damage to Southern California's homes, businesses, and infrastructure every year.

10.2.5 Warning Time

Landslides can occur suddenly or slowly. The velocity of movement may range from a slow creep of inches per year to many feet per second, depending on slope angle, material, and water content. Landslides and debris flows can be initiated by severe storms, earthquakes, wildfires, or human modification of the land. They can move rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Some methods used to monitor landslides can provide an idea of the type of movement and the amount of time prior to failure. It is also possible to determine what areas are at risk during general time periods. Assessing the geology, vegetation, and amount of predicted precipitation for an area can help in these predictions. However, there is no practical warning system for individual landslides. The current standard operating procedure is to monitor situations on a case-by-case basis and respond after the event has occurred.

When atmospheric river weather patterns occur, the risk and dangers of landslides and debris flows increase. Improved forecasting of such events could allow advanced warning to better prepare for and respond to potential slope failures and flood events. According to the USGS (website, 2021), landslide warning signs can include but are not limited to:

- Springs, seeps, or saturated ground in areas that have not typically been wet before.
- New cracks or unusual bulges in the ground, street pavements or sidewalks.
- Soil moving away from foundations.
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house.
- Tilting or cracking of concrete floors and foundations.
- Broken water lines and other underground utilities.
- Leaning telephone poles, trees, retaining walls or fences.
- Offset fence lines.
- Sunken or down-dropped road beds.
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content).
- Sudden decrease in creek water levels though rain is still falling or just recently stopped.

- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb.
- A faint rumbling sound that increases in volume is noticeable as the landslide nears.
- Unusual sounds, such as trees cracking or boulders knocking together, might indicate moving debris.

10.3 EXPOSURE

The risk assessment for landslide determined District assets that lie within each landslide susceptibility zone. Table 10-2 and Table 10-3 summarize the length of pipeline and number structures, respectively, in each mapped landslide susceptibility zone. Figure 10-3 and Figure 10-4 show the results for potable water and wastewater systems, respectively, as the percent of total planning area assets.

Transportation infrastructure in landslide susceptibility areas can see significant impacts from landside activity; however, this risk assessment does not evaluate transportation infrastructure because CVWD does not have the responsibility or ownership of the infrastructure that would be exposed, with the exception of access to its facilities.

10.4 VULNERABILITY

Loss estimation modeling is not available for the landslide hazard. Although complete historical documentation of the landslide threat in the planning area is lacking, the available history of landslides in the region suggests a significant vulnerability to such hazards.

Damage attributable to landslides has the potential to affect any exposed District assets. At this time all assets exposed to the landslide hazard are considered vulnerable until more information becomes available. A more in-depth analysis of mitigation measures taken to protect these facilities in the event of landslides should be done to determine if they could withstand the potential impacts. In the District's potable water and wastewater pipeline systems, pipes made of more brittle materials, such as clay or concrete, are more likely to be damaged by landslide movements than pipes of more ductile materials, such as steel, ductile iron, or PVC. Damage to access roads would hinder the District's ability to access critical assets that had sustained damage for repair.

10.5 FUTURE TRENDS IN DEVELOPMENT

The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by Los Angeles County, the City of La Cañada Flintridge, or the City of Glendale, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. The building code includes provisions for geotechnical analyses in steep slope areas that have soil types that are susceptible to landslide hazards. These provisions ensure that new construction is built to standards that reduce the vulnerability to landslide risk. Applications of these codes and standards to any new or redeveloped District assets will reduce the risk of potential impacts from landslides.

Table 10-2. Length of District Pipeline Within Landslide Hazard Areas

	Length of Pipe in Landslide Hazard Areas (feet)			
	Very High Susceptibility	High Susceptibility	Moderate Susceptibility	Low Susceptibility
Potable Water Pipeline				
Brittle Pipe	6,003	493,879	2,507	2,193
Ductal Pipe	1	6,350	0	0
Total	**6,004**	**500,229**	**2,507**	**2,193**
Wastewater Pipeline				
Brittle Pipe	5,703	309,772	2,488	1,814
Ductal Pipe	620	5,404	0	37
Total	**6,323**	**315,176**	**2,488**	**1,851**

Table 10-3. Number of District Structures Exposed to the Landslide Hazard

	Number of Exposed Structures in Landslide Susceptibility Zone			
	Very High Susceptibility	High Susceptibility	Moderate Susceptibility	Low Susceptibility
Potable Water Structures				
Building	0	3	0	0
Aeration Tower	0	2	0	0
Debris Basin	0	5	1	2
Emergency Interconnection	0	19	0	0
Fitting	18	1,738	8	8
Hydrant	7	624	7	3
Interconnection	0	8	0	0
Mixing Station	0	1	0	0
Motor Control Center	1	18	0	1
Pipeline Crossing	2	21	0	0
Potable Water Treatment Plant	0	8	2	0
Potable Water Valve	19	2,075	9	8
Pressure Reducing Station	0	7	0	0
Reservoir	1	14	1	2
Water Booster Pump Station	1	11	0	1
Well	0	9	0	0
Total	**49**	**4,563**	**28**	**25**
Wastewater Structures				
Sewer Control Valve	0	2	0	0
Sewer Fitting	85	6,015	41	27
Sewer Flow Meter	0	0	0	0
Sewer Manhole	25	1,100	8	5
Sewer Wet Well	0	1	0	0
Wastewater Lift Station	1	1	0	0
Wastewater Treatment Plant	0	0	0	0
Total	111	7,119	49	32

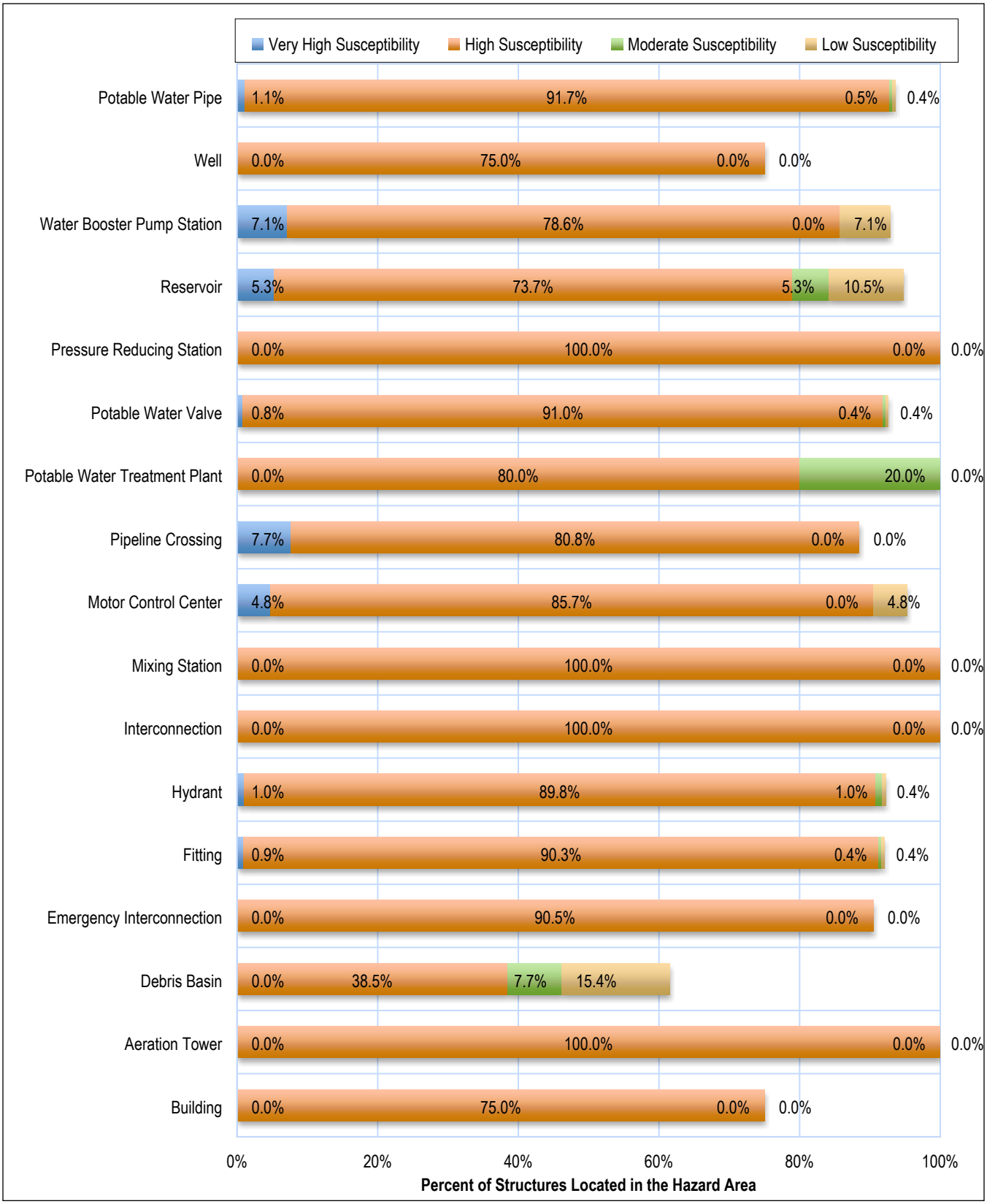


Figure 10-3. Percent of District Potable Water Facilities Exposed to the Landslide Hazard

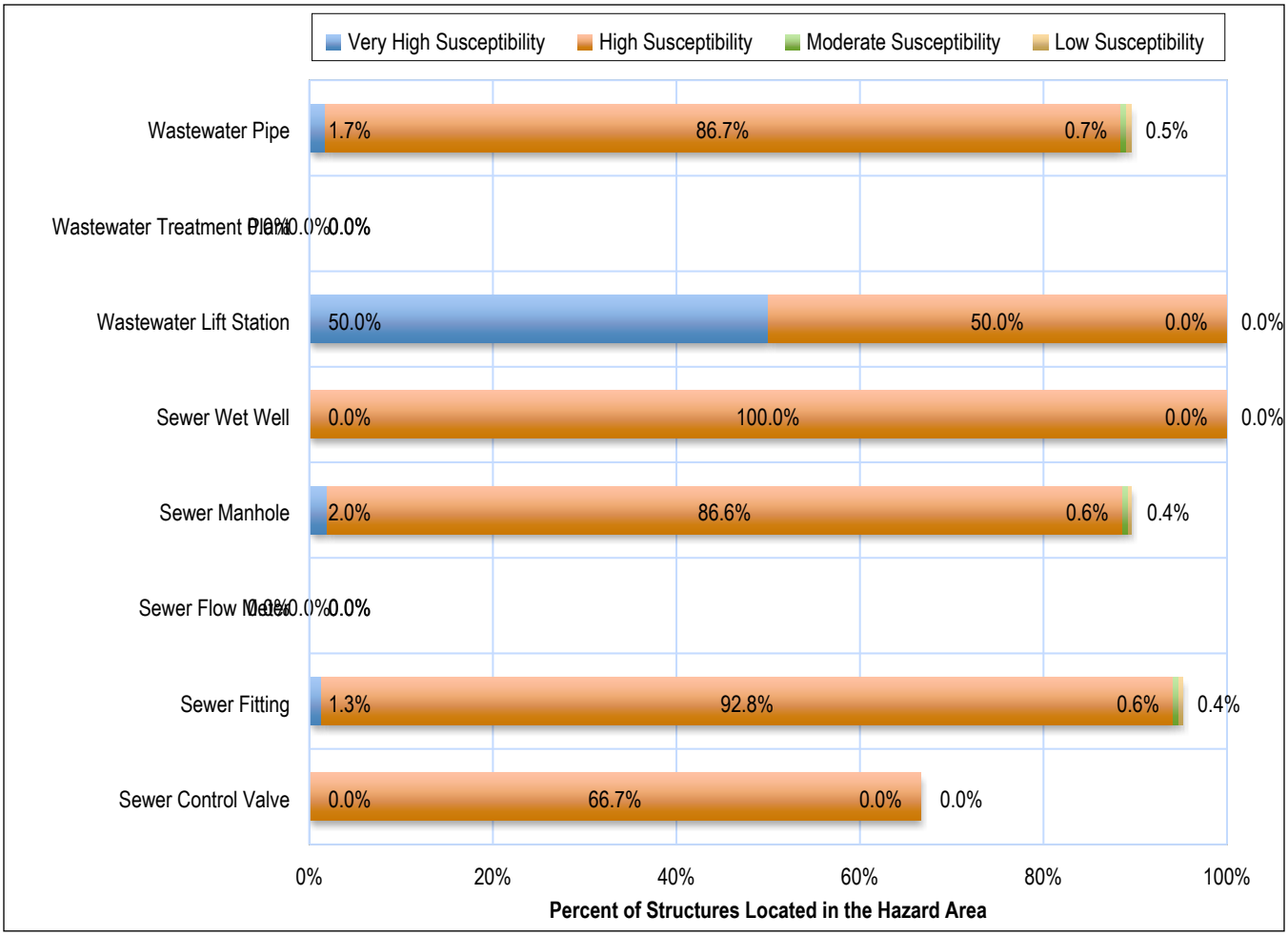


Figure 10-4. Percent of District Wastewater Facilities Exposed to the Landslide Hazard

10.6 SCENARIO

Major landslides in the planning area occur as a result of soil conditions that have been affected by severe storms, groundwater, wildfires, or human development. The worst-case scenario for landslide hazards in the planning area would generally correspond to a severe storm that had heavy rain isolated over a watershed denatured by wildfire. Landslides are most likely during late winter when the water table is high. After heavy rains from November to December, soils become saturated with water. Soils in watersheds impacted by wildfires tend to become impermeable due to the extreme heat exposure, which can lead to debris flows. This is especially true for soils with high clay content. Weakness and destabilization in the slope can occur when water that seeps downward through the upper soils that may consist of permeable sands and gravels and accumulates on impermeable silt. A short intense storm could cause saturated soil to move, resulting in landslides. As rains continue, the groundwater table rises, adding to the weakening of the slope. Gravity, poor drainage, a rising groundwater table and poor soil exacerbate hazardous conditions.

Landslides are becoming more of a concern as development moves outside of urban centers and into areas less developed in terms of infrastructure. Most are isolated events affecting specific areas, including private property and public infrastructure. Landslides can affect bridges that pass over landslide prone ravines and knock out rail

service through the planning area. Road obstructions caused by landslides would create isolation problems for people in sparsely developed areas. Property owners exposed to steep slopes may suffer damage to property or structures. Landslides carrying vegetation such as shrubs and trees may cause a break in utility lines, cutting off power and communication.

Continued heavy rains and flooding will complicate the problem further. As emergency response resources are applied to problems with flooding, they may be unavailable to assist with landslides occurring all over the planning area.

10.7 ISSUES

Important issues associated with landslides in the planning area include the following:

- Over 90% of the District's critical assets are located in a very high or high landslide susceptibility zone.
- Over 88% of the District's potable water and wastewater pipelines intersect a very high or high landslide susceptibility zone.
- Landslide activity within the CVWD service area could impact access to the District's critical assets.
- The high occurrence of wildfire activity within the planning area increases the probability for future debris flow potential.
- Mapping and assessment of landslide hazards are constantly evolving. As new data and science become available, assessments of landslide risk should be reevaluated.
- The impact of climate change on landslides is uncertain. If climate change impacts atmospheric conditions, then exposure to landslide risks is likely to increase.
- Landslides may cause negative environmental consequences, including water quality degradation.
- The risk associated with the landslide hazard overlaps the risk associated with other hazards such as earthquake, flood, and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.

11. SEVERE WEATHER

11.1 GENERAL BACKGROUND

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. The most common severe weather events affecting the District are extreme heat and high wind. Both types of severe weather are described in the following sections.

11.1.1 High Winds

High winds are generally short-duration events involving straight-line winds or gusts of over 50 mph, strong enough to cause property damage. High winds or a windstorm are especially dangerous in areas with significant tree stands and areas with exposed property, poorly constructed buildings, manufactured housing units, major infrastructure, and above-ground utility lines. A windstorm can topple trees and power lines, cause damage to residential, commercial, and critical facilities, and leave tons of debris in its wake.

Types of Damaging Winds

Damaging winds are classified as those exceeding 60 mph. Damage from such winds is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. There are seven types of damaging winds:

- **Straight-line winds—**Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts—**A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts—**A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts—**A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph.
- **Gust front**—A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho—**A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-

cooled air). The word "derecho" is of Spanish origin and means "straight ahead." Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.

- **Bow Echo**—A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

Santa Ana winds are a principal feature of Southern California weather. These are offshore winds, usually warm, blowing from the mountains to the coast, and occurring principally in fall and winter, with a frequency peaking in December. Santa Ana winds are marked by light coastal winds, clean air, and low humidity. They may last from a day to over a week. The Santa Ana condition is usually one of warm temperatures when the rest of the United States is in the grip of winter. High pressure builds over the Great Basin in fall and winter as cold air travels into that region from Canada. When the surface pressure gradient reaches or exceeds 10 millibars, as measured from Tonopah, Nevada, to Los Angeles, wind gusts can reach 70 mph in the mountains and below passes and canyons near the Southern California coast.

Santa Ana winds broadly affect the planning area. Winds tend to channel below specific passes and canyons, coming in gust clusters. High winds may blow in one neighborhood, while a few blocks away there are only gentle warm breezes. Offshore winds from the northeast or east must reach 30 mph or more below passes and canyons to reach minimum criteria for Santa Ana wind advisories. Typical wind speeds are in the 40 to 55 mph range; in extreme cases, winds can gust locally to over 100 mph.

Rating Wind Strength

As shown in Table 11-1 the Beaufort Wind Scale is an empirical measure that relates wind speed to observed conditions at sea or on land.

Table 11-1. Beaufort Wind Scale

Force	Wind (knots)	Classification	Appearance of Wind Effects On Land
0	< 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, considerable structural damage
11	56-63	Violent Storm	Seldom experienced on land
12	64+	Hurricane	Seldom experienced on land

Source: NOAA, NWS, Storm Prediction Center

11.1.2 Extreme Temperature

Extreme heat can be defined as temperatures that hover 10 ºF or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity. The National Weather Service (NWS) monitors a heat index that takes both temperature and humidity into account (see Figure 11-1).

Source: National Weather Service

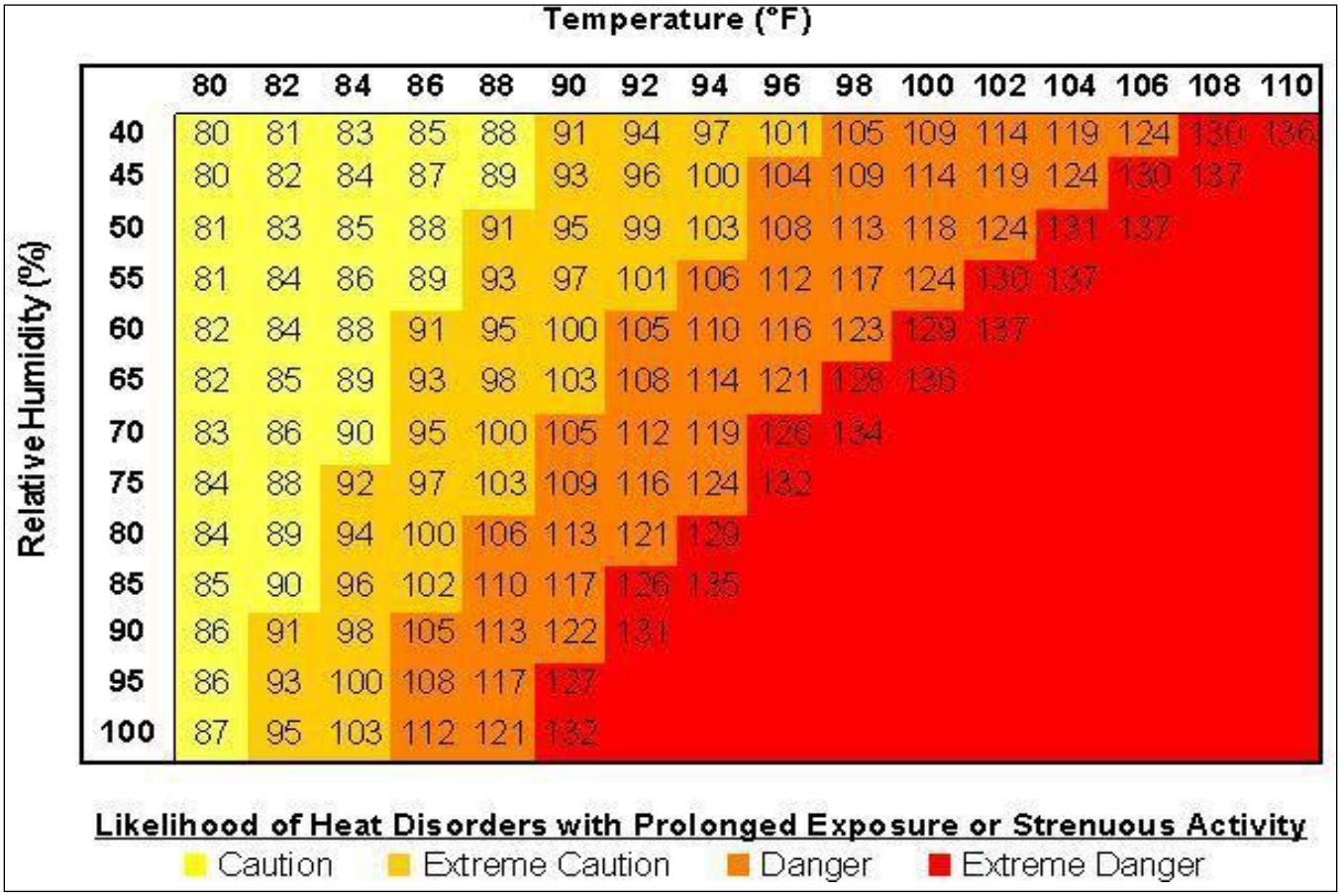


Figure 11-1. Extreme Heat Index

According to the *California Climate Adaptation Strategy*, heat waves have claimed more lives in California than all other declared disaster events combined. Despite this history, not a single heat emergency was proclaimed at the state or federal level between 1960 and 2016. Heat emergencies are often slow to develop and usually hurt vulnerable populations. It can take a number of days of oppressive heat for a heat wave to have a significant or quantifiable impact. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations.

The "urban heat island effect" can produce significantly higher nighttime temperatures where asphalt and concrete (which store heat longer) gradually release heat at night. Urban heat islands develop in urban areas where natural surfaces are paved with asphalt or covered by buildings. Radiation from the sun is absorbed by these surfaces during the day and re-radiated at night, raising ambient temperatures. Urban heat islands have high nighttime minimum temperatures compared to neighboring areas. Waste heat from air conditioners, vehicles, and other equipment contributes to the urban heat island effect.

11.1.3 Secondary Hazards

High winds and extreme heat may cause loss of power if utility service is disrupted. Both also may make communities more vulnerable to wildfire. The California Public Utilities Commission's current guidelines on Public Safety Power Shutoffs (PSPS) permits utilities to cut power to electrical lines in danger of failure to reduce the likelihood of those lines contributing to a wildfire. From 2013-2019, the three largest energy companies in the state conducted 33 PSPS de-energizations. A secondary hazard associated with extreme heat is poor air quality when stagnant atmospheric conditions trap humid air and pollutants near the ground.

11.2 HAZARD PROFILE

11.2.1 Past Events

Los Angeles County has not been included in any federal declarations for heat, high winds, or thunderstorm.

High Winds and Thunderstorm Winds

The planning area has experienced both high wind and thunderstorm wind events. The National Centers for Environmental Information storm events database lists the following wind events from 2000 to 2020:

- 312 high wind events, with 235 considered as damaging wind events.
- 32 thunderstorm events, with four events resulting in death or injury.
- High wind event, CVWD without electrical power for five days

On December 1, 2011, a strong north to northeast wind event crossed sections of Southern California. Widespread wind gusts between 60 and 70 mph were recorded in Ventura County and Los Angeles County. Widespread power outages were reported, especially across the San Gabriel Valley, where over 350,000 residents lost power. In Pasadena, at least 42 buildings were red-tagged due to wind damage. Numerous trees were uprooted or severely damaged from La Canada Flintridge to Monrovia. Strong cross winds at Los Angeles International Airport resulted in 23 flights being diverted to Ontario International Airport. Power at some sites was out for up to five days (National Oceanic and Atmospheric Administration, 2021).

Extreme Heat

According to the Western Regional Climate Center, the planning area averages 24 days a year with temperatures exceeding 90°F, and those days may be included in a heat wave event. A storm event database maintained by NOAA's National Centers for Environmental Information lists three excessive heat events in the planning area:

- **August 30-31, 2007**— From the 29th through the 31st, strong high pressure built over the southwest United States. With this pattern, above normal temperatures developed across the mountains and valleys of Southern California. An influx of monsoonal moisture from northern Mexico increased the relative humidity across the area. The combination of very hot temperatures and increased relative humidity produce heat index values between 105 and 112 degrees. The excessive heat resulted in numerous heat-related injuries and deaths. The heat wave extended into the first few days of September.
- **September 1-3, 2007**— The heat wave which started at the end of August continued into the first few days of September. The combination of above normal temperatures and relative humidity continued to

produce excessive heat conditions across sections of Southern California. At the end of the heat wave, 18 heat-related deaths were reported across Los Angeles County.

- **June 20 – 21, 2008**—The combination of strong high pressure centered over Arizona and weak offshore flow generated extreme heat conditions across Central and Southern California. Across many sections of the area, afternoon temperatures climbed to between 100 ºF and 114 ºF, setting numerous high temperature records. The extreme heat resulted in several power outages due to excessive electrical use. The remote automatic weather station sensor at Acton reported a heat index of greater than 100 degrees.

11.2.2 Location

Severe weather events have the potential to happen anywhere in the planning area. Extreme heat events may be exacerbated in the District where reduced air flow, reduced vegetation, and increased generation of waste heat can contribute to temperatures that are several degrees higher than in surrounding less urbanized areas. High wind and thunderstorm events affect an entire region.

11.2.3 Frequency

The severe weather events for the planning area are often related to high winds associated with severe storms and Santa Ana winds. Based on a record of 235 damaging wind events (over 60 mph) in 20 years, the planning area will continue to experience these on an annual basis.

The National Climatic Data Center storm events database lists 10 heat events in Los Angeles County since 2000. This correlates to a 0.5 percent annual probability. Climate change is likely to bring hotter temperatures, more hot days, and more frequent heat waves, leading to higher rates of heat-related impairments and deaths.

11.2.4 Severity

The most common problems associated with severe weather are immobility and loss of function for utilities caused by power outage. Fatalities are uncommon but can occur. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Physical damage to homes and facilities can be caused by wind induced falling objects such as trees.

Extreme heat can cause heat exhaustion, in which the body becomes dehydrated, resulting in an imbalance of electrolytes. Without intervention, heat exhaustion can lead to collapse and heatstroke. Heatstroke occurs when perspiration cannot occur, and the body overheats. Without intervention, heatstroke can lead to confusion, coma, and death. Extreme heat is the primary weather-related cause of death in the U.S. In an 80-year record of weather fatalities across the nation from (1940-2019), excessive heat claimed more lives each year than floods, lightning, tornadoes, and hurricanes. The total averaged to 103 heat-related deaths every 10 years (NWS, 2020). Extreme heat events do not typically impact buildings; however, losses may be associated with the urban heat island effect and overheating of HVAC systems. These extreme heat events can lead to drought, impact water supplies, and lead to an increase in heat-related illnesses and deaths.

Hot weather also can increase levels of ozone, a major component of smog that is created in the presence of sunlight via reactions between chemicals in gasoline vapors and industrial smokestacks. High ozone levels often cause or worsen respiratory problems. The longer a heat wave lasts and the hotter the temperature is, the greater the risk of adverse impacts on human health or infrastructure.

High winds are a frequent problem in the planning area, while thunderstorms occur less frequently. Both have been known to damage utilities. The wind speed given in wind warnings issued by the NWS is for a one-minute average; gusts may be 25 to 30 percent higher.

11.2.5 Warning Time

Meteorologists can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time. The NWS issues advisories, watches and warnings associated with thunderstorms, wind and temperature as listed in Table 11-2.

Table 11-2. NWS Weather Warnings, Watches and Advisories

	Warning	Watch	Advisory
Wind[a]	Strong sustained winds for one hour or longer, or wind gusts for any duration that are not associated with thunderstorms are occurring or will occur within six to 12 hours	Strong sustained winds for one hour or longer, or wind gusts for any duration that are not associated with thunderstorms are occurring or will occur within 12 to 48 hours	Strong winds are occurring or will occur within 12 to 24 hours but are not so strong as to warrant a high wind warning
Excessive heat[b]	Heat index values are forecast to meet or exceed locally defined warning criteria for more than three hours over at least two consecutive days; issued within 12 hours of the onset of the high heat index	Conditions are favorable in the next 24 to 72 hours for extreme heat index values during the day, combined with nighttime low temperatures of 80 °F or higher that limit perspiration recovery,	Heat index values are forecast to meet or exceed locally defined warning criteria for one or two days; usually issued within 12 hours of the onset of the high heat index

a. NWS offices issue wind-related products based on local criteria for strong sustained winds or gusts
b. Specific criteria varies among local weather forecast offices due to climate variability and the effect of excessive heat on the local population. Typical criteria are maximum daytime temperatures above 105 ºF to 110 °F for up to three hours per day, with minimum nighttime temperatures above 75 °F for two consecutive days. Criteria may be lowered if the heat event occurs early in the season or during a multi-day heat wave or a widespread power outage

Sources: Wikipedia, 2020; NWS, 2020

11.3 EXPOSURE

It can be assumed that all District assets are exposed to some extent to severe weather events profiled in this chapter. Power outages or roaming blackouts may occur as a result of extreme heat events that strain and overheat circuits. During a blackout, all critical facilities that rely on electricity for power will be severely impacted unless they are connected to a backup power source. Facilities on higher ground may also be exposed to wind damage or damage from falling trees.

11.4 VULNERABILITY

Direct impacts from severe weather events are little or no impacts. All District assets are vulnerable to indirect impacts from the severe weather events profiled in this chapter. This vulnerability is tied predominately to the loss of power, as most of the District's critical assets are power dependent. Currently, there are no available models that can estimate loss and loss of function from severe weather events. Therefore, no formal loss estimations are being provided, and this vulnerability assessment is qualitative in its narrative.

Weather induced loss of power for the planning area is prevalent, especially considering the impact of Public Safety Power Shutoff protocols being deployed by electric utility service providers in the state of California. High

temperatures, extreme dryness and record-high winds can create conditions in the state where any spark at the wrong time and place can lead to a major wildfire. The Public Safety Power Shutoff is a procedure where if severe weather threatens a portion of the electric system, it may be necessary for the utility service provider, Southern California Edison, to turn off electricity in the interest of public safety. A PSP event can be correlated to severe weather.

The District does have backup power to most, but not all of its critical assets, so there is some degree of vulnerability associated with this core capability. There are portable sources for emergency power supply, but these sources are not as efficient as picked place backup power for each facility.

11.5 FUTURE TRENDS IN DEVELOPMENT

The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by Los Angeles County, the City of La Cañada Flintridge, or the City of Glendale, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. The building code includes provisions for mitigating the impacts from high winds and structure insulation requirements that can mitigate the impacts from extreme heat. These codes and standards would have no direct impact on future District assets, with the exception of any new structures the District may construct.

11.6 SCENARIO

Although extreme heat and high winds occur on an annual basis, a worst-case scenario event would be a severe windstorm or extreme heat event that occurs during a Public Safety Power Shutoff event that disrupts power for a long period of time. This would tax the District's backup power capability beyond its capacity.

11.7 ISSUES

Important issues associated with a severe weather in the planning area include the following:

- Power interruption is the biggest impact from this hazard for the District.
- Prolonged backup power usage during extreme heat events could have regional impacts on air quality.
- The District's backup power capability should be enhanced
- Severe weather events are likely to increase as a result of climate change impacts, including the potential for extreme heat.

12. WILDFIRE

12.1 GENERAL BACKGROUND

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use, and arson. Fire hazards present a considerable risk to vegetation and wildlife habitats. Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as "wildland-urban interface areas," where development is adjacent to densely vegetated areas.

12.1.1 Secondary Hazards

Wildfires can have a significant impact on air quality, especially with prolonged periods of burning combined with climatic conditions. Wildfires strip slopes of vegetation, exposing them to greater amounts of runoff and debris flow. This in turn can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

12.2 HAZARD PROFILE

12.2.1 Past Events

Incident information from the California Department of Forestry and Fire Protection (CAL FIRE) identifies 94 wildfires in Los Angeles County since 2005. Los Angeles County has been included in 12 federal wildfire disaster declarations and another five federal fire management declaration events, for a total of 17 federal declaration since 1978. Table 12-1 lists some of the most damaging urban-wildland interface fires that have affected Los Angeles County since 2005 (as reported by CAL FIRE)

The Station Fire was the largest wildfire in the history of Los Angeles County, igniting on August 26, 2009 near the U.S. Forest Service ranger station on the Angeles Crest Highway in the Angeles National Forest. The blaze threatened 12,000 structures in the National Forest and the nearby communities of La Cañada Flintridge, Pasadena, Glendale, Acton, La Crescenta, Juniper Hills, Littlerock, and Altadena, as well as the Sunland and Tujunga neighborhoods of the City of Los Angeles. By the time the fire was extinguished on October 16, over 160,000 acres had burned, 106 structures were destroyed, 10 people were injured, and two firefighters died.

Table 12-1. Damaging Urban-Wildland Interface Fires in Los Angeles County Since 2005

	Dates	Area Burned (acres)
Station Fire	August 26 – October 16, 2009,	160,577
Woolsey Fire	November 8, 2018 – January 4, 2019,	96,949 (Los Angeles and Ventura counties)
Ranch Fire	October 20 – November 01, 2007,	58,401
Buckweed (Agua Dulce) Fire	October 21 – November 01, 2007,	38,000
Lake Fire	August 12 – September 28, 2020,	31,089
Powerhouse Fire	May 30 – June 08, 2007,	30,274
Topanga Fire	September 29 – October 06, 2005,	24,175
Creek Fire	December 5, 2017 – August 06, 2018,	15,619

Given the Station Fire's proximity to the Crescenta Valley, CVWD worked with Los Angeles County, the Cities of Glendale and La Cañada Flintridge, and the U.S. Forest Service to prevent serious damage and disruption to water and sewer service. CVWD closely monitored all progress of the wildfire within the service areas. Response actions included filling all of its reservoirs to overflow levels, increasing flows from Foothill Municipal Water District, moving portable generators to upper reservoir sites, and coordinating with personnel regarding response and availability.

12.2.2 Location

CAL FIRE's Fire and Resource Assessment Program has modeled and mapped wildfire hazard zones using a science-based and field-tested computer model that assigns a fire hazard severity zone (FHSZ) of moderate, high, or very high. The FHSZ model is built from existing CAL FIRE data and hazard information based on factors such as the following:

- **Fuel**—Fuel may include living and dead vegetation on the ground, along the surface as brush and small trees, and above the ground in tree canopies. Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite. Trees killed or defoliated by forest insects and diseases are more susceptible to wildfire.
- **Weather**—Relevant weather conditions include temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount and duration, and the stability of the atmosphere. Of particular importance for wildfire activity are wind and thunderstorms:
  - Strong, dry winds produce extreme fire conditions. Such winds generally reach peak velocities during the night and early morning hours.
  - The thunderstorm season typically begins in June with wet storms and turns dry with little or no precipitation reaching the ground as the season progresses into July and August.
- **Terrain**—Topography includes slope and elevation. The topography of a region influences the amount and moisture of fuel; the impact of weather conditions such as temperature and wind; potential barriers to fire spread, such as highways and lakes; and elevation and slope of landforms (fire spreads more easily uphill than downhill).
- **Probability of Future Occurrence**—The likelihood of an area burning over a 30- to 50-year time period, based on history and other factors.

The model also is based on frequency of fire weather, ignition patterns, and expected rate-of spread. It accounts for flying ember production, which is the principal driver of the wildfire hazard in densely developed areas. A

related concern in built-out areas is the relative density of vegetative fuels that can serve as sites for new spot fires within the urban core and spread to adjacent structures. The model refines the zones to characterize fire exposure mechanisms that cause ignitions to structures. Significant land-use changes need to be accounted for through periodic model updates. FHSZ mapping for the District is shown in Figure 12-1 and Figure 12-2.

12.2.3 Frequency

Wildfire frequency can be assessed through review of the number of previous wildfire events and the area burned over a defined period. CAL FIRE records of fires indicate that, from 1878 to 2016, 53.5 percent of the total area within the very-high FHSZ was burned by wildfire (50,782 acres out of 94,904 acres). This averages 0.4 percent of the very-high FHSZ area burned per year over that 139-year period. However, those records are incomplete prior to 1950, so the annual average is likely higher than that. CAL FIRE records indicate that there were 94 fires in the planning area from 2004-2020, which comes to an average of nearly six fires per year.

12.2.4 Severity

Potential losses from wildfire include human life, structures and other improvements, and natural resources. There are no recorded incidents of loss of life from wildfires in the planning area. Wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local watersheds.

Beyond the human impact, wildfires also affect the Earth's climate. Forests in particular store large amounts of carbon. When they burn, they release carbon dioxide into the atmosphere, which in turn contributes to climate change.

12.2.5 Warning Time

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Since fireworks often cause brush fires, extra diligence is warranted around the Fourth of July when the use of fireworks is highest. Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Adverse weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

A fire that breaks out and spreads rapidly can require evacuation within days or hours. A fire's peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications and social media in recent years has further contributed to a significant improvement in warning time.

Insert Map

Figure 12-1. Potable Water System - Wildfire Hazard Severity Zones

Insert Map

Figure 12-2. Wastewater System - Wildfire Hazard Severity Zones

12.3 EXPOSURE

The risk assessment for wildfire determined District assets that lie within each mapped wildfire severity zone. It was assumed that underground pipelines are not at risk from fire, so only above-ground structures were identified. Table 12-2 summarizes the number of structures in each zone. Figure 12-3 and Figure 12-4 show the results as the percent of total planning area assets.

Table 12-2. Number of District Structures Exposed to the Wildfire Hazard

	Number of Exposed Structures in Wildfire Severity Zone[a]	
	Very High Severity	No Mapped Severity Zone
Potable Water Facilities		
Building	3	1
Aeration Tower	2	0
Debris Basin	13	0
Emergency Interconnection	11	10
Fitting	901	1,023
Hydrant	319	376
Interconnection	7	1
Mixing Station	0	1
Motor Control Center	17	4
Pipeline Crossing	12	14
Potable Water Treatment Plant	9	1
Potable Water Valve	1,025	1,254
Pressure Reducing Station	2	5
Reservoir	16	3
Water Booster Pump Station	12	2
Well	10	2
Total	**2,359**	**2,697**
Wastewater Facilities		
Sewer Control Valve	1	2
Sewer Fitting	3,496	2,986
Sewer Flow Meter	0	1
Sewer Manhole	670	600
Sewer Wet Well	1	0
Wastewater Lift Station	2	0
Wastewater Treatment Plant	0	1
Total	**4,170**	**3,590**

a. All assets not in a Very High wildfire severity zone are not located in any sort of severity zone.

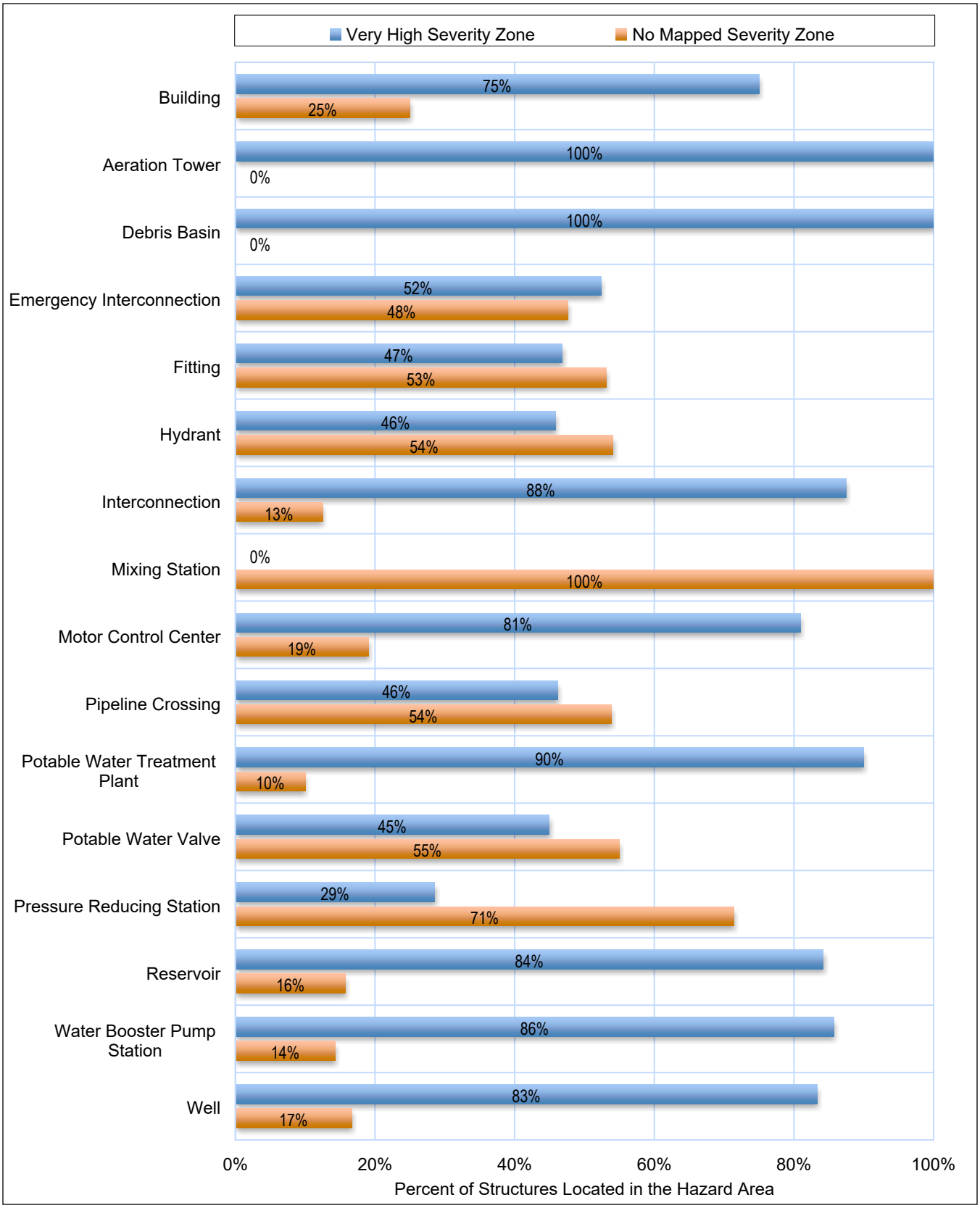


Figure 12-3. Percent of District Potable Water Structures Exposed to the Wildfire Hazard

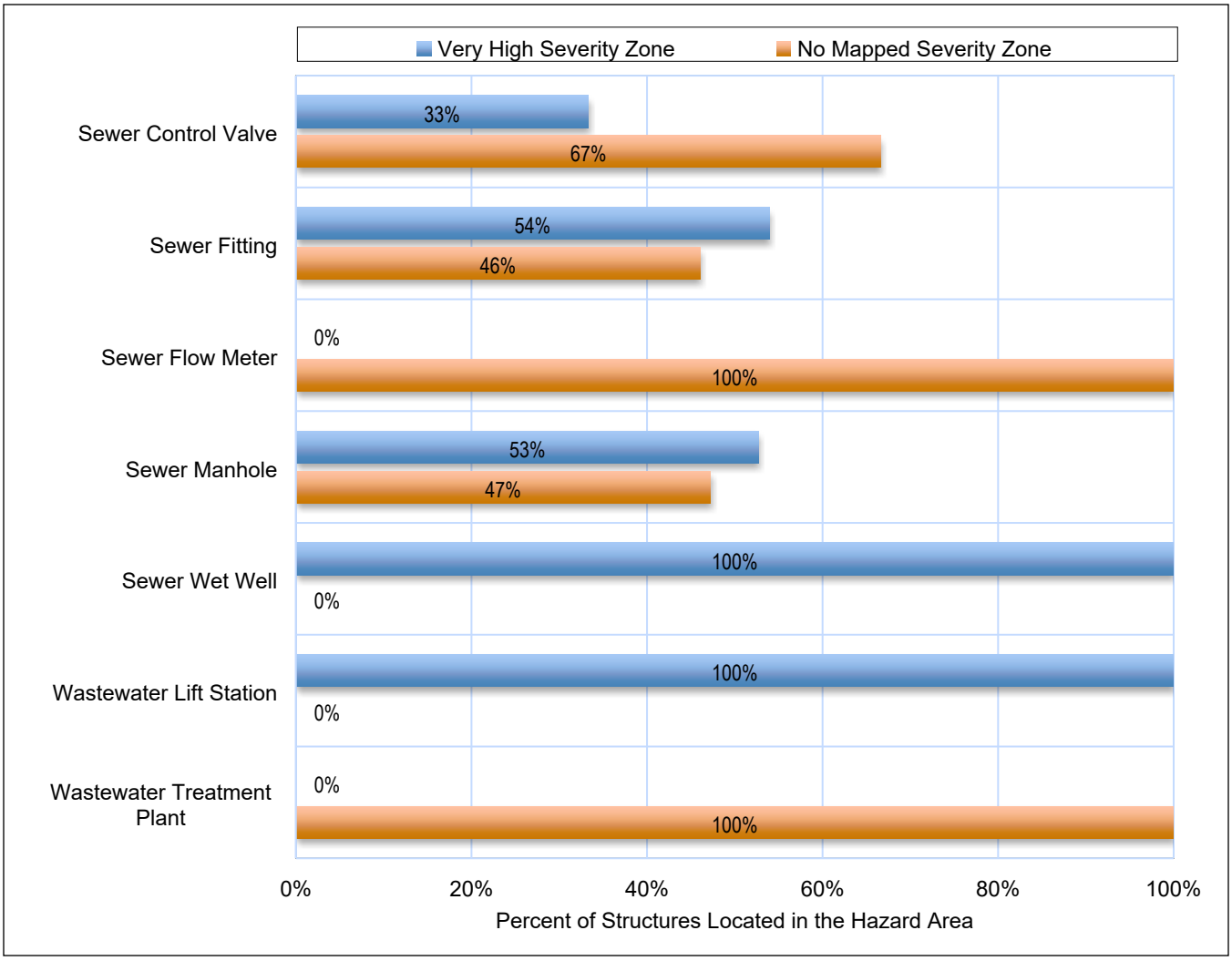


Figure 12-4. Percent of District Wastewater Structures Exposed to the Wildfire Hazard

12.4 VULNERABILITY

Structures, above-ground infrastructure, and critical facilities are all vulnerable to the wildfire hazard. There is currently no validated damage function available to support wildfire mitigation planning. Vulnerable assets are assumed to include all those identified as exposed to the wildfire hazard. Critical facilities of wood frame construction or with wood roofs are especially vulnerable during wildfire events.

12.5 FUTURE TRENDS IN DEVELOPMENT

Urbanization alters the natural fire regime and can create the potential for expansion of urbanized areas into wildland areas. The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by Los Angeles County, the City of La Cañada Flintridge, or the City of Glendale, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code.

12.6 SCENARIO

A major wildfire in the planning area might begin with a high rainfall spring season, adding to fuels already present on the forest floor. Flashy fuels would build throughout the spring. The summer could see the onset of insect infestation. A dry summer could follow the wet spring, exacerbated by dry hot winds. Carelessness with combustible materials or a tossed lit cigarette, or a sudden lighting storm could trigger a multitude of small isolated fires.

The embers from these smaller fires could be carried miles by hot, dry winds. The deposition zone for these embers would be deep in the forests and interface zones. Fires that start in flat areas move slower, but wind still pushes them. It is not unusual for a wildfire pushed by wind to burn the ground fuel and later climb into the crown and reverse its track. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These new small fires would most likely merge. Suppression resources would be redirected from protecting the natural resources to saving more remote subdivisions.

The worst-case scenario would include an active fire season throughout the American west, spreading resources thin. Firefighting teams would be exhausted or unavailable. Many federal assets would be responding to other fires that started earlier in the season. While local fire districts would be extremely useful in the urban interface areas, they have limited wildfire capabilities or experience, and they would have a difficult time responding to the ignition zones. Even though the existence and spread of the fire is known, it may not be possible to respond to it adequately, so an initially manageable fire can become out of control before resources are dispatched.

12.7 ISSUES

The major issues for wildfire are the following:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildfires could cause landslides as a secondary natural hazard.
- Public Safety Power Shutoff (PSPS) events for “fire weather” could impact District operations.
- Climate change could increase the wildfire hazard.
- Future growth into the foothills interface areas should continue to be managed by local agencies like Los Angeles County and the Cities of Glendale and La Canada Flintridge.
- Vegetation management activities should include enhancement through expansion of the target areas as well as additional resources as directed by the local fire authority.
- Backup power is needed for critical assets exposed to the wildfire hazard.
- Increased water storage can enhance firefighting capability.
- There is a need for coordination with local fire departments and increased training of CVWD personnel.

13. CLIMATE CHANGE CONSIDERATIONS

13.1 WHAT IS CLIMATE CHANGE?

Climate, consisting of patterns of temperature, precipitation, humidity, wind and seasons, plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. "Climate change" refers to changes over a long period of time.

The well-established worldwide warming trend of recent decades and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth's atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known greenhouse gas; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as the combustion of fossil fuels, agricultural production, and changes in land use. According to the National Aeronautics and Space Administration (NASA), carbon dioxide concentrations measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen dramatically since then, surpassing 400 ppm in 2013 for the first time in recorded history (see Figure 13-1).

Source: NASA, 2020

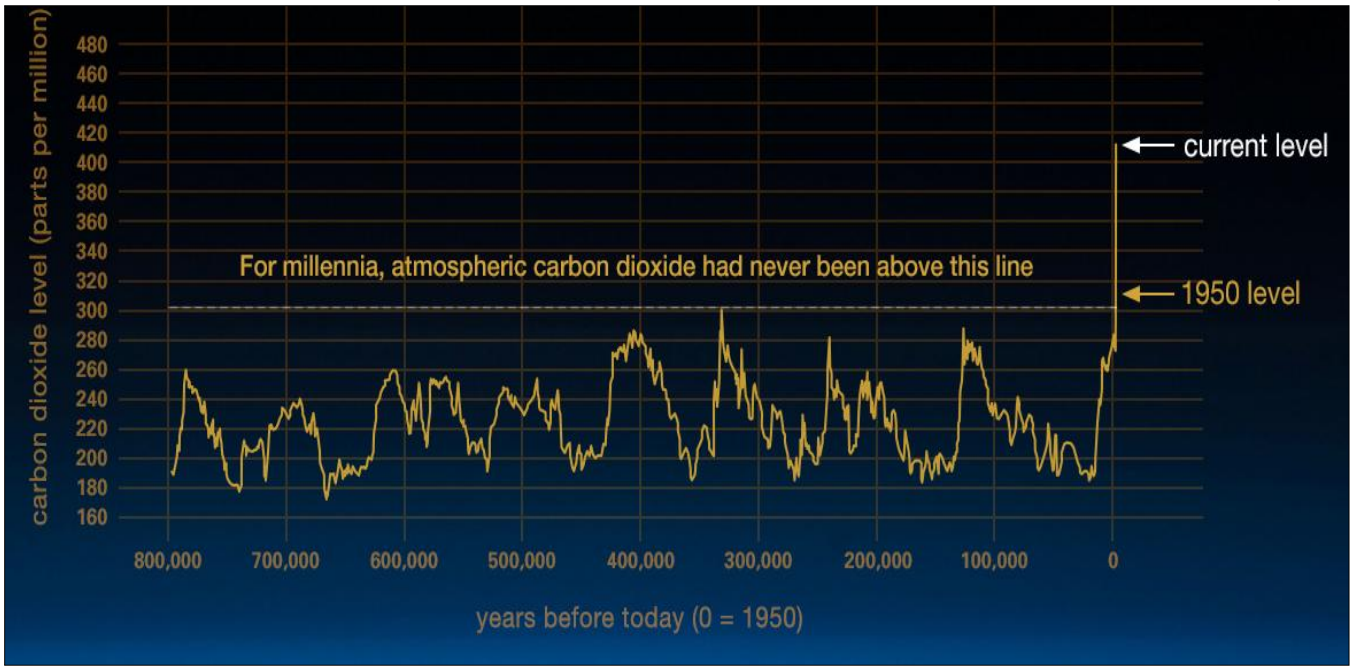


Figure 13-1. Global Carbon Dioxide Concentrations Over Time

13.2 HOW CLIMATE CHANGE AFFECTS HAZARD MITIGATION

Climate change will affect people, property, economy, and ecosystems in a variety of ways. Consequences of climate change include increased flood vulnerability, and increased heat-related illnesses. The most important effect for the development of this plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. Specifically, as hydrology changes, storms currently considered to be the 100-year flood might strike more often, leaving many communities at greater risk. The risks of landslide, severe storms, and wildfire are all affected by climate patterns as well. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis.

13.3 CURRENT GLOBAL INDICATIONS OF CLIMATE CHANGE

The major scientific agencies of the United States—including NASA and the National Oceanic and Atmospheric Administration (NOAA)—have presented evidence that climate change is occurring. NASA summarizes key evidence as follows (NASA, 2020a):

- Global Temperature Rise—The planet's average surface temperature has risen about 1.62 ºF since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere. Most of the warming occurred in the past 35 years, with the five warmest years on record taking place since 2010.
- Warming Oceans—The oceans have absorbed much of this increased heat, with the top 2,300 feet of ocean showing warming of more than 0.4 ºF since 1969.
- Shrinking Ice Sheets—The Greenland and Antarctic ice sheets have decreased in mass. Greenland lost an average of 286 billion tons of ice per year between 1993 and 2016, and Antarctica lost about 127 billion tons of ice per year during the same time period. The rate of Antarctica ice mass loss has tripled in the last decade.
- Glacial Retreat—Glaciers are retreating almost everywhere around the world—including in the Alps, Himalayas, Andes, Rockies, Alaska, and Africa.
- Decreased Snow Cover—Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier
- Sea Level Rise—Global sea level rose about 8 inches in the last century. The rate in the last two decades is nearly double that of the last century and is accelerating slightly every year.

- Declining Arctic Sea Ice—Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades
- Extreme Events—The number of record high temperature events in the United States has been increasing since 1950, while the number of record low temperature events has been decreasing. The U.S. has also witnessed increasing numbers of intense rainfall events.
- Ocean Acidification—Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year.

13.4 PROJECTED FUTURE IMPACTS

The Third National Climate Assessment Report for the United States indicates that impacts resulting from climate change will continue through the 21st century and beyond. Although not all changes are understood at this time, the following impacts are expected in the United States (NASA, 2017):

- Temperatures will continue to rise.
- Growing seasons will lengthen.
- Precipitation patterns will change.
- Droughts and heat waves will increase.
- Hurricanes will become stronger and more intense.
- Sea level will rise 1 to 8.2 feet by 2100 (NOAA, 2020a and 2020b).
- The Arctic may become ice free.

The *California Climate Adaptation Planning Guide* outlines the following climate change impact concerns for the South Coast climate impact region (Cal EMA et al., 2012):

- Increased temperatures
- Reduced overall precipitation
- Sea level rise
- Public health (heat and air quality)
- Reduced water supply
- Reduced tourism
- Coastal erosion
- Wildfire risk.

Some of these changes are direct or primary climatic changes, such as increased temperature, while others are indirect or secondary impacts resulting from the direct changes, such as heat and air pollution. Some direct changes may interact with one another to create unique secondary impacts. These primary and secondary impacts may then result in impacts on human and natural systems. The climate change impacts likely to affect the planning area are summarized in Table 13-1.

Table 13-1. Summary of Climate Change Impacts Likely to Affect the Planning Area

Primary Impact	Secondary Impact	Example Human and Natural System Impacts
Increased Temperature	Heat wave and high carbon emissions	• Increased frequency of illness and death • Increased high alert ozone days, urban heat islands • Increased stress on mechanical systems, such as HVAC systems • Increased stress on electricity supply and demand
Reduced Precipitation	Changed seasonal patterns	• Reduced water supply • Reduced tourism
	Increased wildfires	• More people, wildlife, land, and structures impacted by fires. • Summer dryness will begin earlier, last longer, and become more intense.
Sea Level Rise	Permanent inundation of previously dry land	• Loss of assets and tax base • Loss of coastal habitat • Loss of tourism
	Larger area impacted by extreme high tide	• More people and structures impacted by storms
	Increased coastal erosion	• Loss of assets and tax base
Reduced Mountain Snowpack	Reduced water supply	• Primary sources of water are State Water Project and the Colorado River, both originating in mountain snowpack; change may reduce water supply. • Increased costs for water

Adapted and expanded from California Adaptation Planning Guide: Planning for Adaptive Communities

Climate change projections contain inherent uncertainty, largely because they depend on future greenhouse gas emission scenarios. Generally, the uncertainty in greenhouse gas emissions is addressed by the assessment of differing scenarios: low-emissions scenarios and high-emissions scenarios. In low-emissions scenarios, greenhouse gas emissions are reduced substantially from current levels. In high-emissions scenarios, greenhouse gas emissions generally increase or continue at current levels. Uncertainty in outcomes is generally addressed by averaging a variety of model outcomes.

Despite this uncertainty, climate change projections present valuable information to help guide decision-making for possible future conditions. The following sections summarize information developed by Cal-Adapt, a resource for public information on how climate change might impact local communities, for the Los Angeles Region.

13.4.1 Temperature

The historical (1981-2010) average temperature for the region was 66.6ºF. By 2090, the average temperature is expected to increase above this baseline by 3.5ºF and 6.0ºF in the low- and high-emissions scenarios, respectively (see Figure 13-2). By 2100, if temperatures rise to the higher warning range, there could be up to 100 more days per year with temperatures above 90 ºF.

13.4.2 Extreme Heat

The extreme heat day temperature threshold for the planning area is 96.7°F. The historical average number of extreme heat days is four. The number of extreme heat days, the number of warm nights (68.5°F threshold), the number of heat waves and the duration of heat waves are all expected to increase over the next century (see Figure 13-3).

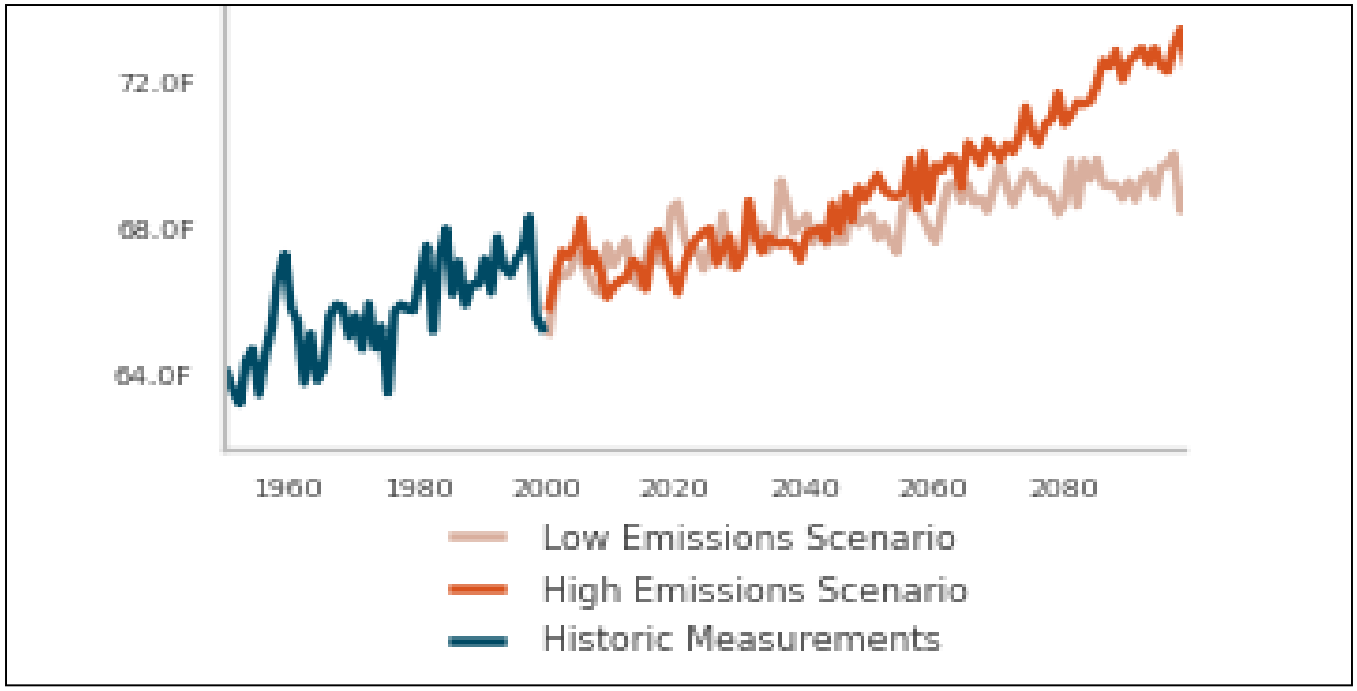


Figure 13-2. Observed and Projected Average Temperatures for the Los Angeles Region

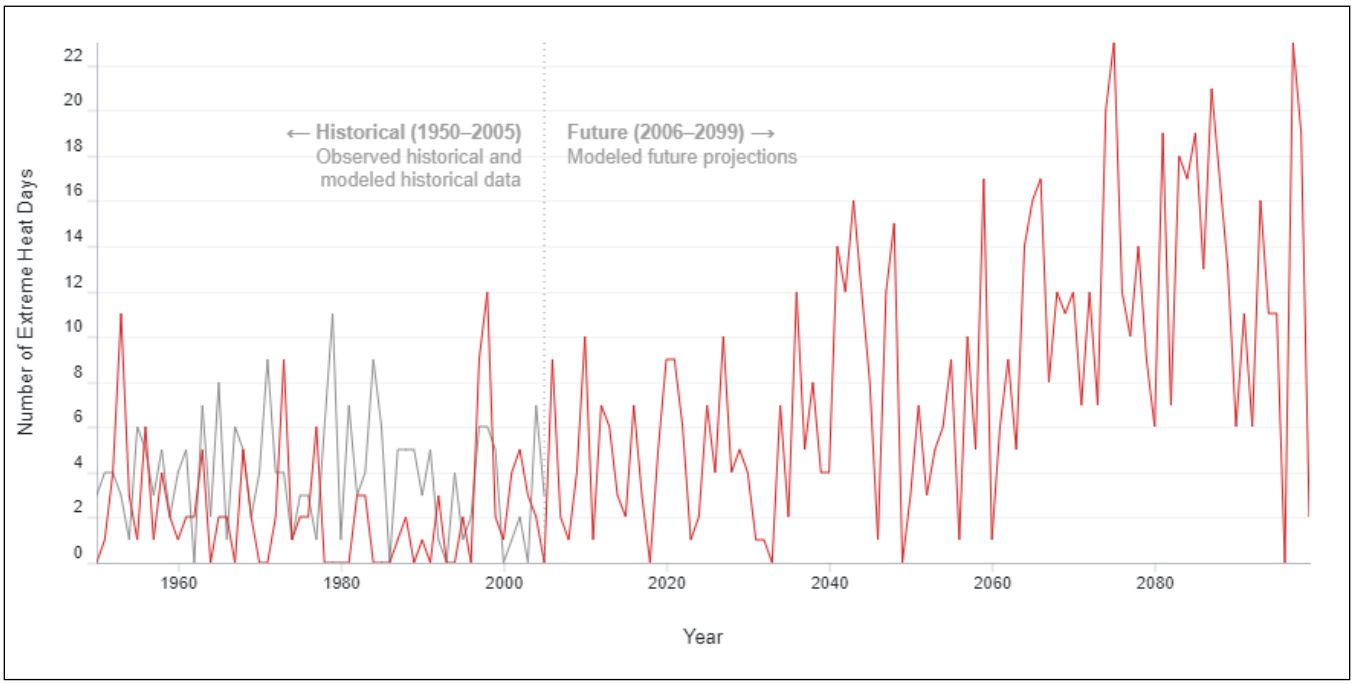


Figure 13-3. Projected Number of Extreme Heat Days by Year for the Los Angeles Region

13.4.3 Precipitation

Precipitation projections for California remain uncertain. Models show differing impacts from slightly wetter winters to slightly drier winters, with the potential for a 10- to 20-percent decrease in total annual precipitation. Changes in precipitation patterns, coupled with warmer temperatures, may lead to significant changes in hydrology. In high-emissions scenarios, more precipitation may fall as rain rather than snow and this snow may melt earlier in the season, thus impacting the timing of changes in stream flow and flooding (Cal-Adapt, 2016).

13.4.4 Snowpack

While there are no snow water equivalency measurements for the planning area, Cal-Adapt indicates that parts of California should expect snowpack levels to be reduced by up to 25 inches from the baseline (1961-1990) by 2090.

13.4.5 Wildfire

Wildfire risk is expected to change in the coming decades (see Figure 13-4). Under both high- and low-emissions scenarios, the change in area burned may slightly increase until 2020 and then decrease by 10 to 20 percent by 2085.

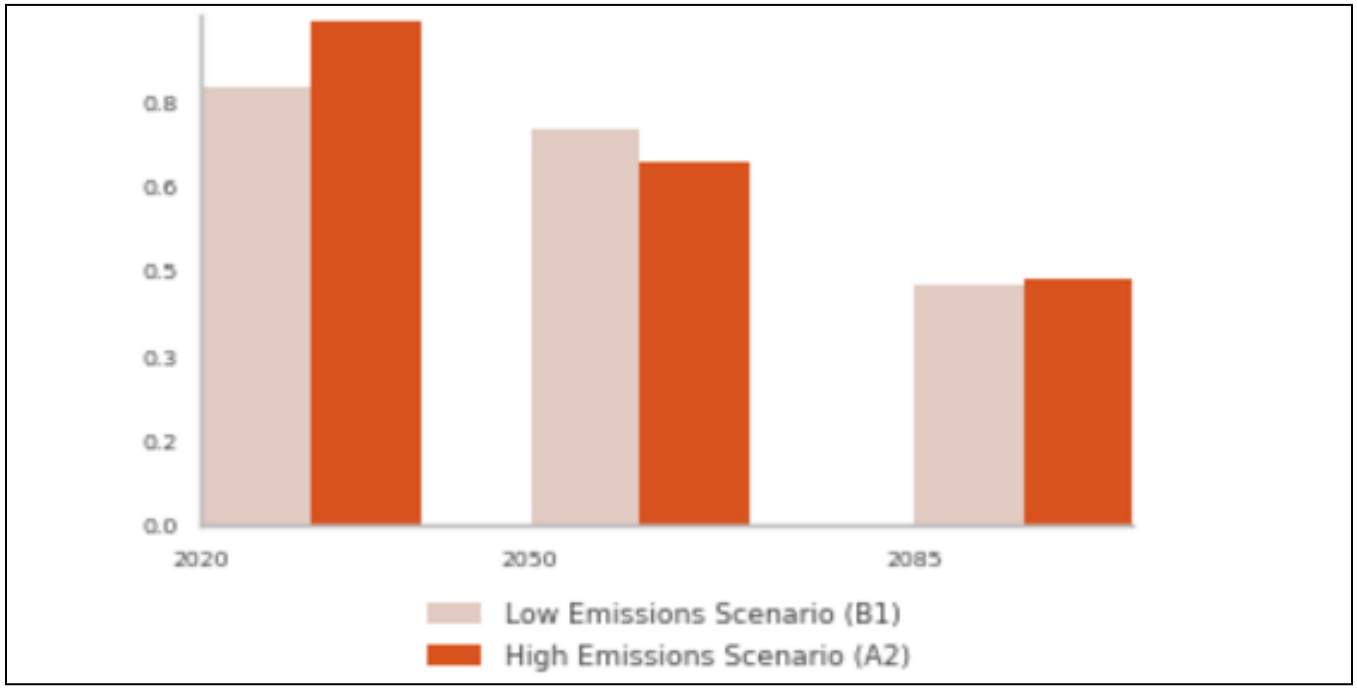


Figure 13-4. Projected Changes in Fire Risk for Los Angeles Region, Relative to 2010 Levels

13.5 RESPONSES TO CLIMATE CHANGE

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to impact communities in coming decades. Adaptation is defined by the IPCC as the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid

harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014).

Societies across the world are facing the need to adapt to changing conditions associated with natural disasters and climate change such as those indicated above. Farmers are altering crops and agricultural methods to deal with changing rainfall and rising temperature; architects and engineers are redesigning buildings; planners are looking at managing water supplies to deal with droughts or flooding.

Most ecosystems show a remarkable ability to adapt to change and to buffer surrounding areas from the impacts of change. Forests can bind soils and hold large volumes of water during times of plenty, releasing it through the year; floodplains can absorb vast volumes of water during peak flows; coastal ecosystems can hold out against storms, attenuating waves and reducing erosion. Other ecosystem services—such as food provision, timber, materials, medicines, and recreation—can provide a buffer to societies in the face of changing conditions.

Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services.

13.6 CLIMATE CHANGE IMPACTS ON HAZARDS

The following sections provide information on how each identified hazard of concern for this planning process may be impacted by climate change and how these impacts may alter current exposure and vulnerability for the people, property, critical facilities, and the environment in the planning area to these hazards.

13.6.1 Drought

Impacts on the Hazard

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer lasting. According to the National Climate Assessment, “higher surface temperatures brought about by global warming increase the potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, environments will tend to dry, promoting drought conditions” (Globalchange.gov, 2014). Because expected changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain.

Critical Facilities

Critical facility exposure and vulnerability are unlikely to increase as a result of increased drought resulting from climate change; however, critical facility operators may need to alter standard management practices and actively manage resources, particularly in water-related service sectors.

13.6.2 Earthquake

Impacts on the Hazard

The impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity. NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes (NASA, 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms or heavy precipitation could experience liquefaction or an increased propensity for slides during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events.

Critical Facilities

Because impacts on the earthquake hazard are not well understood, increases in exposure and vulnerability of local resources are not able to be determined.

13.6.3 Flood

Impacts on the Hazard

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain areas to contribute

to peak storm runoff. High frequency flood events (e.g. 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 1-percent-annual-chance flood may become more likely, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.

Critical Facilities

Critical facility exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change resulting in risk to facilities that have not historically been at risk from flooding. Additionally, changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems.

13.6.4 Landslide

Climate Change Impacts on the Hazard

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature is likely to affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for landslide occurrences.

Critical Facilities

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard; however, critical facility owners and operators may experience more frequent disruption to service provision as a result of landslide hazards. For example, transportation systems may experience more frequent delays if slides blocking these systems occur more frequently. In addition, increased sedimentation resulting from landslides may negatively impact flood control facilities, such as dams.

13.6.5 Severe Weather

Impacts on the Hazard

Climate change presents a challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily in recent decades (see Figure 13-5). Historical data shows that the probability for severe weather events increases in a warmer climate.

Source: Munich RE, 2020

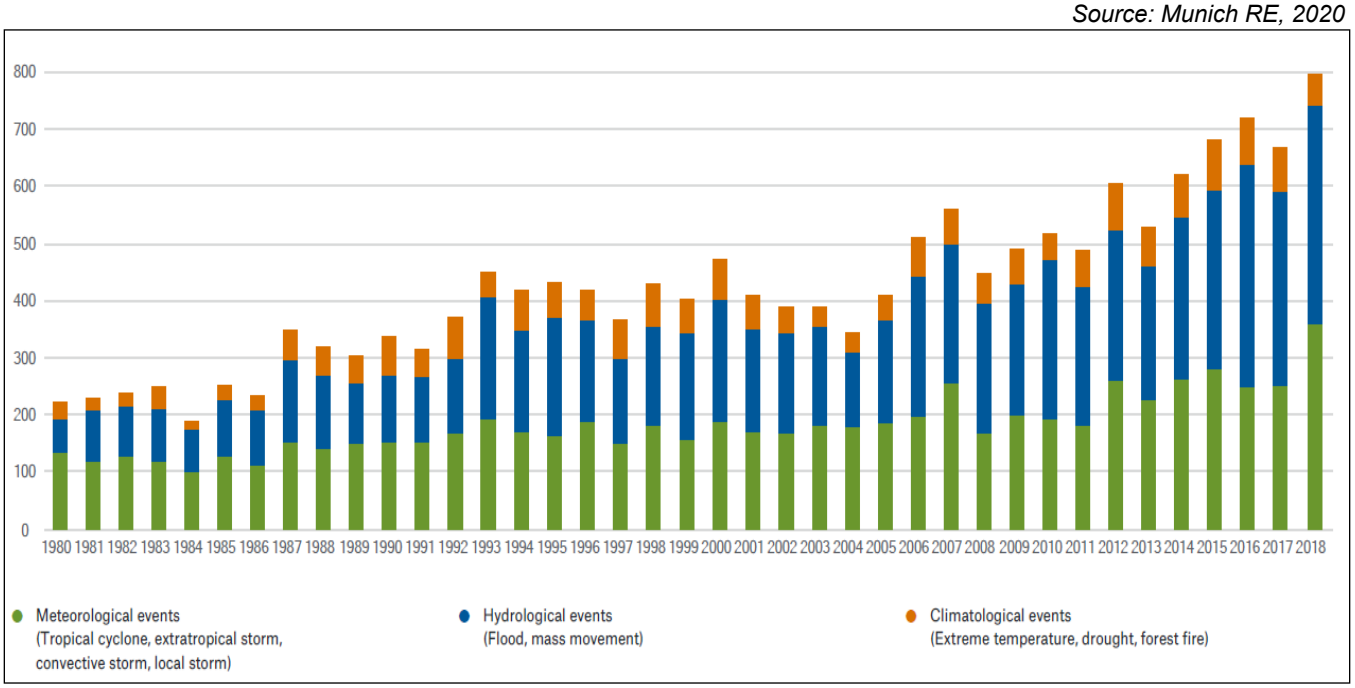


Figure 13-5. Worldwide Natural Catastrophe Events, 1980 – 2018

This increase in average surface temperatures can also lead to more intense heat waves that can be exacerbated in urbanized areas by what is known as urban heat island effect. The evidence suggests that heat waves are already increasing, especially in western states.

Critical Facilities

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, critical facility operators may experience more frequent disruptions. For example, more frequent and intense storms may cause more frequent disruptions in power service.

13.6.6 Wildfire

Impacts on the Hazard

Wildfire is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Additionally, changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Critical Facilities

Larger, more severe, more frequent fires may impact the people, property, and critical facilities by increasing the risk of ignition from nearby fire sources. Additionally, secondary impacts such as air quality issues may increase.

14. RISK RANKING

FEMA requires all hazard mitigation planning to have jurisdiction-specific mitigation actions based on local risk, vulnerability, and community priorities (FEMA, 2011). This plan includes a risk ranking protocol for the District, in which "risk" was calculated by multiplying probability by impact on people, property and the District's continuity of operations following the hazard events assessed. The risk estimates were generated using methodologies promoted by FEMA. The Steering Committee reviewed, discussed, and approved the methodology and results.

Numerical ratings of probability and impact were based on the hazard profiles and exposure and vulnerability evaluations presented in Chapters 7 through 12. Using that data, the Core Planning Team ranked the risk of all the natural hazards of concern described in this plan. When available, estimates of risk were generated with data from Hazus or GIS. For hazards of concern with less specific data available, qualitative assessments were used. As appropriate, results were adjusted based on local knowledge and other information not captured in the quantitative assessments. The hazards of interest described in Chapter 15 were not ranked for the following reasons:

- A key component of risk as defined for the planning effort is probability of occurrence. Some natural hazards can be assigned a recurrence interval because of historical occurrence, but the listed hazards of interest, which lack such historical precedent, cannot be provided with a probability estimate.
- Federal hazard mitigation planning regulations do not require the assessment of non-natural hazards (44 CFR, 201.6). FEMA provides local decision-makers discretion to assess non-natural hazards.

Risk ranking results are used to help establish mitigation priorities. The District used these rankings to inform the identification and prioritization of actions for the plan. The District chose to identify mitigation actions, at a minimum, to address each hazard with a "high" or "medium" risk ranking. Actions that address hazards with a low or no hazard ranking are optional.

14.1 PROBABILITY OF OCCURRENCE

A probability factor is assigned based on how often a hazard is likely to occur. The probability of occurrence of a hazard event is generally based on past hazard events in an area, although weight can be given to expected future probability of occurrence based on established return intervals, changing climate conditions, and knowledge of local conditions. For example, if a jurisdiction has experienced two damaging floods in the last 25 years, the probability of occurrence is high for flooding and scores a 3 under this category. If a jurisdiction has experienced no damage from landslides in the last 100 years, the probability of occurrence for landslide is low and scores a 1 under this category. Each hazard was assigned a probability factor as follows:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor = 2)

- Low—Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- None—If there is no exposure to a hazard, there is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Table 14-1 summarizes the probability assessment for each hazard of concern for this plan.

Table 14-1. Probability of Hazards

Hazard Event	Probability (high, medium, low)	Probability Factor
Drought	High	3
Earthquake	High	3
Flood	High	3
Landslide/debris flow	High	3
Severe Weather	High	3
Wildfire	High	3

14.2 IMPACT

The impact of each hazard is divided into three categories: impacts on people, impacts on District property and assets, and impacts on the continuity of District operations. These categories are also assigned weighted values. Impact on people was assigned a weighting factor of 3, impact on property was assigned a weighting factor of 2 and impact on the economy was assigned a weighting factor of 1.

- **People**—Values are assigned based on the percentage of the total population exposed in your service area to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. Impact factors were assigned as follows:
  - High—25 percent or more of the population is exposed to a hazard (Impact Factor = 3)
  - Medium—10 percent to 24 percent of the population is exposed to a hazard (Impact Factor = 2)
  - Low—9 percent or less of the population is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the population is exposed to a hazard (Impact Factor = 0)
- **Property**—Values are assigned based on the percentage of the total District assets exposed to the hazard event:
  - High—25 percent or more of the total replacement value of assets is exposed to a hazard (Impact Factor = 3)
  - Medium—10 percent to 24 percent of the total replacement value of assets is exposed to a hazard (Impact Factor = 2)
  - Low—9 percent or less of the total replacement value of assets is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total replacement value is exposed to a hazard (Impact Factor = 0)
- **Continuity of Operations**—Impact on water and sewer operations are assessed based on estimates of how long it will take CVWD to become 100-percent operable after a hazard event. The estimated functional downtime for critical facilities has been subjectively assigned an impact as follows:
  - High—Functional downtime of 365 days or more (Impact Factor = 3)
  - Medium—Functional downtime of 180 to 364 days (Impact Factor = 2)
  - Low—Functional downtime of 180 days or less (Impact Factor = 1)

- No impact—No functional downtime is estimated from the hazard (Impact Factor = 0).

Table 14-2 summarizes the impacts for each hazard.

Table 14-2. Hazard Impact on People, Property and Operations

Hazard Event	People (Weighting Factor = 3)		Property (Weighting Factor = 2)		Operations (Weighting Factor = 1)	
	Impact / Score	Weighted Score	Impact / Score	Weighted Score	Impact / Score	Weighted Score
Drought	Low / 1	3	High / 3	6	High / 3	3
Earthquake	High / 3	9	High / 3	6	Low / 1	1
Flood	Low / 1	3	Low / 1	2	Low / 1	1
Landslide	Medium / 2	6	High / 3	6	Low / 1	1
Severe Weather	Medium / 2	6	Low / 1	2	Low / 1	1
Wildfire	Medium / 2	6	Medium / 2	4	Medium / 2	2

14.3 RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property, and continuity of operations, as summarized in Table 14-3.

Table 14-3. Hazard Risk Rating

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Drought	3	(3+6+3) = 12	3x12=36
Earthquake	3	(9+6+1) = 16	3x16=48
Flood	3	(3+2+1) = 6	3x6=18
Landslide	3	(6+6+1) = 13	3x13=39
Severe Weather	3	(6+2+1) = 9	3x9=27
Wildfire	3	(6+4+2) = 12	3x12 =36

Based on these ratings, a priority of high, medium, or low was assigned to each hazard. Generally, score of 30 or greater receive a “high” rating, score between 15 and 29 receive a “medium” rating, and score of less than 15 receives a “low” rating. The hazards ranked as being of highest concern are earthquake and severe weather. Hazards ranked as being of medium concern are landslide, flood, and wildfire. The hazards ranked as being of lowest concern are drought and dam failure. Figure 14-1 shows the hazard risk ranking.

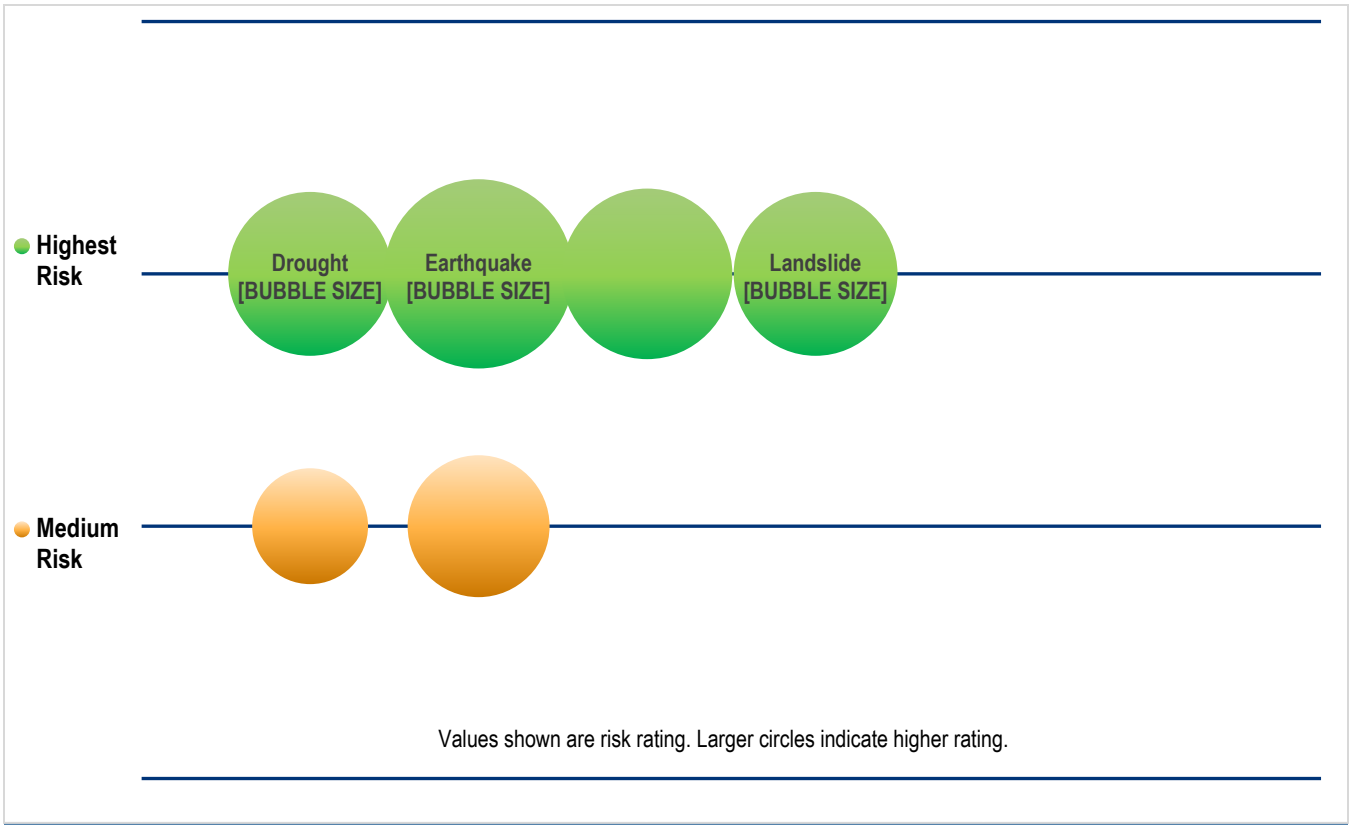


Figure 14-1. Hazard Risk Rating

15. OTHER HAZARDS OF INTEREST

The hazards of concern assessed in this plan are those that present significant risks in the CVWD service area. Additional hazards, both natural and human-caused, were identified by the Steering Committee as having some potential to impact the planning area, but at a much lower risk level than the hazards of concern. These other hazards are identified as hazards of interest.

The sections below provide short profiles of each hazard of interest, including qualitative discussion of their potential to impact the District. No formal risk assessment of these hazards was performed, and no mitigation initiatives have been developed to address them. However, the District should be aware of these hazards and should take steps to reduce the risks they present whenever it is practical to do so.

15.1 CYBER-THREATS

This risk assessment includes cyber-attacks and cyber-terrorism under the single hazard of cyber-threats. While all cyber-terrorism is a form of cyber-attack, not all cyber-attacks are cyber-terrorism.

15.1.1 Background

Cyber-Attacks

A cyber-attack is an intentional and malicious crime that compromises the digital infrastructure of a person or organization, often for financial or terror-related reasons. Such attacks vary in nature and are perpetrated using digital mediums or sometimes social engineering to target human operators. Generally, attacks last minutes to days, but large-scale events and their impacts can last much longer. As information technology continues to grow in capability and interconnectivity, cyber-attacks become increasingly frequent and destructive. According to the Ponemon Institute's *2015 Cost of Cyber Crime*, the cost of cyber-crime in the U.S. is at an annual average of $15.4 million per company.

Cyber-threats differ by motive, attack type and perpetrator profile. Motives range from the pursuit of financial gain to political or social aims. Attack types include using viruses to erase entire systems, breaking into systems and altering files, using someone's personal computer to attack others, or stealing confidential information. Such threats having a wide range of effects on individuals, communities, and organizations (FEMA 2013).

Computer systems can experience a variety of cyber-attacks, from blanket malware infection to targeted attacks on system capabilities. Cyber-attacks seek to breach IT security measures designed to protect an individual or organization. The initial attack is followed by more severe attacks for the purpose of causing harm, stealing data, or financial gain. Organizations are prone to different types of attacks that can be either automated or targeted in nature. Table 15-1 describes the most common cyber-attack mechanisms faced by organizations today.

Table 15-1. Common Mechanisms for Cyber-Attacks

Type	Description
Advanced Persistent Threat (APT)	An attack in which the attacker gains access to a network and remains undetected. APT attacks are designed to steal data instead of cause damage.
Denial of Service Attacks	Attacks that focus on disrupting service to a network in which attackers send high volumes of data until the network becomes overloaded and can no longer function.
Drive-by Downloads	Malware is downloaded unknowingly by the victims when they visit an infected site.
Malvertising	Malware downloaded to a system when the victim clicks on an affected ad.
Man in the Middle	Man-in-the-Middle attacks mirror victims and endpoints for online information exchange. In this type of attack, the attacker communicates with the victims, who believe they are interacting with a legitimate endpoint website. The attacker is also communicating with the actual endpoint website by impersonating the victim. As the process goes through, the attacker obtains entered and received information from both the victim and endpoint.
Password Attacks	Third party attempts to crack a user's password and subsequently gain access to a system. Password attacks do not typically require malware, but rather stem from software applications on the attacker's system. These applications may use a variety of methods to gain access, including generating large numbers of generated guesses, or dictionary attacks, in which passwords are systematically tested against all of the words in a dictionary.
Phishing	Malicious email messages that ask users to click a link or download a program. Phishing attacks may appear as legitimate emails from trusted third parties.
Ransomware	Occurs when an individual downloads ransom malware, or ransomware, often through phishing or drive-by download, and the subsequent execution of code results in encryption of all data and personal files stored on the system. The victim then receives a message that demands a fee in the form of electronic currency or cryptocurrency, such as Bitcoin, for the decryption code
Socially Engineered Trojans	Programs designed to mimic legitimate processes (e.g. updating software, running fake antivirus software) with the end goal of human-interaction caused infection. When the victim runs the fake process, the Trojan is installed on the system.
Unpatched Software	Nearly all software has weak points that may be exploited by malware. Most common software exploitations occur with Java, Adobe Reader, and Adobe Flash. These vulnerabilities are often exploited as small amounts of malicious code are often downloaded via drive-by download.

Cyber-Terrorism

Cyber-terrorism is the use of computers and information, particularly over the Internet, to recruit others to an organization's cause, cause physical or financial harm, or cause a severe disruption of infrastructure service. Such disruptions can be driven by religious, political, or other motives. Like traditional terrorism tactics, cyber-terrorism seeks to evoke very strong emotional reactions, but it does so through information technology rather than a physically violent or disruptive action. Cyber-terrorism has three main types of objectives:

- **Organizational**—Cyber-terrorism with an organizational objective includes specific functions outside of or in addition to a typical cyber-attack. Terrorist groups today use the internet on a daily basis. This daily use may include recruitment, training, fundraising, communication, or planning. Organizational cyber-terrorism can use platforms such as social media as a tool to spread a message beyond country borders and instigate physical forms of terrorism. Additionally, organizational goals may use systematic attacks as a tool for training new members of a faction in cyber-warfare.
- **Undermining**—Cyber-terrorism with undermining as an objective seeks to hinder the normal functioning of computer systems, services, or websites. Such methods include defacing, denying, and exposing information. While undermining tactics are typically used due to high dependence on online structures to support vital operational functions, they typically do not result in grave consequences unless undertaken as part of a larger attack. Undermining attacks on computers include the following (Waldron 2011):

- Directing conventional kinetic weapons against computer equipment, a computer facility, or transmission lines to create a physical attack that disrupts the reliability of equipment.
- Using electromagnetic energy, most commonly in the form of an electromagnetic pulse, to create an electronic attack against computer equipment or data transmissions. By overheating circuitry or jamming communications, an electronic attack disrupts the reliability of equipment and the integrity of data.
- Using malicious code directed against computer processing code, instruction logic, or data. The code can generate a stream of malicious network packets that disrupt data or logic by exploiting vulnerability in computer software, or a weakness in computer security practices. This type of cyber-attack can disrupt the reliability of equipment, the integrity of data, and the confidentiality of communications (Wilson 2008)

- **Destructive**—The destructive objective for cyber-terrorism is what organizations fear most. Through the use of computer technology and the Internet, the terrorists seek to inflict destruction or damage on tangible property or assets, and even death or injury to individuals. There are no cases of pure cyber-terrorism as of the date of this plan.

15.1.2 Profile

Location

This hazard is not geography-based. Attacks can originate from any computer to affect any other computer in the world. If a system is connected to the Internet or operating on a wireless frequency, it is susceptible to exploitation. Targets of cyber-attacks can be individual computers, networks, organizations, business sectors, or governments. Financial institutions and retailers are often targeted to extract personal and financial data that can be used to steal money from individuals and banks. The most affected sectors are finance, energy and utilities, and defense and aerospace, as well as communication, retail, and health care. Both public and private operations in Southern California are threatened on a near-daily basis by the millions of currently engineered cyberattacks developed to automatically seek technological vulnerabilities.

Frequency

Cyber-attacks are experienced on a daily basis, often without being noticed. Up-to-date virus protection software used in public and private sectors prevents most cyberattacks from becoming successful. Programs that promote public education on virus protection are an effective way to mitigate cyber-threats.

Severity

There is no index for measuring the severity of a cyber-attack. An international study released by Malwarebytes in 2016 found that cyber-ransom threats caused 34 percent of business victims to lose revenue and 20 percent had to stop business immediately. The study also reported that nearly 60 percent of all cyber-ransom attacks demanded over $1,000, over 20 percent asked for more than $10,000, and 1 percent asked for over $150,000.

Warning Time

There is no warning time for cyber-attacks. The top vector for spreading cyber-ransom threats is email.

15.1.3 Impacts

All critical assets operated by a computer system are exposed to cyber-attacks. A catastrophic cyber-attack can have far-ranging effects on District assets. All critical facilities operated by electricity and/or a computer system are vulnerable to cyber-attacks. Cyber-attacks may affect structures if any critical electronic systems suffer service disruption. For instance, a cyber-attack may cripple the electronic system that controls a cooling system or pressure system within critical infrastructure. This may result in physical damage to the structure from components overheating, or an explosion if pressure relief systems are rendered inoperable. Such failures may not be immediately recognizable as cyber-attacks, appearing at first to be attributable to mechanical malfunctions.

Economic impacts can be far-reaching if a cyber-attack is prolonged for a week or longer. Cyber-attacks can have extensive fiscal impacts. Companies and government services can lose large sums of unrecoverable revenue from site downtime and possible compromise of sensitive confidential data. Cyber-incidents could result in the theft or modification of important data—including personal, agency, or corporate information— and the sabotage of critical processes, including the provision of basic services by government or private-sector entities.

The District will continue to be impacted by cyber-attacks in the future. The nature of these attacks is projected to evolve in sophistication over time. The District has a vested interest is securing its cyber based systems. The reality remains that many computers and networks in organizations of all sizes and industries around the U.S. will continue to suffer intrusion attempts on a daily basis from viruses and malware that are passed through websites and emails.

The America's Water Infrastructure Act assessment that the District is currently performing includes a significant cyber security assessment and recommendations element. The District will integrate elements of this Hazard Mitigation Plan with the America's Water Infrastructure Act assessment as appropriate.

15.2 HAZARDOUS MATERIALS

15.2.1 Definition

A hazardous material is a substance or combination of substances that, because of quantity, concentration, or physical, chemical, or infectious characteristics, may cause or contribute to an increase in mortality or an increase in serious illness, or otherwise pose a hazard to human life, property, or the environment. According to the California State Hazard Mitigation Plan, hazardous materials are substances that are flammable, combustible, explosive, toxic, noxious, corrosive, an oxidizer, an irritant or radioactive. Title 49 of the CFR lists thousands of hazardous materials, including gasoline, insecticides, household cleaning products, and radioactive materials. Even the natural gas used in homes and businesses is a dangerous substance when a leak occurs. State-regulated substances that have the greatest probability of adversely impacting communities are listed in California Code Title 19.

Hazardous materials are present in nearly every city and county in the United States in facilities that produce, store, or use them:

- Fuel storage vessels (both in and above ground)
- Water treatment plants use chlorine to eliminate bacterial contaminants.
- Hazardous materials are transported along interstate highways and railways daily.

- The natural gas used in homes and businesses is a dangerous substance when a leak occurs.
- Many businesses, through intentional action, lack of awareness or accidental occurrences, have contamination in and around their property.

Hazardous material releases can pose a risk to life, public health, air quality, water quality and the environment. They may result in the evacuation of a facility or an entire neighborhood. In addition to the immediate risk, long-term public health and environmental impacts may result from sustained exposure to certain substances.

15.2.2 Types of Incidents

The following are the most common types of hazardous material incidents:

- **Fixed-Facility Hazardous Materials Incident**—A fixed-facility hazardous materials incident is an uncontrolled release from a fixed site of materials that pose a risk to health, safety, and property. Preparation for the incident is possible at a fixed facility because hazardous materials being used or produced are identified in advance to local authorities as required by federal and state laws.
- **Hazardous Materials Transportation Incident**—A hazardous materials transportation incident is any event during transport resulting in uncontrolled release of materials that can pose a risk to health, safety, and property. Transportation incidents are difficult to prepare for because there is little if any notice about what materials could be involved should an accident happen. Transported hazardous wastes include thousands of shipments of radiological materials moved across the United States by ground transportation, mostly medical materials, and low-level radioactive waste. Hazardous materials transportation incidents can occur on any transportation corridor, although most occur on interstate highways, other major federal or state highways, or major rail lines. Many incidents occur in sparsely populated areas and affect very few people. Others are in areas with much higher population densities, such as the January 6, 2005 train accident in Graniteville, South Carolina that released chlorine gas killing nine, injuring 500, and causing the evacuation of 5,400 residents.
- **Interstate Pipeline Hazardous Materials Incident**—There are a significant number of interstate natural gas, heating oil, and petroleum pipelines running through the State of California. These are used to provide natural gas to utilities and to transport these materials from production facilities to end-users.

Hazardous materials are likely accidently released or spilled numerous times each day. Eliminating these widespread substances would be nearly impossible, but the threat of accidental releases or spills may be reduced by mitigation. The following required mitigation efforts pertaining to hazardous substances are implemented through state and federal regulation:

- Fixed Facilities:
  - Process hazard analysis through the California Division of Occupational Safety and Health
  - Policies and procedures, hazard communication, and training
  - Placarding and labeling of containers
  - Hazard assessment
  - Security
  - Process and equipment maintenance
  - Mitigating techniques (flares, showers, mists, containment vessels, failsafe devices)
  - Use of inherently safer alternative products
  - Emergency plans and coordination
  - Response procedures

- Transported:
  - Placards and labeling of containers
  - Proper container for material type
  - Random inspections of transporters
  - Safe handling policies and procedures
  - Hazard communications
  - Training for handlers
  - Permitting
  - Transportation flow studies, e.g., restricting HAZMAT transportation over certain routes.

15.2.3 Oversight

Los Angeles County Public Works is a Unified Program Agency and a Participating Agency to the Los Angeles Los Angeles County Certified Unified Program Agency, which is managed by the Los Angeles County Fire Department Health Hazardous Materials Division.

The City of Glendale Fire Department oversees the Hazardous Material Business Plan Program in compliance with the state's Health and Safety Code (Chapter 6.95). It requires any business that uses, stores, or manufactures hazardous materials to file a Hazardous Material Business Plan with the Fire Department. CVWD complies with these requirements.

15.3 EPIDEMIC/PANDEMIC

An outbreak is defined by the U.S. Centers for Disease Control and Prevention (CDC) as the occurrence of more cases of disease than normally expected within a specific place or group of people over a given period of time. State and local regulations require immediate reporting of any known or suspected outbreaks by health care providers, health care facilities, laboratories, veterinarians, schools, child day care facilities, and food service establishments. An epidemic is a localized outbreak that spreads rapidly and affects a large number of people or animals in a community. A pandemic is an epidemic that occurs worldwide or over a very large area and affects a large number of people or animals.

NOTE REGARDING COVID-19

As this planning process was being completed, the State of California, including Crescenta Valley Water District, and the world have been affected by the COVID-19 pandemic for more than one year. COVID-19 is the disease caused by SARS-CoV-2 virus (severe acute respiratory syndrome coronavirus 2)

The impacts of this crisis have affected the way society prepares for and responds to pandemics. At the time of this plan, the District had minimal operational impact from COVID-19, with the exception of planning for the addition of office space to accommodate social distancing guidelines to enable remote distancing workers to return to the work site.

Data on the impacts from this pandemic and the development policies to respond are being reviewed at the time of this writing and have not been vetted enough to inform this plan update.

Heath hazards may affect the District service area in various ways – bioterrorism, natural disaster, disease outbreak. Each of these situations could have impact on not only residents but also District staff. The District will work with local, state, and federal officials to ensure effective delivery of services during such situations.

Part 3. MITIGATION PLAN

16. GOALS AND OBJECTIVES

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 CFR Section 201.6(c)(3)(i)). The Steering Committee established a set of goals and measurable objectives for this plan, based on data from the preliminary risk assessment and the results of the public involvement strategy. The goals, objectives and actions in this plan all support each other. Objectives were selected that meet multiple goals. Actions were prioritized based on ability to accomplish multiple objectives.

16.1 GOALS

The following goals were set for this hazard mitigation plan:

1. Protect life and property
2. Maintain continuity of essential water and sewer services
3. Increase public awareness of the risks of loss of water/sewer service
4. Facilitate partnerships with recognized stakeholders within the Crescenta Valley and implement a coordination plan between the stakeholders
5. Protect local water supply sources
6. Protect against environmental consequences caused by water and sewer system failure initiated by natural hazards

16.2 OBJECTIVES

The Steering Committee members identified the following plan objectives:

1. Implement activities that assist in protecting lives by making CVWD's infrastructure, critical facilities, and other properties more resistant to natural hazards
2. Protect water quality and supply
3. Properly address aging infrastructure issues to reduce/minimize future hazards and disasters
4. Raise awareness and communicate to the Crescenta Valley Community about the risks to District assets
5. Leverage grant funding and low interest loan programs to implement hazard mitigation capital projects
6. Establish policies to ensure mitigation projects are prioritized for critical facilities, services, and infrastructure
7. Create, rehabilitate, enhance, and preserve local ecosystems to serve as natural hazard mitigation functions

17. MITIGATION BEST PRACTICES

Catalogs of hazard mitigation alternatives were developed that present a broad range of alternatives to be considered for use in the planning area, in compliance with 44 CFR (Section 201.6(c)(3)(ii)). One catalog was developed for each natural hazard of concern evaluated in this plan. The catalogs present alternatives that are categorized in two ways:

- Who would have responsibility for implementation:
  - Individuals (personal scale)
  - Businesses (corporate scale)
  - Government (government scale).
- What the alternative would do:
  - Manipulate the flooding hazard
  - Reduce exposure to the hazard
  - Reduce vulnerability to the hazard
  - Increase the ability to respond to or be prepared for the hazard.

The catalogs list mitigation actions that might be able to reduce the risk of hazards in the planning area. They show a baseline set of alternatives that are backed by a planning process and are consistent with plan goals and objectives. Mitigation actions recommended in this plan were selected from among the alternatives. The following actions in the catalog would generally not be selected as recommended mitigations for this plan:

- Any action that is not feasible
- Any action that is already being implemented
- Any action for which there is an apparently more cost-effective alternative
- Any government action that is beyond the capabilities of the District to implement (government actions in the catalogs are generic to all forms of government, and may not fall within the responsibilities of a water or sewer district)
- Any government action that does not have public or political support

The catalogs for each hazard of concern are presented in Table 17-1 through Table 17-6.

Table 17-1. Alternatives to Mitigate the Drought Hazard

Personal-Scale	Corporate-Scale	Government-Scale[a]
• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Drought-resistant landscapes ❖ Reduce water system losses ❖ Modify plumbing systems (through water saving kits) • **Increase the ability to respond to or be prepared for the hazard:** ❖ Practice active water conservation	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Drought-resistant landscapes ❖ Reduce private water system losses • **Increase the ability to respond to or be prepared for the hazard:** ❖ Practice active water conservation	• **Manipulate the hazard:** ❖ Groundwater recharge through stormwater management • **Reduce exposure to the hazard:** ❖ Identify and create groundwater backup sources • **Reduce vulnerability to the hazard:** ❖ Water use conflict regulations ❖ Reduce water system losses ❖ Distribute water saving kits • **Increase the ability to respond to or be prepared for the hazard:** ❖ Public education on drought resistance ❖ Encourage recycling ❖ Identify alternative water supplies for times of drought, mutual aid agreements with alternative suppliers ❖ Develop drought contingency plan ❖ Develop criteria "triggers" for drought-related actions ❖ Improve accuracy of water supply forecasts ❖ Modify rate structure to influence active water conservation techniques ❖ Increase emergency storage capacity

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water or sewer district.

Table 17-2. Alternatives to Mitigate the Earthquake Hazard

Personal-Scale	Corporate-Scale	Government-Scale[a]
• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ Locate outside of hazard area (off soft soils) • **Reduce vulnerability to the hazard:** ❖ Retrofit structure (anchor house structure to foundation) ❖ Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances) ❖ Build to higher design • **Increase the ability to respond to or be prepared for the hazard:** ❖ Practice "drop, cover, and hold" ❖ Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event ❖ Keep cash reserves for reconstruction ❖ Become informed on the hazard and risk reduction alternatives available. ❖ Develop a post-disaster action plan for your household	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ Locate or relocate mission-critical functions outside hazard area where possible • **Reduce vulnerability to the hazard:** ❖ Build redundancy for critical functions and facilities ❖ Retrofit critical buildings and areas housing mission-critical functions • **Increase the ability to respond to or be prepared for the hazard:** ❖ Adopt higher standard for new construction; consider "performance-based design" when building new structures ❖ Keep cash reserves for reconstruction ❖ Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility. ❖ Develop a continuity of operations plan	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ Locate critical facilities or functions outside hazard area where possible • **Reduce vulnerability to the hazard:** ❖ Harden infrastructure ❖ Provide redundancy for critical functions ❖ Adopt higher regulatory standards ❖ Perform seismic retrofits for vulnerable critical buildings and areas • **Increase the ability to respond to or be prepared for the hazard:** ❖ Provide better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas (e.g., tax incentives, information) ❖ Include retrofitting and replacement of critical system elements in capital improvement plan ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components such as pipe, spare well pumps, power line, and road repair materials ❖ Develop and adopt a continuity of operations plan ❖ Initiate triggers guiding improvements (such as <50% substantial damage or improvements) ❖ Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities. ❖ Develop a post-disaster action plan that includes grant funding and debris removal components.

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water or sewer district.

Table 17-3. Alternatives to Mitigate the Flood Hazard

Personal-Scale	Corporate-Scale	Government-Scale[a]
• **Manipulate the hazard:** ❖ Clear storm drains and culverts ❖ Use low-impact development • **Reduce exposure to the hazard:** ❖ Locate outside of hazard area ❖ Elevate utilities above base flood elevation ❖ Use low-impact development techniques • **Reduce vulnerability to the hazard:** ❖ Raise structures above base flood elevation ❖ Elevate items within house above base flood elevation ❖ Build new homes above base flood elevation ❖ Flood-proof structures • **Increase the ability to respond to or be prepared for the hazard:** ❖ Buy flood insurance ❖ Develop household plan, such as retrofit savings, communication, 72-hour self-sufficiency during and after an event	• **Manipulate the hazard:** ❖ Clear storm drains and culverts ❖ Use low-impact development • **Reduce exposure to the hazard:** ❖ Locate critical facilities outside hazard area ❖ Use low-impact development techniques • **Reduce vulnerability to the hazard:** ❖ Build critical function redundancy or retrofit critical buildings ❖ Provide flood-proofing when new critical infrastructure must be located in floodplains • **Increase the ability to respond to or be prepared for the hazard:** ❖ Keep cash reserves for reconstruction ❖ Support and implement hazard disclosure for sale of property in risk zones. ❖ Solicit cost-sharing through partnerships on projects with multiple benefits.	• **Manipulate the hazard:** ❖ Maintain drainage system ❖ Institute low-impact development techniques on property ❖ Dredging, levee construction, and providing regional retention areas ❖ Structural flood control, levees, channelization, or revetments. ❖ Stormwater management regulations and master planning ❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff • **Reduce exposure to the hazard:** ❖ Locate or relocate critical facilities outside of hazard area ❖ Acquire or relocate identified repetitive loss properties ❖ Promote open space uses in high hazard areas via techniques such as planned unit developments, easements, setbacks, greenways, sensitive area tracks. ❖ Adopt development criteria such as planned unit developments, density transfers, clustering ❖ Institute low impact development techniques on property ❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff • **Reduce vulnerability to the hazard:** ❖ Harden infrastructure, bridge replacement program ❖ Provide redundancy for critical functions and infrastructure ❖ Adopt regulations for freeboard, cumulative substantial improvement, substantial damage, compensatory storage, non-conversion deed restrictions. ❖ Stormwater management regulations and master planning. ❖ Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Produce better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) ❖ Incorporate retrofitting or replacement of critical system elements in capital improvement plan ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components ❖ Develop and adopt a continuity of operations plan ❖ Maintain and collect data to define risks and vulnerability ❖ Train emergency responders ❖ Create an elevation inventory of structures in the floodplain ❖ Develop and implement a public information strategy ❖ Charge a hazard mitigation fee ❖ Integrate floodplain management policies into other planning mechanisms within the planning area. ❖ Consider climate change impacts on the risk associated with the flood hazard ❖ Consider the residual risk associated with structural flood control in future land use decisions ❖ Enforce National Flood Insurance Program ❖ Adopt a Stormwater Management Master Plan

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water or sewer district.

Table 17-4. Alternatives to Mitigate the Landslide Hazard

Personal-Scale	Corporate-Scale	Government-Scale[a]
• **Manipulate the hazard:** ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope ❖ Minimize vegetation removal and the addition of impervious surfaces. • **Reduce exposure to the hazard:** ❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area) • **Reduce vulnerability to the hazard:** ❖ Retrofit home • **Increase the ability to respond to or be prepared for the hazard:** ❖ Institute warning system, and develop evacuation plan ❖ Keep cash reserves for reconstruction ❖ Educate yourself on risk reduction techniques for landslide hazards	• **Manipulate the hazard:** ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope • **Reduce exposure to the hazard:** ❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area) • **Reduce vulnerability to the hazard:** ❖ Retrofit at-risk facilities • **Increase the ability to respond to or be prepared for the hazard:** ❖ Institute warning system, and develop evacuation plan ❖ Keep cash reserves for reconstruction ❖ Develop a continuity of operations plan ❖ Educate employees on the potential exposure to landslide hazards and emergency response protocol.	• **Manipulate the hazard:** ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope • **Reduce exposure to the hazard:** ❖ Acquire properties in high-risk landslide areas. ❖ Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas. • **Reduce vulnerability to the hazard:** ❖ Adopt higher regulatory standards for new development within unstable slope areas. ❖ Armor/retrofit critical infrastructure against the impact of landslides. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Produce better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas: better land controls, tax incentives, information ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components ❖ Develop and adopt a continuity of operations plan ❖ Educate the public on the landslide hazard and appropriate risk reduction alternatives.

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water or sewer district.

Table 17-5. Alternatives to Mitigate the Severe Weather Hazard

Personal-Scale	Corporate-Scale	Government-Scale[a]
• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Insulate house ❖ Provide redundant heat and power ❖ Insulate structure ❖ Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program) • **Increase the ability to respond to or be prepared for the hazard:** ❖ Trim or remove trees that could affect power lines ❖ Promote 72-hour self-sufficiency ❖ Obtain a NOAA weather radio. ❖ Obtain an emergency generator.	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Relocate critical infrastructure (such as power lines) underground ❖ Reinforce or relocate critical infrastructure such as power lines to meet performance expectations ❖ Install tree wire • **Increase the ability to respond to or be prepared for the hazard:** ❖ Trim or remove trees that could affect power lines ❖ Create redundancy ❖ Equip facilities with a NOAA weather radio ❖ Equip vital facilities with emergency power sources.	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Harden infrastructure such as locating utilities underground ❖ Trim trees back from power lines ❖ Consider "cool roofs" and "green roofs" • **Increase the ability to respond to or be prepared for the hazard:** ❖ Support programs such as "Tree Watch" that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc. ❖ Establish and enforce building codes that require all roofs to withstand snow loads ❖ Increase communication alternatives ❖ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. ❖ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines ❖ Provide NOAA weather radios to the public

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water or sewer district.

Table 17-6. Alternatives to Mitigate the Wildfire Hazard

Personal-Scale	Corporate-Scale	Government-Scale[a]
• **Manipulate the hazard:** ❖ Clear potential fuels on property such as dry overgrown underbrush and diseased trees • **Reduce exposure to the hazard:** ❖ Create and maintain defensible space around structures ❖ Locate outside of hazard area ❖ Mow regularly • **Reduce vulnerability to the hazard:** ❖ Create and maintain defensible space around structures and provide water on site ❖ Use fire-retardant building materials ❖ Create defensible spaces around home • **Increase the ability to respond to or be prepared for the hazard:** ❖ Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home ❖ Identify alternative water supplies for fire fighting ❖ Install/replace roofing material with non-combustible roofing materials.	• **Manipulate the hazard:** ❖ Clear potential fuels on property such as dry underbrush and diseased trees • **Reduce exposure to the hazard:** ❖ Create and maintain defensible space around structures and infrastructure ❖ Locate outside of hazard area • **Reduce vulnerability to the hazard:** ❖ Create and maintain defensible space around structures and infrastructure and provide water on site ❖ Use fire-retardant building materials ❖ Use fire-resistant plantings in buffer areas of high wildfire threat. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Support Firewise community initiatives. ❖ Create /establish stored water supplies to be utilized for firefighting.	• **Manipulate the hazard:** ❖ Clear potential fuels on property such as dry underbrush and diseased trees ❖ Implement best management practices on public lands. • **Reduce exposure to the hazard:** ❖ Create and maintain defensible space around structures and infrastructure ❖ Locate outside of hazard area ❖ Enhance building code to include use of fire resistant materials in high hazard area. • **Reduce vulnerability to the hazard:** ❖ Create and maintain defensible space around structures and infrastructure ❖ Use fire-retardant building materials ❖ Use fire-resistant plantings in buffer areas of high wildfire threat. ❖ Consider higher regulatory standards (such as Class A roofing) ❖ Establish biomass reclamation activities • **Increase the ability to respond to or be prepared for the hazard:** ❖ More public outreach and education efforts, including an active Firewise program ❖ Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas ❖ Identify fire response and alternative evacuation routes ❖ Seek alternative water supplies ❖ Become a Firewise community ❖ Use academia to study impacts/solutions to wildfire risk ❖ Establish/maintain mutual aid agreements between fire service agencies. ❖ Create/implement fire plans ❖ Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water or sewer district.

18. MITIGATION ACTIONS

18.1 RECOMMENDED MITIGATION ACTIONS

The Steering Committee selected actions to be included in a hazard mitigation action plan based on the risk assessment of identified hazards of concern and the defined hazard mitigation goals and objectives. Table 18-1 lists the recommended hazard mitigation actions that make up the action plan (actions are not listed by priority in this table; prioritization is described below). The timeframe indicated in the table is defined as follows:

- Short-term = Completion within 5 years
- Long-term = Completion within 10 years

Table 18-1. Hazard Mitigation Action Plan Matrix

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action #1 -- Acquire stationary emergency electric generators for Main Booster Stations (2 total)						
Hazards Mitigated:	Earthquake, Flood, Wildfire, Severe Weather, Landslide					
New	1,2,5	CVWD	N/A	High ($1.1 Million)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #2 – Acquire stationary emergency electric generators for well sites (5 total sites)						
Hazards Mitigated:	Earthquake, Flood, Wildfire, Sever Weather, Landslide					
New	1,2,5	CVWD	N/A	Med ($885,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #3 – Acquire portable emergency electric generators for booster stations (4 total)						
Hazards Mitigated:	Earthquake, Flood, Wildfire, Severe Weather, Landslide					
New	1,2,5	CVWD	N/A	Low ($475,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #4 – Acquire portable emergency electric generators for well sites (4 total)						
Hazards Mitigated:	Earthquake, Flood, Wildfire, Severe Weather, Landslide					
New	1,2,5	CVWD	N/A	Low ($140,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #5 – Install seismic sensors and valve actuators on reservoir inlet/outlet valves (4 sites)						
Hazards Mitigated:	Earthquake					
New	1,2,3,4,5	CVWD	N/A	Med ($320,000)	FEMA HMA Grant funding, District Funds	Short term
Action #6 – Install security cameras at reservoir and well sites (88 cameras total)						
Hazards Mitigated:	Earthquake, wildfire, severe weather, landslide, flood					
New	1,2,4,5	CVWD	N/A	Low ($175,000)	Homeland Security Grant Program, EMPG, District Funds	Long Term
Action #7 – Install an emergency chlorine / ammonia portable station						
Hazards Mitigated	Earthquake, wildfire, severe weather, landslide					
New	1,2	CVWD	N/A	Low ($125,000)	District funds, EPA grant funding	Long term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action #8 – Conduct seismic evaluation study of existing CVWD building (4 buildings)						
Hazards Mitigated:	Earthquake					
New	1,3,4,6	CVWD	N/A	Low ($110,000)	District funds, FEMA HMA grant funding	Short term
Action #9 – Seismically upgrade/retrofit CVWD buildings						
Hazards Mitigated:	Earthquake					
New	1,3,4,7	CVWD	N/A	High ($2.1 Million)	FEMA HMA Grant funding, District Funds for Local Match	Long term
Action #10 – Repair slope and inlet/outlet pipeline at Edmund #2 Reservoir						
Hazards Mitigated:	Earthquake, wildfire, landslide					
New	1,2,3,4	CVWD	N/A	High ($170,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #11 – Replace above ground outlet pipe at Gross Canyon Reservoir such that it will mitigate the future impacts from Earthquake, Landslide and Wildfire events.						
Hazards Mitigated:	Earthquake, wildfire, landslide					
New	1,2,3,4	CVWD	N/A	High ($225,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #12 – Conduct feasibility study for relocation / upgrades to access roads at reservoirs						
Hazards Mitigated:	Earthquake, wildfire, sever weather, landslide, flood					
Existing	1,3,4,5,6	CVWD	N/A	Low ($95,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #13 – Relocate access roadway at Pickens Canyon Reservoir						
Hazards Mitigated:	Earthquake, wildfire, landslide, flood					
Existing	1,3,4	CVWD	N/A	High ($2.1 Million)	FEMA HMA Grant funding, District Funds for Local Match	Long Term
Action #14 – Retrofit access road to Edmund #2 Reservoir						
Hazards Mitigated:	Earthquake, wildfire, landslide, flood					
Existing	1,3,4	CVWD	N/A	High ($1.15 million)	FEMA HMA Grant funding, District Funds for Local Match	Long Term
Action #15 – Retrofit access roadway at Shields Reservoir						
Hazards Mitigated:	Earthquake, wildfire, landslide, flood					
New and Existing	1,3,4	CVWD		High ($850,000)	FEMA HMA Grant funding, District Funds for Local Match	Long term
Action #16 – Retrofit CVWD / La Cañada Irrigation District interconnection at Canalda Dr.						
Hazards Mitigated:	Drought, Earthquake, wildfire, severe weather, landslide					
New	1,2,3,4	CVWD	N/A	Med ($75,000)	FEMA HMA Grant funding, District Funds for Local Match	Long term
Action #17 – Install emergency interconnection pipeline among Glendale/FMWD/CVWD						
Hazards Mitigated:	Drought, Earthquake, wildfire, Flood					
New and Existing	1,2,3,4,5	CVWD	FMWD, Glendale	High ($1.35 Million)	District funds, grant funding	Long term
Action #18 – Conduct feasibility study for sewer bypass system for large diameter pipeline with Glendale						
Hazards Mitigated:	Earthquake, wildfire, landslide, flood					
New	1,3,4,6	CVWD	Glendale	Low ($55,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #19 – Install sewer bypass system for large diameter pipeline with Glendale						
Hazards Mitigated:	Earthquake, wildfire, landslide, flood					
New	1,2,3,4,	CVWD	Glendale	High ($2.25 million)	FEMA HMA Grant funding, District Funds for Local Match	Long term

Applies to New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline
Action #20 – Conduct feasibility study of protection of water & sewer pipeline within Caltrans Bridge Freeway crossing						
Hazards Mitigated:	Earthquake					
New	1,3,4,6	CVWD	N/A	Low ($75,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #21 – Conduct feasibility study for new water storage facility and pipeline crossings of Pickens Canyon						
Hazards Mitigated:	Drought, Earthquake, wildfire, landslide, flood					
New and Existing	1,3,4,6	CVWD	N/A	Low ($95,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #22 – Conduct feasibility study for pipeline crossing of LA County Flood Control Channels						
Hazards Mitigated:	Earthquake, wildfire, landslide, flood					
New	1,3,4,6	CVWD	N/A	Low ($75,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term
Action #23 – Develop Emergency Community Water Fulfillment Center						
Hazards Mitigated:	Drought, Earthquake, wildfire, landslide, flood					
New	1,3,4	CVWD		Low ($50,000)	FEMA HMA Grant funding, District Funds for Local Match	Short term

18.2 ACTION PLAN PRIORITIZATION

The actions recommended in the action plan were prioritized based on the following factors:

- Cost and availability of funding
- Benefit, based on likely risk reduction to be achieved
- Number of plan objectives achieved
- Timeframe for project implementation
- Eligibility for grand funding programs

Two priorities were assigned for each action:

- A high, medium, or low priority for implementing the action
- A high, medium, or low priority for pursuing grant funding for the action.

The sections below describe the analysis of benefits and costs and the assignment of the two priority ratings.

18.2.1 Benefit/Cost Review

The action plan must be prioritized according to a benefit/cost analysis of the proposed actions (44 CFR, Section 201.6(c)(3)(iii)). For this hazard mitigation plan, a qualitative benefit-cost review was performed for each action by assigning ratings for benefit and cost as follows:

- Cost:
  - **High**—Existing funding will not cover the cost of the action; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee or water rate increases).
  - **Medium**—The action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.

  - **Low**—The action could be funded under the existing budget. The action is part of or can be part of an ongoing existing program.

- Benefit:
  - **High—**Action will provide an immediate reduction of risk exposure for life and property.
  - **Medium—**Action will have a long-term impact on the reduction of risk exposure for life and property, or action will provide an immediate reduction in the risk exposure for property.
  - **Low—**Long-term benefits of the action are difficult to quantify in the short term.

To assign priorities, each action with a benefit rating equal to or higher than its cost rating (such as high benefit/medium cost, medium benefit/medium cost, medium benefit/low cost, etc.) was considered to be cost-beneficial. This is not the detailed level of benefit/cost analysis required for some FEMA hazard-related grant programs. Such analysis would be performed at the time a given action is being submitted for grant funding.

18.2.2 Implementation Priority

Implementation priority ratings were assigned as follows:

- **High Priority**—An action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
- **Medium Priority**—An action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the short term (1 to 5 years), once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
- **Low Priority**—An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions may be eligible for grant funding from programs that have not yet been identified.

18.2.3 Grant Pursuit Priority

Grant pursuit priority ratings were assigned as follows:

- **High Priority**—An action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.
- **Medium Priority**—An action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
- **Low Priority**—An action that has not been identified as meeting any grant eligibility requirements.

18.2.4 Prioritization Summary for Mitigation Actions

Table 18-2 lists the priority of each recommended action.

Table 18-2. Mitigation Action Priority

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/ Budgets?	Implementation Priority	Grant Pursuit Priority
1	3	High	High	Yes	Yes	No	Medium	High
2	3	High	Med	Yes	Yes	No	Medium	High
3	3	High	Low	Yes	Yes	No	Medium	High
4	3	High	Low	Yes	Yes	No	Medium	High
5	5	High	Med	Yes	Yes	No	Medium	Low
6	4	High	Low	Yes	Yes	No	Medium	Low
7	2	High	Low	Yes	Yes	Yes	High	Low
8	4	High	Low	Yes	Yes	Yes	High	Low
9	4	High	High	Yes	Yes	No	Medium	Low
10	4	High	High	Yes	Yes	No	Medium	Medium
11	4	High	High	Yes	Yes	No	Medium	Medium
12	5	High	Low	Yes	Yes	Yes	High	Low
13	3	High	High	Yes	Yes	No	Medium	Medium
14	3	High	High	Yes	Yes	No	Low	Low
15	3	High	High	Yes	Yes	No	Low	Low
16	4	High	Med	Yes	Yes	Yes	High	Low
17	5	High	High	Yes	Yes	No	Medium	Medium
18	4	High	Low	Yes	Yes	Yes	High	Low
19	4	High	High	Yes	Yes	No	Medium	Medium
20	4	Med	Low	Yes	Yes	Yes	High	Low
21	4	Med	Low	Yes	Yes	Yes	High	Low
22	4	Med	Low	Yes	Yes	Yes	High	Low
23	3	Med	Low	Yes	Yes	No	Low	Low

18.3 CLASSIFICATION OF MITIGATION ACTIONS

Each recommended action was classified based on the hazard it addresses and the type of mitigation it involves. Table 18-3 shows these classifications. Mitigation types used for this categorization are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform customers and local officials about hazards and ways to mitigate them. Includes outreach projects, hazard information centers, and school-age and adult education.

Table 18-3. Analysis of Mitigation Actions

Hazard Type	Action Addressing Hazard, by Mitigation Type							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
High-Risk Hazards								
Earthquake	5, 6, 8, 12, 18, 20, 21, 22	7, 9, 12, 13, 14, 15, 16, 19, 20, 22	23		1, 2, 3, 4, 23	10, 11, 17		8, 12, 18, 20, 21, 22, 23
Landslide	6, 12, 18, 21, 22	7, 12, 13, 14, 15, 16, 19, 22	23		1, 2, 3, 4, 23	10, 11, 17		12, 18, 21, 22, 23
Drought	21	16	23		23	17		21, 23
Wildfire	6, 12, 18, 21, 22	7, 12, 13, 14, 15, 16, 19, 22	23		1, 2, 3, 4, 23	10, 11, 17		12, 18, 21, 22, 23
Medium-Risk Hazards								
Severe Weather	6, 12	7, 12	23		1, 2, 3, 4, 23			12, 23
Flood	6, 12, 18, 21, 22	7, 12, 13, 14, 15, 16, 19, 22	23		1, 2, 3, 4, 23	17		12, 18, 21, 22, 23
Low-Risk Hazards								
None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, wetland restoration and preservation, and green infrastructure.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resiliency**—Actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building**—Actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

18.4 ACTION PLAN IMPLEMENTATION

The mitigation action plan presents a range of action items for reducing loss from hazard events. The District has prioritized actions and can begin to implement the highest-priority actions over the next five years. The effectiveness of the hazard mitigation plan depends on its effective implementation and incorporation of the outlined action items into all relevant District plans, policies, and programs. Some action items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. The District will have lead responsibility for overseeing the plan implementation.

19. PLAN ADOPTION AND MAINTENANCE

19.1 PLAN ADOPTION

The governing body of the jurisdiction requesting federal approval of a hazard mitigation plan must formally adopt the plan and document the action (44 CFR Section 201.6(c)(5)). DMA compliance and its benefits cannot be achieved until the plan is adopted. This plan was submitted for a pre-adoption review to Cal OES and FEMA Region IX prior to adoption. Once pre-adoption approval was provided, the District formally adopted the plan. The plan was then approved by FEMA. The District Board of Directors resolution adopting this plan and the FEMA letter of approval are provided in Appendix D.

19.2 PLAN MAINTENANCE STRATEGY

Plan maintenance is the formal process for achieving the following:

- Ensuring that the hazard mitigation plan remains an active and relevant document and that the adopting jurisdiction maintains its eligibility for applicable funding sources
- Monitoring and evaluating the plan annually and producing an updated plan every five years
- Integrating public participation throughout the plan maintenance and implementation process
- Incorporating the mitigation actions outlined in the plan into existing planning mechanisms and programs.

To achieve these ends, a hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A method and schedule for monitoring, evaluating, and updating the mitigation plan within a 5-year cycle
- An approach for how the community will continue public participation in the plan maintenance process.
- A process by which local governments will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate

Table 19-1 summarizes the plan maintenance strategy. The sections below further describe each element.

19.2.1 Plan Implementation and Monitoring

The effectiveness of the hazard mitigation plan depends on monitoring, implementation, and incorporation of its action items into existing District plans, policies, and programs. Together, the action items in the plan provide a framework for activities that the District can implement over the next five years. The Planning Team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be

implemented through existing plans, policies, and programs. The Director of Engineering will have individual responsibility for overseeing the plan monitoring and implementation strategy as summarized in Table 19-1.

Table 19-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Preparation of status updates and action implementation tracking as part of submission for Annual Progress Report.	Biennial after the adoption and final approval of the plan by FEMA. Reporting period TBD	Director of Engineering	Steering Committee
Evaluation	Review the status of previous actions as submitted by the monitoring task lead and support the assessment of the effectiveness of the plan; compile the Annual Progress Report; assess appropriate action for preparing next hazard mitigation plan update.	Biennial after final plan approval by FEMA, or following a major disaster that significantly impacts the District	Director of Engineering	Steering Committee
Update	The District will complete a comprehensive update to this plan every 5 years. Plan update to be facilitated through oversight of a stakeholder Steering Committee	Every 5 years or after a major disaster that significantly impacts the District	Director of Engineering	Steering Committee
Continuing Public Involvement	The principle means for providing the public access to the implementation of this plan will be the District Hazard Mitigation Plan website.	Annually	Director of Engineering	Public Affairs Manager
Plan Integration	Integrate relevant information from hazard mitigation plan into other plans and programs where viable and opportunities arise	Ongoing	Director of Engineering	N/A

19.2.2 Plan Evaluation

The plan will be evaluated by how successfully the implementation of identified actions has helped to achieve the goals and objectives identified in this plan. This will be assessed by a review of the changes in risk that occur over the performance period and by the degree to which mitigation goals and objectives are incorporated into existing plans, policies, and programs. The minimum task of the District will be the evaluation of the progress of its action plan during a 12-month performance period. This review will include the following:

- Summary of any hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation.

The evaluation will be summarized in an annual progress report. This report should be used as follows:

- Posted on the District website page dedicated to the hazard mitigation plan
- Presented to the District board to inform them of the progress of actions implemented

Uses of the progress report will be at the discretion of the Director of Engineering. Annual progress reporting is not a requirement specified under 44 CFR. However, it may enhance the District's opportunities for funding. While failure to implement this component of the plan maintenance strategy will not jeopardize the District's compliance under the DMA, it may jeopardize its opportunity to partner and leverage funding opportunities with the other stakeholders in the planning area.

An oversight committee with representation similar to the Steering Committee that oversaw the development of this plan should have an active role in the plan evaluation. The new steering committee will review the annual progress report and provide input to the District on possible enhancements to be considered at the next update.

19.2.3 Plan Update

Federal regulations require that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits awarded under the Disaster Mitigation Act (44 CFR Section 201.6.d(3)). This plan's format allows the District to review and update sections when new data become available. New data can be easily incorporated, resulting in a plan that will remain current and relevant. The District intends to update the plan on a five-year cycle from the date of plan approval. This cycle may be accelerated to less than 5 years based on the following triggers:

- A presidential disaster declaration that impacts the planning area
- A hazard event that causes loss of life

It will not be the intent of the update process to develop a completely new hazard mitigation plan. Based on needs identified by the Planning Team, the update will, at a minimum, include the following elements:

- The update process will be convened through a new steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or District policies identified under other planning mechanisms.
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The Board of Directors will adopt the updated plan.

Future plan updates will be overseen by a steering committee similar to the one that participated in this update process, so keeping an interim steering committee intact will provide a head start on future updates. The steering committee's role will be to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

19.2.4 Continuing Public Participation

The public will continue to be apprised of the plan's progress through the District website, including providing copies of annual progress reports on the website. This site will not only house the final plan, it will become the one-stop shop for information regarding the plan and plan implementation. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of the District at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

19.2.5 Incorporation into Other Planning Mechanisms

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time this update was prepared. This planning process provided the District with the opportunity to identify, review and expand on core capabilities of the District that could support or enhance the outcomes of this plan. Opportunities for integration identified by this planning process include:

- District Strategic Plan
- District Master Plans
- District emergency response plans
- America's Water Infrastructure Act plan – in process
- Capital improvement programs

Some action items do not need to be implemented through regulation. Instead, they can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

REFERENCES

California Department of Finance. 2020. Demographics Research Unit. Accessed at: http://www.dof.ca.gov/forecasting/demographics/

California Department of Water Resources (California DWR). 2020. California's Most Significant Droughts: Comparing Historical and Recent Conditions. January 2020. Accessed at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/What-We-Do/Drought-Mitigation/Files/Publications-And-Reports/a6022_CalSigDroughts19_v9_ay11.pdf

Crescenta Valley Water District. 2019. Strategic Plan 2020. October 2019.

City of Glendale. 2021. "Hazardous Material Business Plan Program." Page on City of Glendale Fire Department website. Accessed at https://www.glendaleca.gov/government/departments/fire-department/fire-prevention/environmental-management-center/hazardous-materials-business-plan

Federal Emergency Management Agency (FEMA). 2020. Disasters. Accessed at https://www.fema.gov/disasters.

Los Angeles County Waterworks Districts. 2020. Los Angeles County Water Management Plans.

Los Angeles Time. 1993. Bracing for a Reprise of '83, '88 Calamities: Weather: Devastating storms in those years left flooding and destruction in their wakes. This one shouldn't be as bad. January 6, 1993. Accessed at: https://www.latimes.com/archives/la-xpm-1993-01-06-me-950-story.html

National Drought Mitigation Center. 2020. Tustin, CA (1970-2019). Accessed at: https://droughtreporter.unl.edu/advancedsearch/impacts.aspx

National Weather Service (NWS). 1978. report on the Southern California Floods, Flash Floods and Mud Slides of February 8 – 10, 1978. Prepared by Western Regional Headquarters, National Weather Service. Salt Lake City, Utah. December 8, 1978. Accessed at: https://www.weather.gov/media/publications/assessments/Southern%20CA%20Flash%20Floods%20Feb%201978.pdf

National Weather Service (NWS). 2017. A History of Significant Weather Events in Southern California; Organized by Weather Type. May 2017 Accessed at: https://www.weather.gov/media/sgx/documents/weatherhistory.pdf

National Weather Service (NWS). 2020. Understand Tornado Alerts. Accessed at: https://www.weather.gov/safety/tornado-ww

National Oceanic and Atmospheric Administration (NOAA). 2021. NOAA Storm Events Database. https://www.ncdc.noaa.gov/stormevents/

National Oceanic and Atmospheric Administration (NOAA). 2020a. Climate Change: Global Sea Level. August 14, 2020. Accessed at: https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level

National Oceanic and Atmospheric Administration (NOAA). 2020b. Global and Regional Sea Level Rise Scenarios for the United States. January 2017. Accessed at: https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf

Orange County. 1986. Orange County Hydrology Manual. Accessed at: https://www.ocflood.com/civicax/filebank/blobdload.aspx?BlobID=8336

Orange County. 2015. County of Orange and Orange County Fire Authority Local Hazard Mitigation Plan. November 2015. Accessed at: http://cams.ocgov.com/Web_Publisher/Agenda07_12_2016_files/images/O00216-000668A.PDF

Orange County Fire Authority. 2020. "Vegetation Management." Accessed at: https://www.ocfa.org/RSG/VegetationManagement

Orange County Public Works. 2020. "Flood Protection." Orange County Infrastructure Programs. Accessed at: https://www.ocflood.com/civicax/filebank/blobdload.aspx?blobid=114998

Orange County Public Works. 2020a. "Local Flood Hazard." Orange County Infrastructure Programs. Accessed at: https://www.ocflood.com/safety/protection/hazard

Orange County Register. 2010. O.C. storm damage tops $33 million. December 31, 2020. Accessed at: https://www.ocregister.com/2010/12/31/oc-storm-damage-tops-33-million-2/

Santiago Fire. 2020. Accessed at: https://en.wikipedia.org/wiki/Santiago_Fire

Taylor and Francis Online. 2020. The Unusual Storms of February 1992 in Southern California. May 15, 2013. Accessed at: https://www.tandfonline.com/doi/abs/10.1080/02723646.1994.10642528

U.S. Census. 2020. QuickFacts. North Tustin, CA. Accessed at: https://www.census.gov/quickfacts/fact/table/northtustincdpcalifornia,tustincitycalifornia/PST045219

U.S. Census. 2020. QuickFacts. Tustin, CA. Accessed at: https://www.census.gov/quickfacts/tustincitycalifornia

U.S. Department of Health and Human Services, Office of Minority Health. February 2008. "Cultural Competency in Disaster Response: A Review of Current Concepts, Policies, and Practices."

U.S. Geological Survey (USGS). 1975. Summary of Floods in the United States During 1969. Accessed at: https://pubs.usgs.gov/wsp/2030/report.pdf

U.S. Geological Survey (USGS). 1991. Floods of February 1980 in Southern California and Central Arizona. Accessed at: https://pubs.usgs.gov/pp/1494/report.pdf

U.S. Geological Survey (USGS). 1993. Southern California Storms and Floods of January-February 1993. Accessed at: https://pubs.usgs.gov/of/1993/0411/report.pdf

U.S. Geological Survey (USGS). 2020. Earthquake Hazards Program Unified Hazard Tool; Earthquake Hazard and Probability Maps. Accessed at: https://earthquake.usgs.gov/hazards/interactive/

Upper Los Angeles River Area (ULARA) Watermaster. 2021. "Watermaster Service in the Upper Los Angeles River Area." Page of the ULARA Watermaster web site. Accessed at http://ularawatermaster.com/index.html?page_id=589

Western Regional Climate Center. 2020. "Santa Ana Fire Station" https://wrcc.dri.edu/summary/Climsmsca.html.

Western Regional Climate Center. 2020a. "Tustin Irvine Ranch." https://wrcc.dri.edu/summary/Climsmsca.html

Wikipedia. 2020. Severe weather terminology (United States). Accessed at: https://en.wikipedia.org/wiki/Severe_weather_terminology_(United_States)

Crescenta Valley Water District Hazard Mitigation Plan

Appendix A. Public Involvement Materials

A. PUBLIC INVOLVEMENT MATERIALS

To Be Completed for Next Draft

Appendix B. Summary of Federal and State Agencies, Programs and Regulations

B. Summary of Federal and State Agencies, Programs and Regulations

Existing laws, ordinances, plans and programs at the federal and state level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan. Information presented in this section can be used to review local capabilities to implement mitigation actions. A review of local plans, studies, reports, and technical information is provided in Chapter 4 of this hazard mitigation plan.

FEDERAL

Americans with Disabilities Act

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or other visual alerts. Two technical documents for shelter operators address physical accessibility needs of people with disabilities, as well as medical needs and service animals.

The ADA intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Bureau of Land Management

The U.S. Bureau of Land Management (BLM) funds and coordinates wildfire management programs and structural fire management and prevention on BLM lands. BLM works closely with the Forest Service and state and local governments to coordinate fire safety activities. The Interagency Fire Coordination Center in Boise, Idaho serves as the center for this effort.

Civil Rights Act of 1964

The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex, or nation origin and requires equal access to public places and employment. The Act is relevant to emergency management and hazard mitigation in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, and pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Numerous issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

The CWA is important to hazard mitigation in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for mitigation projects identified by a local jurisdiction. Additionally, CWA requirements apply to wetlands, which serve important functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community's floodplain management program. Finally, the National Pollutant Discharge Elimination System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in hazard mitigation by addressing urban drainage or localized flooding issues within jurisdictions.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Community Development Block Grant Disaster Resilience Program

In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery

grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of FEMA, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria:

- Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster
- Be a CDBG-eligible activity (according to regulations and waivers)
- Meet a national objective.

Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger. CDBG-DR funding is a potential alternative source of funding for actions identified in this plan.

Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The discount partially depends on location of the property. Properties outside the special flood hazard area receive smaller discounts: a 10-percent discount if the community is at Class 1 to 6 and a 5-percent discount if the community is at Class 7 to 9. The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation’s flood risk; over 66 percent of the NFIP’s policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

Disaster Mitigation Act

The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds.

Emergency Relief for Federally Owned Roads Program

The U.S. Forest Service's Emergency Relief for Federally Owned Roads Program was established to assist federal agencies with repair or reconstruction of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to public travel and have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure. The program funds both emergency and permanent repairs (Office of Federal Lands Highway, 2016). Eligible activities under this program meet some of the goals and objectives for this plan and the program is a possible funding source for actions identified in this plan.

Emergency Watershed Program

The USDA Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, which responds to emergencies created by natural disasters. Eligibility for assistance is not dependent on a national emergency declaration. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. EWP is an emergency recovery program. Financial and technical assistance are available for the following activities (Natural Resources Conservation Service, 2016):

- Remove debris from stream channels, road culverts, and bridges
- Reshape and protect eroded banks
- Correct damaged drainage facilities
- Establish cover on critically eroding lands
- Repair levees and structures
- Repair conservation practices.

This federal program could be a possible funding source for actions identified in this plan.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- Endangered means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- Threatened means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.
- Critical habitat means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

- Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.
- Section 9: Prohibition of Take—It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding, or sheltering.
- Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."
- Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. More than 3,000 dams are part of regulated hydroelectric projects in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity

grows, so oversight and regular inspection are important. FERC inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet.

FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication Engineering Guidelines for the Evaluation of Hydropower Projects guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

Federal Wildfire Management Policy and Healthy Forests Restoration Act

Federal Wildfire Management Policy and Healthy Forests Restoration Act (2003). These documents call for a single comprehensive federal fire policy for the Interior and Agriculture Departments (the agencies using federal fire management resources). They mandate community-based collaboration to reduce risks from wildfire.

National Dam Safety Act

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:

- Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act
- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's

leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.

National Environmental Policy Act

The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input from organizations and individuals that could be affected, and an unbiased presentation of direct, indirect, and cumulative environmental impacts. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

National Fire Plan (2001)

The 2001 National Fire Plan was developed based on the National Fire Policy. A major aspect of the National Fire Plan is joint risk reduction planning and implementation carried out by federal, state, and local agencies and communities. The National Fire Plan presented a comprehensive strategy in five key initiatives:

- Firefighting—Be adequately prepared to fight fires each fire season.
- Rehabilitation and Restoration—Restore landscapes and rebuild communities damaged by wildfires.
- Hazardous Fuel Reduction—Invest in projects to reduce fire risk.
- Community Assistance—Work directly with communities to ensure adequate protection.
- Accountability—Be accountable and establish adequate oversight, coordination, program development, and monitoring for performance.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act.

For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent-annual-chance flood and the 0.2-percent-annual-chance flood. Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principle tool for identifying the extent and location of the flood hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under the local floodplain management program. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments, and stakeholders.

NFIP participants must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 1-percent-annual-chance flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

NFIP participation is limited to local governments that possess permit authority and have the ability to adopt and enforce regulations that govern land use. This does not typically apply to special purpose districts.

National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, technological hazards, and human-caused hazards) regardless of size or complexity.

Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered as a response function, and information in this hazard mitigation plan can support the implementation and update of all NIMS-compliant plans within the planning area.

Presidential Executive Order 11988, Floodplain Management

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. It requires federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities (FEMA, 2015a):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

Presidential Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities (National Archives, 2016):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation, and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection, and regulatory status (U.S. Army Corps of Engineers, 2017).

U.S. Army Corps of Engineers Flood Hazard Management

The following U.S. Army Corps of Engineers authorities and programs related to flood hazard management:

- The Floodplain Management Services program offers 100-percent federally funded technical services such as development and interpretation of site-specific data related to the extent, duration, and frequency of flooding. Special studies may be conducted to help a community understand and respond to flood risk. These may include flood hazard evaluation, flood warning and preparedness, or flood modeling.
- For more extensive studies, the Corps of Engineers offers a cost-shared program called Planning Assistance to States and Tribes. Studies under this program generally range from $25,000 to $100,000 with the local jurisdiction providing 50 percent of the cost.
- The Corps of Engineers has several cost-shared programs (typically 65 percent federal and 35 percent non-federal) aimed at developing, evaluating, and implementing structural and non-structural capital projects to address flood risks at specific locations or within a specific watershed:
  - The Continuing Authorities Program for smaller-scale projects includes Section 205 for Flood Control, with a $7 million federal limit and Section 14 for Emergency Streambank Protection with a $1.5 million federal limit. These can be implemented without specific authorization from Congress.
  - Larger scale studies, referred to as General Investigations, and projects for flood risk management, for ecosystem restoration or to address other water resource issues, can be pursued through a specific authorization from Congress and are cost-shared, typically at 65 percent federal and 35 percent non-federal.
  - Watershed management planning studies can be specifically authorized and are cost-shared at 50 percent federal and 50 percent non-federal.

- The Corps of Engineers provides emergency response assistance during and following natural disasters. Public Law 84-99 enables the Corps to assist state and local authorities in flood fight activities and cost share in the repair of flood protective structures. Assistance is provided in the flowing categories:
  - Preparedness—The Flood Control and Coastal Emergency Act establishes an emergency fund for preparedness for emergency response to natural disasters; for flood fighting and rescue operations; for rehabilitation of flood control and hurricane protection structures. Funding for Corps of Engineers emergency response under this authority is provided by Congress through the annual Energy and Water Development Appropriation Act. Disaster preparedness activities include coordination, planning, training and conduct of response exercises with local, state, and federal agencies.
  - Response Activities—Public Law 84-99 allows the Corps of Engineers to supplement state and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a project cooperation agreement signed by the public sponsor and the sponsor must remove all flood fight material after the flood has receded. Public Law 84-99 also authorizes emergency water support and drought assistance in certain situations and allows for "advance measures" assistance to prevent or reduce flood damage conditions of imminent threat of unusual flooding.
  - Rehabilitation—Under Public Law 84-99, an eligible flood protection system can be rehabilitated if damaged by a flood event. The flood system would be restored to its pre-disaster status at no cost to the federal system owner, and at 20-percent cost to the eligible non-federal system owner. All systems considered eligible for Public Law 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program prior to the flood event. Acceptable operation and maintenance by the public levee sponsor are verified by levee inspections conducted by the Corps on a regular basis. The Corps has the responsibility to coordinate levee repair issues with interested federal, state, and local agencies following natural disaster events where flood control works are damaged.

These authorities and programs are all available to support any related hazard mitigation actions.

U.S. Fire Administration

There are federal agencies that provide technical support to fire agencies/organizations. For example, the U.S. Fire Administration, which is a part of FEMA, provides leadership, advocacy, coordination, and support for fire agencies and organizations.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service fire management strategy uses prescribed fire to maintain early successional fire-adapted grasslands and other ecological communities throughout the National Wildlife Refuge system.

STATE

AB 32: The California Global Warming Solutions Act

This bill identifies the following potential adverse impacts of global warming:

> "… the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."

AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels), with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as "cap and-trade" programs—to ensure that the required reductions occur.

The Air Resources Board has adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

Assembly Bill 756: Public Water System PFAs

Existing law, the California Safe Drinking Water Act, requires the State Water Resources Control Board to administer provisions relating to the regulation of drinking water to protect public health, including, but not limited to, conducting research, studies, and demonstration programs relating to the provision of a dependable, safe supply of drinking water, enforcing the federal Safe Drinking Water Act, adopting implementing regulations, and conducting studies and investigations to assess the quality of water in private domestic water supplies. Under the California Safe Drinking Water Act, the implementing regulations are required to include, but are not limited to, monitoring of contaminants and requirements for notifying the public of the quality of the water delivered to customers.

This bill authorizes the state Water Resources Control Board to order a public water system to monitor for perfluoroalkyl substances and polyfluoroalkyl substances (PFAs). It requires a community water system or a non-transient noncommunity water system, upon a detection of these substances, to report that detection, as specified. The bill requires a community water system or a non-transient noncommunity water system where a detected level of these substances exceeds the response level to take a water source where the detected levels exceed the response level out of use or provide a prescribed public notification.

AB 2800: Climate Change—Infrastructure Planning

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent construction of buildings used for human occupancy on the surface trace of active faults. Before a new project is

permitted, cities and counties require a geologic investigation to demonstrate that proposed buildings will not be constructed on active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards, such as liquefaction or seismically induced landslides. The law requires the State of California Geologist to establish regulatory zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. All seismic hazard mitigation actions identified in this plan will seek full compliance with the Alquist-Priolo Earthquake Fault Zoning Act.

California Department of Forestry and Fire Protection

CAL FIRE has responsibility for wildfires in areas that are not under the jurisdiction of the Forest Service or a local fire organization, including lands designated as State Responsibility Areas. CAL FIRE also has fire protection responsibilities by contract and mutual aid agreements. For example, CAL FIRE provides year-round fire protection under Amador Plan agreements with certain local government agencies (Public Resources Code §4144). Through these agreements, CAL FIRE provides local structural and wildfire protection or dispatch services to a community and maintains a staffing level that otherwise would be available only during the fire season. The local entity pays the additional cost of the service.

California Department of Parks and Recreation (State Parks)

State Parks manages portions of the California coastline including coastal wetlands, estuaries, beaches, and dune systems. The State Parks Resources Management Division has limited wildfire protection resources available to suppress fires on State Park lands. State Parks does not operate a fire station in Humboldt County and relies on CAL FIRE as the primary wildfire protection resource for the lands under its management. State Parks cooperates with CAL FIRE and Redwood National Park on prescribed burns and can provide limited mutual aid.

California Department Water Resources

In California, the DWR is the coordinating agency for floodplain management. The DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management programs, reviewing local floodplain ordinances, participating in statewide flood hazard mitigation planning, and facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by the DWR.

California Division of Safety of Dams

California's Division of Safety of Dams (a division of the DWR) monitors the dam safety program at the state level and maintains a working list of dams in the state. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam to ensure that it is performing as intended and is not developing problems. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards

and hydrologic estimates in California. Over 1,200 dams are inspected by Division engineers on a yearly schedule to ensure performance and maintenance of dams (California Division of Safety of Dams, 2017).

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government enacted the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision-making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. Jurisdictions conduct analysis of the project to determine if there are potentially significant environmental impacts, identify mitigation measures, and possible project alternatives by preparing environmental reports for projects that requires CEQA review. This environmental review is required before an agency takes action on any policy, program, or project. Any project action identified in this plan will seek full CEQA compliance upon implementation.

California Fire Alliance

The California Fire Alliance (CFA) was established in response to directives from the 2001 National Fire Plan. The CFA pursues four strategies to deal with the National Fire Plan's community assistance initiative:

- Work with communities at risk from wildfires to develop community-based planning leadership and facilitate the development of community fire loss mitigation plans, which transcend jurisdiction and ownership boundaries.
- Assist communities in development of fire loss mitigation planning, education, and projects to reduce the threat of wildfire losses on public and private lands.
- Develop an information and education outreach plan to increase awareness of wildfire protection program opportunities available to communities at risk.
- Work collaboratively to develop, modify, and maintain a comprehensive list of communities at risk.

California Fire Plan

The State Board of Forestry and CAL FIRE have prepared a comprehensive update of the California Fire Plan for wildfire protection. The planning process included defining a level of service measurement; considering assets at risk; incorporating the cooperative interdependent relationships of wildfire protection providers; providing for public stakeholder involvement; and creating a fiscal framework for policy analysis. The California Fire Plan's overall goal is to reduce costs and losses from wildfire in the state by protecting assets at risk through pre-fire management and by reducing the spread of fire through more successful initial response.

California Fire Safe Council

In 1993, the statewide Fire Safe Council, consisting of private and public membership, was formed to educate and encourage Californians to plan and prepare for wildfires by reducing the risk of fire to property, communities, and natural/structural resources. In 2002, this group created a nonprofit organization and board of directors, called the

California Fire Safe Council. The Council works with the California Fire Alliance to facilitate the distribution of National Fire Plan grants for wildfire risk reduction and education (www.grants.firesafecouncil.org). The Council also provides assistance to local Fire Safe Councils through its website (www.firesafecouncil.org), the distribution of educational materials, and technical assistance, primarily through regional representatives. More than 130 local Fire Safe Councils have formed in California to plan, coordinate, and implement fire prevention activities.

California Fire Service and Rescue Emergency Mutual Aid Plan

The Governor's Office of Emergency Services Fire and Rescue Branch administers the California Fire Service and Rescue Emergency Mutual Aid Plan. The agency provides guidance and procedures for agencies developing emergency operations plans, as well as training and technical support, primarily to overall emergency service organizations and urban search and rescue teams.

California Multi-Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan to be eligible for certain disaster assistance and mitigation funding. The intent of the State of California Multi-Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Under 44 CFR Section 201.6, local hazard mitigation plans must be consistent with their state's hazard mitigation plan. In updating this plan, the Steering Committee reviewed the California State Hazard Mitigation Plan to identify key relevant state plan elements.

California Residential Mitigation Program

The California Residential Mitigation Program was established in 2011 to help Californians strengthen their homes against damage from earthquakes. The program is a joint powers authority created by Cal OES and the California Earthquake Authority, which is a not-for-profit, publicly managed, privately funded provider of home earthquake insurance to California homeowners and renters.

Earthquake Brace + Bolt was developed to help homeowners lessen the potential for damage to their houses during an earthquake. A residential seismic retrofit strengthens an existing older house, making it more resistant to earthquake activity such as ground shaking and soil failure. The seismic retrofitting involves bolting the house to its foundation and adding bracing around the perimeter of the crawl space. Most homeowners hire a contractor to do the retrofit work, and owners of houses in ZIP Codes with house characteristics suitable for this type of retrofit are eligible for up to $3,000 toward the cost. A typical retrofit by a contractor may cost between $3,000

and $7,000, depending on the location and size of the house, contractor fees, and the amount of materials and work involved. If the homeowner is an experienced do-it-yourselfer, a retrofit can cost less than $3,000.

California Water Use Efficiency Legislation

Two long-term water-use efficiency/conservation bills signed into law in 2018 (SB 606 and AB 1668) are intended to help the state better prepare for droughts and climate change. One of the biggest components of the bills is the creation of water-use objectives for water agencies (not individual households or businesses). Local water agencies are responsible for calculating their water-use objective and determining whether their systemwide, aggregate water use meets that objective. If necessary, they will also have flexibility in how best to help customers use water more efficiently, such as conservation rebates and educational programs.

Starting in 2027, the State Water Board could issue fines to local water agencies that have not met their water-use objectives. These fines would be levied on agencies, not individuals. The bills also establish new planning and submittal requirements for Agricultural Water Management and Urban Water Management plans. Water agencies must calculate their system-wide, water-use objectives by November 2023 based on the following components:

- Water efficiency standards for indoor water use—This will be based on a provisional standard of 55 gallons of water a day per person served by the water agency.
- Outdoor water use—This standard is still being determined but will account for local climate and irrigable acres.
- Commercial, industrial, and institutional landscape irrigation
- Water loss (system leaks)
- Unique local circumstances (e.g., livestock water use)
- Credit for recycled water use

Disadvantaged and Low-Income Communities Investments

Senate Bill (SB) 535 directs state and local agencies to make investments that benefit California's disadvantaged communities. It also directs the California Environmental Protection Agency to identify disadvantaged communities for the purposes of these investments based on geographic, socio-economic, public health, and environmental hazard criteria. Assembly Bill (AB) 1550 increased the percent of funds for projects located in disadvantaged communities from 10 to 25 percent and added a focus on investments in low-income communities and households. This program is a potential alternative source of funding for actions identified in this plan.

Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.

- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

Office of the State Fire Marshal

The Office of the State Fire Marshal is a division of CAL FIRE that has a wide variety of fire safety and training responsibilities and provides technical support to fire agencies/organizations.

Senate Bill 97: Guidelines for Greenhouse Gas Emissions

Senate Bill 97, enacted in 2007, amends CEQA to clearly establish that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for CEQA analysis. It directs the Governor's Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects by July 1, 2009 and directs the California Natural Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

Standardized Emergency Management System

California Code Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The system is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system by December 1, 1996, to be eligible for state funding of response-related personnel costs under California Code Title 19 (Sections 2920, 2925 and 2930). The roles and responsibilities of Individual agencies contained in existing laws or the state emergency plan are not superseded by these regulations. This hazard mitigation plan is considered to be a support document for all phases of emergency management, including those associated with the system.

Western Governors Association Ten-Year Comprehensive Strategy

The Western Governors Association Ten-Year Comprehensive Strategy: A Collaborative Approach for Reducing Wildfire Risks to Communities and the Environment (August 2001),

Crescenta Valley Water District Hazard Mitigation Plan

Appendix C. Detailed Risk Assessment Results

C. Detailed Risk Assessment Results

EARTHQUAKE IMPACTS ON POTABLE WATER BUILDINGS

Sierra Madre M7.1 Scenario Event

Damage Probability

Facility Name	Probability of Experiencing Listed Level of Damage				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Structural					
Crescenta Valley Water District Office	0.59%	17.03%	56.17%	22.83%	3.35%
Glenwood Plant	1.89%	26.98%	46.53%	20.49%	4.08%
Markridge Building	0.99%	7.21%	44.88%	42.19%	4.70%
Ordunio Building	6.57%	20.29%	46.85%	23.13%	3.15%
Nonstructural, Acceleration-Sensitive					
Crescenta Valley Water District Office	11.58%	32.87%	30.97%	20.69%	3.87%
Glenwood Plant	13.07%	32.46%	27.10%	22.71%	4.63%
Markridge Building	9.42%	30.70%	32.79%	22.49%	4.58%
Ordunio Building	12.06%	33.25%	30.51%	20.34%	3.81%
Nonstructural, Drift-Sensitive					
Crescenta Valley Water District Office	1.27%	11.14%	51.45%	29.84%	6.27%
Glenwood Plant	3.20%	17.61%	48.06%	25.96%	5.15%
Markridge Building	1.85%	12.68%	49.75%	29.03%	6.67%
Ordunio Building	8.72%	26.41%	43.06%	18.23%	3.56%

Estimated Loss

Facility Name	Structure Replacement Cost	Estimated Loss			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total
Crescenta Valley Water District Office	$3,700,000	$146,899	$323,100	$244,773	**$714,771**
Glenwood Plant	$2,150,000	$80,461	$164,712	$152,240	**$397,414**
Markridge Building	$1,510,000	$88,096	$131,157	$109,967	**$329,220**
Ordunio Building	$820,000	$31,132	$47,288	$53,445	**$131,865**

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Crescenta Valley Water District Office	0.50	1.40	17.50	17.60	73.70	96.60
Glenwood Plant	1.80	3.10	28.70	28.80	75.40	95.80
Markridge Building	0.90	1.30	8.10	8.20	53.00	95.20
Ordunio Building	6.50	7.50	26.80	26.80	73.70	96.80

Verdugo M6.9 Scenario Event

Damage Probability

Facility Name	Probability of Experiencing Listed Level of Damage				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Structural					
Crescenta Valley Water District Office	0.39%	13.95%	56.63%	25.47%	3.54%
Glenwood Plant	0.56%	16.03%	52.86%	26.18%	4.35%
Markridge Building	1.30%	8.50%	46.44%	39.43%	4.30%
Ordunio Building	4.26%	16.48%	48.74%	27.20%	3.30%
Nonstructural, Acceleration-Sensitive					
Crescenta Valley Water District Office	9.14%	30.49%	33.27%	22.81%	4.27%
Glenwood Plant	8.28%	28.31%	31.61%	26.44%	5.33%
Markridge Building	8.61%	29.85%	33.76%	23.37%	4.38%
Ordunio Building	8.82%	30.11%	33.56%	23.14%	4.33%
Nonstructural, Drift-Sensitive					
Crescenta Valley Water District Office	0.91%	9.17%	50.23%	32.30%	7.37%
Glenwood Plant	1.20%	10.48%	48.43%	32.63%	7.24%
Markridge Building	2.31%	14.29%	49.98%	27.42%	5.98%
Ordunio Building	6.10%	22.89%	46.55%	20.49%	3.96%

Estimated Loss

Facility Name	Structure Replacement Cost	Estimated Loss			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total
Crescenta Valley Water District Office	$3,700,000	$157,493	$349,417	$266,450	**$773,360**
Glenwood Plant	$2,150,000	$94,964	$202,204	$174,849	**$472,017**
Markridge Building	$1,510,000	$83,461	$124,026	$111,022	**$318,509**
Ordunio Building	$820,000	$34,742	$52,149	$59,762	**$146,653**

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Crescenta Valley Water District Office	0.30	1.00	14.30	14.30	70.90	96.40
Glenwood Plant	0.50	1.30	16.50	16.50	69.40	95.60
Markridge Building	1.30	1.70	9.70	9.80	56.20	95.60
Ordunio Building	4.20	5.00	20.60	20.70	69.40	96.60

Puente Hills M6.95 Scenario Event

Damage Probability

Facility Name	Probability of Experiencing Listed Level of Damage				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Structural					
Crescenta Valley Water District Office	1.33%	24.33%	52.64%	18.53%	3.14%
Glenwood Plant	1.25%	22.90%	49.55%	22.13%	4.14%
Markridge Building	4.26%	16.48%	48.74%	27.20%	3.30%
Ordunio Building	12.86%	26.37%	39.89%	17.82%	3.04%
Nonstructural, Acceleration-Sensitive					
Crescenta Valley Water District Office	10.82%	32.21%	31.68%	21.28%	3.97%
Glenwood Plant	9.13%	29.27%	30.82%	25.61%	5.15%
Markridge Building	10.40%	31.81%	32.09%	21.64%	4.04%
Ordunio Building	11.59%	32.88%	30.95%	20.68%	3.87%
Nonstructural, Drift-Sensitive					
Crescenta Valley Water District Office	2.44%	15.85%	51.97%	25.01%	4.71%
Glenwood Plant	2.30%	14.92%	48.91%	28.16%	5.69%
Markridge Building	6.10%	22.89%	46.55%	20.49%	3.96%
Ordunio Building	15.25%	31.33%	34.89%	15.31%	3.20%

Estimated Loss

Facility Name	Structure Replacement Cost	Estimated Loss			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total
Crescenta Valley Water District Office	$3,700,000	$128,732	$276,656	$250,730	**$656,118**
Glenwood Plant	$2,150,000	$84,977	$176,488	$169,796	**$431,260**
Markridge Building	$1,510,000	$63,975	$96,030	$103,857	**$263,862**
Ordunio Building	$820,000	$25,894	$40,461	$54,228	**$120,583**

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Crescenta Valley Water District Office	1.30	2.40	25.50	25.60	78.30	96.80
Glenwood Plant	1.20	2.30	24.00	24.10	73.70	95.80
Markridge Building	4.20	5.00	20.60	20.70	69.40	96.60
Ordunio Building	12.80	14.10	39.10	39.20	79.10	96.90

Northridge M6.89 Scenario Event

Damage Probability

Facility Name	Probability of Experiencing Listed Level of Damage				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Structural					
Crescenta Valley Water District Office	47.11%	46.00%	6.73%	0.11%	0.01%
Glenwood Plant	45.97%	34.22%	3.95%	12.68%	3.16%
Markridge Building	56.22%	25.76%	11.27%	5.46%	1.28%
Ordunio Building	71.40%	21.26%	7.07%	0.22%	0.01%
Nonstructural, Acceleration-Sensitive					
Crescenta Valley Water District Office	41.03%	41.24%	15.75%	1.87%	0.08%
Glenwood Plant	35.76%	34.34%	12.63%	14.03%	3.22%
Markridge Building	31.88%	40.34%	18.67%	7.69%	1.40%
Ordunio Building	40.37%	41.46%	16.12%	1.94%	0.09%
Nonstructural, Drift-Sensitive					
Crescenta Valley Water District Office	47.45%	36.77%	15.33%	0.40%	0.03%
Glenwood Plant	45.52%	28.44%	10.03%	12.83%	3.16%
Markridge Building	55.20%	28.21%	9.94%	5.35%	1.28%
Ordunio Building	69.24%	24.01%	6.52%	0.19%	0.01%

Estimated Loss

Facility Name	Structure Replacement Cost	Estimated Loss			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total
Crescenta Valley Water District Office	$3,700,000	$12,001	$31,034	$53,086	**$96,121**
Glenwood Plant	$2,150,000	$43,773	$78,987	$96,277	**$219,037**
Markridge Building	$1,510,000	$16,415	$27,543	$45,861	**$89,819**
Ordunio Building	$820,000	$1,988	$3,425	$12,049	**$17,462**

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Crescenta Valley Water District Office	47.10	49.30	92.90	93.10	99.80	99.90
Glenwood Plant	45.90	47.60	80.00	80.10	84.10	96.80
Markridge Building	56.20	57.40	81.90	81.90	93.20	98.70
Ordunio Building	71.40	72.40	92.50	92.60	99.70	99.90

Raymond M6.71 Scenario Event

Damage Probability

Facility Name	Probability of Experiencing Listed Level of Damage				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Structural					
Crescenta Valley Water District Office	31.85%	50.90%	11.61%	4.51%	1.10%
Glenwood Plant	22.31%	44.89%	12.64%	16.14%	4.00%
Markridge Building	65.81%	24.51%	9.36%	0.28%	0.01%
Ordunio Building	76.33%	18.18%	5.31%	0.14%	0.01%
Nonstructural, Acceleration-Sensitive					
Crescenta Valley Water District Office	32.54%	40.65%	18.61%	6.95%	1.22%
Glenwood Plant	23.86%	34.87%	18.25%	18.83%	4.16%
Markridge Building	39.17%	41.85%	16.81%	2.06%	0.09%
Ordunio Building	41.60%	41.07%	15.45%	1.78%	0.07%
Nonstructural, Drift-Sensitive					
Crescenta Valley Water District Office	33.57%	38.22%	21.93%	5.13%	1.12%
Glenwood Plant	24.19%	32.86%	22.01%	16.88%	4.03%
Markridge Building	64.15%	27.18%	8.42%	0.22%	0.01%
Ordunio Building	73.83%	20.99%	5.03%	0.12%	0.01%

Estimated Loss

Facility Name	Structure Replacement Cost	Estimated Loss			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total
Crescenta Valley Water District Office	$3,700,000	$39,529	$81,438	$105,240	**$226,207**
Glenwood Plant	$2,150,000	$58,849	$108,587	$126,721	**$294,156**
Markridge Building	$1,510,000	$4,601	$7,663	$23,002	**$35,265**
Ordunio Building	$820,000	$1,550	$2,754	$11,489	**$15,793**

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Crescenta Valley Water District Office	31.80	34.20	82.60	82.70	94.30	98.80
Glenwood Plant	22.30	24.40	67.00	67.20	79.80	95.90
Markridge Building	65.80	66.90	90.20	90.30	99.60	99.90
Ordunio Building	76.30	77.20	94.40	94.50	99.80	99.90

100-Year Probabilistic Event

Damage Probability

Facility Name	Probability of Experiencing Listed Level of Damage				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Structural					
Crescenta Valley Water District Office	93.39%	6.46%	0.13%	0.00%	0.00%
Glenwood Plant	85.51%	5.92%	0.12%	6.75%	1.68%
Markridge Building	92.84%	6.16%	0.97%	0.01%	0.00%
Ordunio Building	92.84%	6.16%	0.97%	0.01%	0.00%
Nonstructural, Acceleration-Sensitive					
Crescenta Valley Water District Office	63.06%	30.09%	6.41%	0.01%	0.01%
Glenwood Plant	57.74%	27.55%	5.87%	1.70%	1.70%
Markridge Building	58.78%	32.78%	7.85%	0.02%	0.02%
Ordunio Building	58.78%	32.78%	7.85%	0.02%	0.02%
Nonstructural, Drift-Sensitive					
Crescenta Valley Water District Office	90.80%	8.28%	0.90%	0.00%	0.00%
Glenwood Plant	83.14%	7.58%	0.82%	6.75%	1.68%
Markridge Building	90.36%	8.48%	1.12%	0.01%	0.00%
Ordunio Building	90.36%	8.48%	1.12%	0.01%	0.00%

Estimated Loss

Facility Name	Structure Replacement Cost	Estimated Loss			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total
Crescenta Valley Water District Office	$3,700,000	$1,048	$3,243	$23,713	**$28,004**
Glenwood Plant	$2,150,000	$21,425	$37,407	$50,940	**$109,772**
Markridge Building	$1,510,000	$665	$1,479	$11,485	**$13,629**
Ordunio Building	$820,000	$361	$803	$6,237	**$7,401**

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Crescenta Valley Water District Office	83.00	83.60	96.80	96.90	99.80	99.90
Glenwood Plant	75.90	76.60	88.70	88.70	91.40	98.20
Markridge Building	81.60	82.10	92.10	92.10	98.90	99.90
Ordunio Building	81.60	82.10	92.10	92.10	98.90	99.90

EARTHQUAKE IMPACTS ON OTHER POTABLE WATER ASSETS (NOT BUILDINGS)

Sierra Madre M7.1 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Glenwood Aeration	10.45%	32.74%	24.26%	25.63%	6.89%	$190,000	$52,334
Mills Air Tower	11.55%	33.29%	22.71%	25.56%	6.87%	$190,000	$51,826
RAMSDELL	11.98%	40.25%	31.99%	12.74%	3.01%	$510,000	$89,072
Cresta Heights - Motor Control Center	13.15%	46.66%	39.18%	0.98%	0.01%	$200,000	$17,616
Eagle Canyon - Motor Control Center	12.15%	45.81%	40.90%	1.10%	0.01%	$350,000	$31,834
Edmund No. 1 - Motor Control Center	17.98%	42.63%	24.01%	12.36%	3.00%	$350,000	$56,522
Edmund No. 2 - Motor Control Center	12.30%	38.52%	28.54%	16.60%	4.01%	$350,000	$70,620
Encinal - Motor Control Center	11.18%	39.66%	33.31%	12.83%	3.01%	$650,000	$114,969
Glenwood - Motor Control Center	9.59%	32.20%	25.59%	25.71%	6.89%	$500,000	$138,823
Goss Canyon - Motor Control Center	1.41%	9.17%	44.22%	38.99%	6.19%	$200,000	$73,351
Markridge - Motor Control Center	4.02%	28.38%	48.49%	16.03%	3.05%	$550,000	$117,483
Mills - Motor Control Center	6.63%	28.67%	31.17%	26.61%	6.90%	$750,000	$217,313
Oak Creek - Motor Control Center	8.86%	37.42%	37.51%	13.17%	3.01%	$500,000	$92,048
Ordunio - Motor Control Center	14.44%	41.61%	28.39%	12.55%	2.99%	$100,000	$16,859
Paschall - Motor Control Center	0.27%	3.41%	38.78%	49.76%	7.75%	$350,000	$152,577
Rosemont - Motor Control Center	9.24%	37.86%	36.76%	13.10%	3.01%	$250,000	$45,693
Well 11 - Motor Control Center	14.44%	41.61%	28.39%	12.55%	2.99%	$175,000	$29,503
Well 14 - Motor Control Center	11.98%	40.25%	31.99%	12.74%	3.01%	$175,000	$30,564
Well 16 - Motor Control Center	11.98%	40.25%	31.99%	12.74%	3.01%	$175,000	$30,564
Well 5 - Motor Control Center	10.45%	32.74%	24.26%	25.63%	6.89%	$175,000	$48,202
Well 7 - Motor Control Center	11.55%	33.29%	22.71%	25.56%	6.87%	$175,000	$47,735
Well 8 - Motor Control Center	11.55%	33.29%	22.71%	25.55%	6.87%	$175,000	$47,724
Well 9 - Motor Control Center	11.55%	33.29%	22.71%	25.56%	6.87%	$175,000	$47,735
Williams - Motor Control Center	10.33%	38.94%	34.77%	12.94%	3.01%	$175,000	$31,389
Mills Plant - PWTP	11.55%	33.29%	22.71%	25.56%	6.87%	$168,750	$46,030
Oak Creek Reservoir - PWTP	3.36%	26.55%	50.29%	16.71%	3.07%	$75,000	$16,475
Paschall Mixing Station - PWTP	10.33%	38.94%	34.77%	12.94%	3.01%	$18,750	$3,363
Pickens Tunnel - PWTP	15.29%	44.06%	30.06%	8.58%	1.99%	$75,000	$10,388
Pickens Tunnel - PWTP	15.29%	44.06%	30.06%	8.58%	1.99%	$75,000	$10,388
Ramsdell Mixing Station - PWTP	11.98%	40.25%	31.99%	12.74%	3.01%	$718,750	$125,530
Well 11 - PWTP	1.52%	10.11%	49.96%	34.12%	4.27%	$75,000	$24,556
Well 2 - PWTP	14.44%	41.61%	28.39%	12.55%	2.99%	$131,250	$22,127
Well 2 - PWTP	14.44%	41.61%	28.39%	12.55%	2.99%	$100,000	$16,859
Well 5 - PWTP	0.83%	6.46%	38.64%	45.46%	8.59%	$75,000	$31,489
2700 Block of Montrose	11.18%	39.66%	33.31%	12.83%	3.01%	$375,000	$66,328
Community & Pennsylvania	10.33%	38.94%	34.77%	12.94%	3.01%	$375,000	$67,262
Foothill & Cloud	10.33%	38.94%	34.77%	12.94%	3.01%	$375,000	$67,262
Markridge Reservoir	9.24%	37.86%	36.76%	13.10%	3.01%	$250,000	$45,693

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Ocean View & Bristow	16.12%	42.21%	26.21%	12.45%	3.00%	$375,000	$61,920
Ramsdell & Mayfield	11.98%	40.25%	31.99%	12.74%	3.01%	$375,000	$65,494
Rosemont Reservoir	9.24%	37.86%	36.76%	13.10%	3.01%	$250,000	$45,693
Cresta Heights # 1 Reservoir	0.01%	0.10%	6.13%	48.06%	45.68%	$1,000,000	$754,405
Cresta Heights # 2 Reservoir	0.01%	0.09%	5.52%	47.60%	46.76%	$1,000,000	$761,525
Dunsmore Reservoir	0.00%	0.05%	3.32%	40.22%	56.39%	$840,000	$680,589
Eagle Canyon Reservoir	0.00%	0.05%	3.91%	40.98%	55.04%	$3,000,000	$2,406,510
Edmund #1 Reservoir	1.16%	6.00%	37.79%	48.98%	6.04%	$1,562,500	$646,820
Edmund #2 Reservoir	0.03%	0.36%	11.28%	58.73%	29.57%	$1,000,000	$665,180
Encinal Reservoir	0.44%	4.70%	42.63%	45.76%	6.45%	$9,375,000	$3,800,203
Glenwood Forebay Reservoir	0.03%	0.40%	11.30%	56.29%	31.96%	$125,000	$84,311
Goss Canyon #1 Reservoir	0.03%	0.34%	10.58%	58.73%	30.30%	$840,000	$563,993
Goss Canyon #2 Reservoir	0.03%	0.34%	10.58%	58.73%	30.30%	$1,000,000	$671,420
Markridge Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$1,000,000	$907,775
Mills Forebay Reservoir	0.03%	0.30%	9.59%	58.37%	31.68%	$312,500	$212,986
Oak Creek #1 Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$3,200,000	$2,904,880
Oak Creek #2 Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$3,200,000	$2,904,880
Ocean View Reservoir	0.27%	3.41%	38.78%	49.76%	7.75%	$11,250,000	$4,904,269
Ordunio Reservoir	0.04%	0.38%	11.99%	58.73%	28.83%	$5,500,000	$3,623,703
Pickens Reservoir	0.19%	1.44%	21.51%	61.21%	15.62%	$1,000,000	$556,445
Rosemont Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$1,000,000	$907,775
Shields Reservoir	0.08%	0.75%	16.39%	61.30%	21.46%	$1,200,000	$728,832
Cresta Heights	13.15%	46.66%	39.18%	0.98%	0.01%	$487,500	$42,939
Eagle Canyon	12.15%	45.81%	40.90%	1.10%	0.01%	$706,250	$64,237
Edmund No. 1	17.98%	42.63%	24.01%	12.36%	3.00%	$743,750	$120,108
Edmund No. 2	12.30%	38.52%	28.54%	16.60%	4.01%	$750,000	$151,328
Encinal	11.18%	39.66%	33.31%	12.83%	3.01%	$1,362,500	$240,992
Glenwood	9.59%	32.20%	25.59%	25.71%	6.89%	$1,162,500	$322,762
Goss Canyon	6.31%	30.35%	36.32%	21.96%	5.02%	$487,500	$122,662
Markridge	4.02%	28.38%	48.49%	16.03%	3.05%	$1,400,000	$299,047
Mills	6.63%	28.67%	31.17%	26.61%	6.90%	$1,600,000	$463,600
Oak Creek	8.86%	37.42%	37.51%	13.17%	3.01%	$1,312,500	$241,625
Ordunio	14.44%	41.61%	28.39%	12.55%	2.99%	$343,750	$57,953
Paschall	10.33%	38.94%	34.77%	12.94%	3.01%	$1,000,000	$179,365
Rosemont	9.24%	37.86%	36.76%	13.10%	3.01%	$575,000	$105,093
Williams	4.63%	29.88%	46.89%	15.53%	3.04%	$1,243,750	$259,763
Potable Well	11.98%	40.25%	31.99%	12.74%	3.01%	$2,625,000	$458,456
Potable Well	11.55%	33.29%	22.71%	25.56%	6.87%	$2,625,000	$716,021
WEL-12100	14.44%	41.61%	28.39%	12.55%	2.99%	$2,625,000	$442,549
WEL-20100	11.55%	33.29%	22.71%	25.56%	6.87%	$2,625,000	$716,021
WEL-20101	10.45%	32.74%	24.26%	25.63%	6.89%	$2,625,000	$723,030
WEL-20102	13.59%	39.16%	26.72%	16.52%	4.00%	$2,625,000	$521,798
WEL-26100	14.44%	41.61%	28.39%	12.55%	2.99%	$2,625,000	$442,549
WEL-26101	10.45%	32.74%	24.26%	25.63%	6.89%	$2,625,000	$723,030

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
WEL-26102	12.30%	38.52%	28.54%	16.60%	4.01%	$2,625,000	$529,646
WEL-26103	12.30%	38.52%	28.54%	16.60%	4.01%	$2,625,000	$529,646
WEL-27100	11.98%	40.25%	31.99%	12.74%	3.01%	$2,625,000	$458,456
WEL-30100	11.55%	33.29%	22.71%	25.55%	6.87%	$2,625,000	$715,864

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Glenwood Aeration						
Mills Air Tower						
RAMSDELL						
Cresta Heights - Motor Control Center						
Eagle Canyon - Motor Control Center						
Edmund No. 1 - Motor Control Center						
Edmund No. 2 - Motor Control Center						
Encinal - Motor Control Center						
Glenwood - Motor Control Center						
Goss Canyon - Motor Control Center						
Markridge - Motor Control Center						
Mills - Motor Control Center						
Oak Creek - Motor Control Center						
Ordunio - Motor Control Center						
Paschall - Motor Control Center						
Rosemont - Motor Control Center						
Well 11 - Motor Control Center						
Well 14 - Motor Control Center						
Well 16 - Motor Control Center						
Well 5 - Motor Control Center						
Well 7 - Motor Control Center						
Well 8 - Motor Control Center						
Well 9 - Motor Control Center						
Williams - Motor Control Center						
Mills Plant - PWTP						
Oak Creek Reservoir - PWTP						
Paschall Mixing Station - PWTP						
Pickens Tunnel - PWTP						
Pickens Tunnel - PWTP						
Ramsdell Mixing Station - PWTP						
Well 11 - PWTP						
Well 2 - PWTP						
Well 2 - PWTP						
Well 5 - PWTP						
2700 Block of Montrose						
Community & Pennsylvania						

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Foothill & Cloud						
Markridge Reservoir						
Ocean View & Bristow						
Ramsdell & Mayfield						
Rosemont Reservoir						
Cresta Heights # 1 Reservoir						
Cresta Heights # 2 Reservoir						
Dunsmore Reservoir						
Eagle Canyon Reservoir						
Edmund #1 Reservoir						
Edmund #2 Reservoir						
Encinal Reservoir						
Glenwood Forebay Reservoir						
Goss Canyon #1 Reservoir						
Goss Canyon #2 Reservoir						
Markridge Reservoir						
Mills Forebay Reservoir						
Oak Creek #1 Reservoir						
Oak Creek #2 Reservoir						
Ocean View Reservoir						
Ordunio Reservoir						
Pickens Reservoir						
Rosemont Reservoir						
Shields Reservoir						
Cresta Heights						
Eagle Canyon						
Edmund No. 1						
Edmund No. 2						
Encinal						
Glenwood						
Goss Canyon						
Markridge						
Mills						
Oak Creek						
Ordunio						
Paschall						
Rosemont						
Williams						
Potable Well						
Potable Well						
WEL-12100						
WEL-20100						
WEL-20101						
WEL-20102						
WEL-26100						

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
WEL-26101						
WEL-26102						
WEL-26103						
WEL-27100						
WEL-30100						

Verdugo M6.9 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Glenwood Aeration	5.33%	27.47%	33.80%	26.48%	6.90%	$190,000	$55,540
Mills Air Tower	6.53%	29.26%	31.13%	26.16%	6.89%	$190,000	$54,565
RAMSDELL	7.52%	35.68%	40.30%	13.46%	3.02%	$510,000	$96,518
Cresta Heights - Motor Control Center	12.15%	45.81%	40.90%	1.10%	0.01%	$200,000	$18,191
Eagle Canyon - Motor Control Center	10.88%	44.54%	43.25%	1.30%	0.01%	$350,000	$33,266
Edmund No. 1 - Motor Control Center	18.50%	42.70%	23.43%	12.34%	3.00%	$350,000	$56,187
Edmund No. 2 - Motor Control Center	12.30%	38.52%	28.54%	16.60%	4.01%	$350,000	$70,620
Encinal - Motor Control Center	7.52%	35.68%	40.30%	13.46%	3.02%	$650,000	$123,013
Glenwood - Motor Control Center	5.33%	27.47%	33.80%	26.48%	6.90%	$500,000	$146,158
Goss Canyon - Motor Control Center	2.29%	12.07%	44.99%	34.90%	5.72%	$200,000	$68,024
Markridge - Motor Control Center	2.87%	24.95%	51.70%	17.37%	3.08%	$550,000	$123,775
Mills - Motor Control Center	2.30%	19.96%	41.36%	29.40%	6.96%	$750,000	$238,515
Oak Creek - Motor Control Center	7.52%	35.68%	40.30%	13.46%	3.02%	$500,000	$94,625
Ordunio - Motor Control Center	8.86%	37.42%	37.51%	13.17%	3.01%	$100,000	$18,410
Paschall - Motor Control Center	0.08%	1.45%	28.68%	57.41%	12.35%	$350,000	$179,097
Rosemont - Motor Control Center	7.52%	35.68%	40.30%	13.46%	3.02%	$250,000	$47,313
Well 11 - Motor Control Center	8.17%	36.57%	38.91%	13.31%	3.01%	$175,000	$32,657
Well 14 - Motor Control Center	6.66%	34.34%	42.25%	13.70%	3.02%	$175,000	$33,765
Well 16 - Motor Control Center	6.66%	34.34%	42.25%	13.70%	3.02%	$175,000	$33,765
Well 5 - Motor Control Center	6.01%	28.54%	32.24%	26.28%	6.90%	$175,000	$50,629
Well 7 - Motor Control Center	6.53%	29.26%	31.13%	26.16%	6.89%	$175,000	$50,257
Well 8 - Motor Control Center	6.53%	29.26%	31.13%	26.16%	6.89%	$175,000	$50,257
Well 9 - Motor Control Center	6.53%	29.26%	31.13%	26.16%	6.89%	$175,000	$50,257
Williams - Motor Control Center	7.52%	35.68%	40.30%	13.46%	3.02%	$175,000	$33,119
Mills Plant - PWTP	6.53%	29.26%	31.13%	26.16%	6.89%	$168,750	$48,462
Oak Creek Reservoir - PWTP	2.41%	23.22%	53.09%	18.15%	3.10%	$75,000	$17,336
Paschall Mixing Station - PWTP	7.52%	35.68%	40.30%	13.46%	3.02%	$18,750	$3,548
Pickens Tunnel - PWTP	19.04%	45.14%	25.42%	8.38%	1.99%	$75,000	$9,816
Pickens Tunnel - PWTP	19.04%	45.14%	25.42%	8.38%	1.99%	$75,000	$9,816
Ramsdell Mixing Station - PWTP	7.52%	35.68%	40.30%	13.46%	3.02%	$718,750	$136,023
Well 11 - PWTP	0.36%	4.10%	41.00%	47.54%	6.98%	$75,000	$31,394
Well 2 - PWTP	8.86%	37.42%	37.51%	13.17%	3.01%	$131,250	$24,162
Well 2 - PWTP	8.86%	37.42%	37.51%	13.17%	3.01%	$100,000	$18,410

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Well 5 - PWTP	0.28%	3.28%	32.80%	52.92%	10.70%	$75,000	$35,652
2700 Block of Montrose	6.66%	34.34%	42.25%	13.70%	3.02%	$375,000	$72,354
Community & Pennsylvania	6.66%	34.34%	42.25%	13.70%	3.02%	$375,000	$72,354
Foothill & Cloud	6.66%	34.34%	42.25%	13.70%	3.02%	$375,000	$72,354
Markridge Reservoir	8.17%	36.57%	38.91%	13.31%	3.01%	$250,000	$46,653
Ocean View & Bristow	16.12%	42.21%	26.21%	12.45%	3.00%	$375,000	$61,920
Ramsdell & Mayfield	7.52%	35.68%	40.30%	13.46%	3.02%	$375,000	$70,969
Rosemont Reservoir	7.52%	35.68%	40.30%	13.46%	3.02%	$250,000	$47,313
Cresta Heights # 1 Reservoir	0.02%	0.20%	9.25%	54.08%	36.43%	$1,000,000	$702,755
Cresta Heights # 2 Reservoir	0.02%	0.18%	8.32%	53.76%	37.70%	$1,000,000	$712,130
Dunsmore Reservoir	0.01%	0.08%	5.21%	47.37%	47.31%	$840,000	$642,747
Eagle Canyon Reservoir	0.01%	0.10%	6.13%	48.06%	45.68%	$3,000,000	$2,263,215
Edmund #1 Reservoir	4.44%	13.26%	44.31%	34.35%	3.62%	$1,562,500	$492,805
Edmund #2 Reservoir	0.20%	1.53%	22.95%	60.56%	14.73%	$1,000,000	$545,850
Encinal Reservoir	0.13%	2.08%	32.81%	54.73%	10.22%	$9,375,000	$4,507,828
Glenwood Forebay Reservoir	0.00%	0.05%	3.26%	35.25%	61.42%	$125,000	$103,827
Goss Canyon #1 Reservoir	0.07%	0.70%	15.37%	61.55%	22.28%	$840,000	$517,024
Goss Canyon #2 Reservoir	0.07%	0.70%	15.37%	61.55%	22.28%	$1,000,000	$615,505
Markridge Reservoir	0.00%	0.01%	1.34%	27.05%	71.58%	$1,000,000	$880,115
Mills Forebay Reservoir	0.01%	0.06%	4.17%	46.33%	49.41%	$312,500	$243,239
Oak Creek #1 Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$3,200,000	$2,904,880
Oak Creek #2 Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$3,200,000	$2,904,880
Ocean View Reservoir	0.08%	1.45%	28.68%	57.41%	12.35%	$11,250,000	$5,756,682
Ordunio Reservoir	0.02%	0.17%	7.86%	53.60%	38.33%	$5,500,000	$3,942,263
Pickens Reservoir	1.22%	5.43%	35.66%	50.09%	7.58%	$1,000,000	$432,545
Rosemont Reservoir	0.00%	0.01%	0.82%	21.24%	77.91%	$1,000,000	$907,775
Shields Reservoir	0.20%	1.53%	22.95%	60.56%	14.73%	$1,200,000	$655,020
Cresta Heights	12.15%	45.81%	40.90%	1.10%	0.01%	$487,500	$44,341
Eagle Canyon	10.88%	44.54%	43.25%	1.30%	0.01%	$706,250	$67,126
Edmund No. 1	18.50%	42.70%	23.43%	12.34%	3.00%	$743,750	$119,398
Edmund No. 2	12.30%	38.52%	28.54%	16.60%	4.01%	$750,000	$151,328
Encinal	7.52%	35.68%	40.30%	13.46%	3.02%	$1,362,500	$257,853
Glenwood	5.33%	27.47%	33.80%	26.48%	6.90%	$1,162,500	$339,816
Goss Canyon	5.54%	29.18%	37.95%	22.27%	5.03%	$487,500	$124,525
Markridge	2.87%	24.95%	51.70%	17.37%	3.08%	$1,400,000	$315,063
Mills	2.30%	19.96%	41.36%	29.40%	6.96%	$1,600,000	$508,832
Oak Creek	7.52%	35.68%	40.30%	13.46%	3.02%	$1,312,500	$248,391
Ordunio	8.86%	37.42%	37.51%	13.17%	3.01%	$343,750	$63,283
Paschall	7.52%	35.68%	40.30%	13.46%	3.02%	$1,000,000	$189,250
Rosemont	7.52%	35.68%	40.30%	13.46%	3.02%	$575,000	$108,819
Williams	2.41%	23.22%	53.09%	18.15%	3.10%	$1,243,750	$287,487
Potable Well	6.66%	34.34%	42.25%	13.70%	3.02%	$2,625,000	$506,481
Potable Well	6.53%	29.26%	31.13%	26.16%	6.89%	$2,625,000	$753,861
WEL-12100	8.86%	37.42%	37.51%	13.17%	3.01%	$2,625,000	$483,249

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
WEL-20100	6.53%	29.26%	31.13%	26.16%	6.89%	$2,625,000	$753,861
WEL-20101	6.01%	28.54%	32.24%	26.28%	6.90%	$2,625,000	$759,439
WEL-20102	7.69%	34.42%	36.62%	17.23%	4.01%	$2,625,000	$566,003
WEL-26100	8.17%	36.57%	38.91%	13.31%	3.01%	$2,625,000	$489,851
WEL-26101	5.33%	27.47%	33.80%	26.48%	6.90%	$2,625,000	$767,327
WEL-26102	7.08%	33.58%	37.93%	17.37%	4.02%	$2,625,000	$572,526
WEL-26103	6.27%	32.32%	39.77%	17.60%	4.02%	$2,625,000	$581,739
WEL-27100	6.66%	34.34%	42.25%	13.70%	3.02%	$2,625,000	$506,481
WEL-30100	6.53%	29.26%	31.13%	26.16%	6.89%	$2,625,000	$753,861

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Glenwood Aeration	35.00	65.60	72.70	74.70	80.20	95.50
Mills Air Tower	36.60	66.40	73.00	74.90	80.40	95.50
RAMSDELL	41.50	78.80	86.50	87.60	90.30	97.90
Cresta Heights - Motor Control Center	50.40	91.70	99.00	99.10	99.30	99.90
Eagle Canyon - Motor Control Center	48.90	91.10	98.90	99.00	99.20	99.90
Edmund No. 1 - Motor Control Center	52.90	82.80	87.40	88.40	90.90	97.90
Edmund No. 2 - Motor Control Center	45.90	77.40	83.10	84.40	87.80	97.30
Encinal - Motor Control Center	41.50	78.80	86.50	87.60	90.30	97.90
Glenwood - Motor Control Center	35.00	65.60	72.70	74.70	80.20	95.50
Goss Canyon - Motor Control Center	26.00	57.80	67.10	69.70	76.80	95.80
Markridge - Motor Control Center	33.30	73.50	83.40	84.70	88.20	97.80
Mills - Motor Control Center	29.40	61.80	70.40	72.60	78.60	95.30
Oak Creek - Motor Control Center	41.50	78.80	86.50	87.60	90.30	97.90
Ordunio - Motor Control Center	43.20	79.50	86.80	87.80	90.50	97.90
Paschall - Motor Control Center	17.50	36.00	43.30	47.60	59.30	91.60
Rosemont - Motor Control Center	41.50	78.80	86.50	87.60	90.30	97.90
Well 11 - Motor Control Center	42.30	79.20	86.70	87.70	90.40	97.90
Well 14 - Motor Control Center	40.20	78.20	86.30	87.40	90.20	97.90
Well 16 - Motor Control Center	40.20	78.20	86.30	87.40	90.20	97.90
Well 5 - Motor Control Center	35.90	66.10	72.90	74.90	80.30	95.40
Well 7 - Motor Control Center	36.60	66.40	73.00	74.90	80.40	95.50
Well 8 - Motor Control Center	36.60	66.40	73.00	74.90	80.40	95.50
Well 9 - Motor Control Center	36.60	66.40	73.00	74.90	80.40	95.50
Williams - Motor Control Center	41.50	78.80	86.50	87.60	90.30	97.90
Mills Plant - PWTP	36.60	66.40	73.00	74.90	80.40	95.50
Oak Creek Reservoir - PWTP	32.10	72.50	82.80	84.10	87.80	97.70
Paschall Mixing Station - PWTP	41.50	78.80	86.50	87.60	90.30	97.90
Pickens Tunnel - PWTP	54.70	86.60	91.50	92.10	93.80	98.60
Pickens Tunnel - PWTP	54.70	86.60	91.50	92.10	93.80	98.60
Ramsdell Mixing Station - PWTP	41.50	78.80	86.50	87.60	90.30	97.90
Well 11 - PWTP	20.30	46.90	56.00	59.50	69.10	94.80

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Well 2 - PWTP	43.20	79.50	86.80	87.80	90.50	97.90
Well 2 - PWTP	43.20	79.50	86.80	87.80	90.50	97.90
Well 5 - PWTP	18.90	40.50	48.40	52.30	63.10	92.60
2700 Block of Montrose	40.20	78.20	86.30	87.40	90.20	97.90
Community & Pennsylvania	40.20	78.20	86.30	87.40	90.20	97.90
Foothill & Cloud	40.20	78.20	86.30	87.40	90.20	97.90
Markridge Reservoir	42.30	79.20	86.70	87.70	90.40	97.90
Ocean View & Bristow	50.80	82.20	87.40	88.30	90.90	98.00
Ramsdell & Mayfield	41.50	78.80	86.50	87.60	90.30	97.90
Rosemont Reservoir	41.50	78.80	86.50	87.60	90.30	97.90
Cresta Heights # 1 Reservoir	13.20	16.20	21.10	23.30	27.20	46.40
Cresta Heights # 2 Reservoir	13.10	15.80	20.30	22.50	26.40	45.70
Dunsmore Reservoir	12.50	14.30	17.40	19.30	23.20	42.20
Eagle Canyon Reservoir	12.60	14.70	18.20	20.20	24.00	43.00
Edmund #1 Reservoir	23.30	44.50	64.40	68.50	70.40	79.70
Edmund #2 Reservoir	15.60	23.10	34.00	37.10	40.70	58.40
Encinal Reservoir	16.50	27.10	42.20	45.90	49.00	64.60
Glenwood Forebay Reservoir	11.70	13.00	15.20	16.90	20.50	38.50
Goss Canyon #1 Reservoir	14.40	19.40	27.00	29.60	33.50	52.60
Goss Canyon #2 Reservoir	14.40	19.40	27.00	29.60	33.50	52.60
Markridge Reservoir	11.20	11.90	13.20	14.70	18.20	35.50
Mills Forebay Reservoir	12.30	13.80	16.50	18.30	22.20	41.20
Oak Creek #1 Reservoir	10.90	11.40	12.50	13.90	17.20	34.00
Oak Creek #2 Reservoir	10.90	11.40	12.50	13.90	17.20	34.00
Ocean View Reservoir	16.00	25.00	38.30	41.80	45.20	61.70
Ordunio Reservoir	13.00	15.70	19.90	22.10	26.00	45.30
Pickens Reservoir	18.40	31.90	48.20	52.00	54.90	68.80
Rosemont Reservoir	10.90	11.40	12.50	13.90	17.20	34.00
Shields Reservoir	15.60	23.10	34.00	37.10	40.70	58.40
Cresta Heights	50.00	77.90	96.10	99.40	99.90	99.90
Eagle Canyon	48.50	76.50	95.70	99.30	99.90	99.90
Edmund No. 1	51.90	74.40	86.20	91.40	97.50	99.90
Edmund No. 2	44.60	67.20	81.70	88.40	96.70	99.90
Encinal	40.30	64.80	84.10	90.80	97.40	99.90
Glenwood	33.00	53.30	71.30	81.20	94.40	99.90
Goss Canyon	34.70	56.50	75.80	84.80	95.80	99.90
Markridge	31.80	55.50	80.30	88.90	97.20	99.90
Mills	27.20	46.90	68.50	79.70	94.20	99.90
Oak Creek	40.30	64.80	84.10	90.80	97.40	99.90
Ordunio	42.10	66.50	84.50	91.00	97.40	99.90
Paschall	40.30	64.80	84.10	90.80	97.40	99.90
Rosemont	40.30	64.80	84.10	90.80	97.40	99.90
Williams	30.60	54.10	79.60	88.50	97.10	99.90
Potable Well	51.30	81.10	87.90	93.10	98.70	99.90
Potable Well	44.60	68.10	75.90	86.00	97.10	99.90

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
WEL-12100	54.50	82.00	88.20	93.30	98.70	99.90
WEL-20100	44.60	68.10	75.90	86.00	97.10	99.90
WEL-20101	43.80	67.80	75.80	86.00	97.10	99.90
WEL-20102	50.90	77.70	84.60	91.20	98.30	99.90
WEL-26100	53.50	81.80	88.10	93.20	98.70	99.90
WEL-26101	42.80	67.50	75.60	85.90	97.10	99.90
WEL-26102	50.10	77.50	84.50	91.10	98.30	99.90
WEL-26103	48.80	77.10	84.30	91.10	98.30	99.90
WEL-27100	51.30	81.10	87.90	93.10	98.70	99.90
WEL-30100	44.60	68.10	75.90	86.00	97.10	99.90

Puente Hills M6.95 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Glenwood Aeration	6.53%	29.26%	31.13%	26.16%	6.89%	$190,000	$54,565
Mills Air Tower	7.39%	30.28%	29.41%	26.00%	6.89%	$190,000	$53,989
RAMSDELL	8.86%	37.42%	37.51%	13.17%	3.01%	$510,000	$93,888
Cresta Heights - Motor Control Center	15.37%	48.15%	35.68%	0.76%	0.01%	$200,000	$16,451
Eagle Canyon - Motor Control Center	14.10%	47.36%	37.64%	0.87%	0.01%	$350,000	$29,911
Edmund No. 1 - Motor Control Center	25.84%	42.28%	16.71%	12.15%	2.99%	$350,000	$52,152
Edmund No. 2 - Motor Control Center	16.93%	40.12%	22.59%	16.34%	4.00%	$350,000	$67,195
Encinal - Motor Control Center	8.86%	37.42%	37.51%	13.17%	3.01%	$650,000	$119,662
Glenwood - Motor Control Center	6.53%	29.26%	31.13%	26.16%	6.89%	$500,000	$143,593
Goss Canyon - Motor Control Center	3.70%	15.52%	44.26%	31.09%	5.41%	$200,000	$62,958
Markridge - Motor Control Center	5.45%	31.59%	44.90%	15.00%	3.04%	$550,000	$111,950
Mills - Motor Control Center	3.21%	22.71%	38.79%	28.33%	6.93%	$750,000	$231,615
Oak Creek - Motor Control Center	9.24%	37.86%	36.76%	13.10%	3.01%	$500,000	$91,385
Ordunio - Motor Control Center	13.07%	40.93%	30.33%	12.64%	3.01%	$100,000	$17,190
Paschall - Motor Control Center	0.22%	2.92%	36.89%	51.48%	8.47%	$350,000	$157,631
Rosemont - Motor Control Center	8.86%	37.42%	37.51%	13.17%	3.01%	$250,000	$46,024
Well 11 - Motor Control Center	9.24%	37.86%	36.76%	13.10%	3.01%	$175,000	$31,985
Well 14 - Motor Control Center	8.17%	36.57%	38.91%	13.31%	3.01%	$175,000	$32,657
Well 16 - Motor Control Center	8.17%	36.57%	38.91%	13.31%	3.01%	$175,000	$32,657
Well 5 - Motor Control Center	7.39%	30.28%	29.41%	26.00%	6.89%	$175,000	$49,727
Well 7 - Motor Control Center	8.26%	31.15%	27.81%	25.87%	6.89%	$175,000	$49,247
Well 8 - Motor Control Center	7.39%	30.28%	29.41%	26.00%	6.89%	$175,000	$49,727
Well 9 - Motor Control Center	8.26%	31.15%	27.81%	25.87%	6.89%	$175,000	$49,247
Williams - Motor Control Center	8.86%	37.42%	37.51%	13.17%	3.01%	$175,000	$32,217
Mills Plant - PWTP	7.39%	30.28%	29.41%	26.00%	6.89%	$168,750	$47,951
Oak Creek Reservoir - PWTP	4.02%	28.38%	48.49%	16.03%	3.05%	$75,000	$16,020
Paschall Mixing Station - PWTP	8.86%	37.42%	37.51%	13.17%	3.01%	$18,750	$3,452
Pickens Tunnel - PWTP	27.41%	44.85%	17.73%	8.03%	1.96%	$75,000	$8,760

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Pickens Tunnel - PWTP	27.41%	44.85%	17.73%	8.03%	1.96%	$75,000	$8,760
Ramsdell Mixing Station - PWTP	8.86%	37.42%	37.51%	13.17%	3.01%	$718,750	$132,318
Well 11 - PWTP	0.96%	7.70%	47.88%	38.53%	4.90%	$75,000	$26,689
Well 2 - PWTP	13.07%	40.93%	30.33%	12.64%	3.01%	$131,250	$22,562
Well 2 - PWTP	13.07%	40.93%	30.33%	12.64%	3.01%	$100,000	$17,190
Well 5 - PWTP	0.77%	6.16%	38.30%	46.04%	8.70%	$75,000	$31,783
2700 Block of Montrose	8.86%	37.42%	37.51%	13.17%	3.01%	$375,000	$69,036
Community & Pennsylvania	8.86%	37.42%	37.51%	13.17%	3.01%	$375,000	$69,036
Foothill & Cloud	8.86%	37.42%	37.51%	13.17%	3.01%	$375,000	$69,036
Markridge Reservoir	11.17%	39.66%	33.31%	12.83%	3.01%	$250,000	$44,219
Ocean View & Bristow	20.06%	42.83%	21.80%	12.29%	2.99%	$375,000	$59,158
Ramsdell & Mayfield	8.86%	37.42%	37.51%	13.17%	3.01%	$375,000	$69,036
Rosemont Reservoir	8.86%	37.42%	37.51%	13.17%	3.01%	$250,000	$46,024
Cresta Heights # 1 Reservoir	0.10%	0.94%	20.49%	60.26%	18.18%	$1,000,000	$574,565
Cresta Heights # 2 Reservoir	0.09%	0.84%	18.45%	60.78%	19.82%	$1,000,000	$590,975
Dunsmore Reservoir	0.09%	0.80%	17.42%	61.04%	20.64%	$840,000	$503,303
Eagle Canyon Reservoir	0.04%	0.45%	14.11%	58.74%	26.63%	$3,000,000	$1,920,390
Edmund #1 Reservoir	8.31%	18.10%	43.30%	27.05%	3.22%	$1,562,500	$419,531
Edmund #2 Reservoir	0.52%	3.05%	30.57%	56.08%	9.77%	$1,000,000	$481,560
Encinal Reservoir	0.36%	4.10%	41.00%	47.54%	6.98%	$9,375,000	$3,924,281
Glenwood Forebay Reservoir	0.01%	0.22%	8.33%	51.71%	39.69%	$125,000	$89,971
Goss Canyon #1 Reservoir	0.19%	1.44%	21.51%	61.21%	15.62%	$840,000	$467,414
Goss Canyon #2 Reservoir	0.19%	1.44%	21.51%	61.21%	15.62%	$1,000,000	$556,445
Markridge Reservoir	0.01%	0.08%	5.21%	47.37%	47.31%	$1,000,000	$765,175
Mills Forebay Reservoir	0.03%	0.30%	9.59%	58.37%	31.68%	$312,500	$212,986
Oak Creek #1 Reservoir	0.00%	0.05%	3.32%	40.22%	56.39%	$3,200,000	$2,592,720
Oak Creek #2 Reservoir	0.00%	0.05%	3.32%	40.22%	56.39%	$3,200,000	$2,592,720
Ocean View Reservoir	0.22%	2.92%	36.89%	51.48%	8.47%	$11,250,000	$5,066,719
Ordunio Reservoir	0.22%	1.63%	24.38%	59.90%	13.84%	$5,500,000	$2,943,518
Pickens Reservoir	2.94%	9.49%	40.32%	41.27%	5.96%	$1,000,000	$372,445
Rosemont Reservoir	0.00%	0.02%	2.07%	33.01%	64.87%	$1,000,000	$849,875
Shields Reservoir	1.30%	5.79%	38.04%	48.24%	6.60%	$1,200,000	$498,474
Cresta Heights	15.37%	48.15%	35.68%	0.76%	0.01%	$487,500	$40,099
Eagle Canyon	14.10%	47.36%	37.64%	0.87%	0.01%	$706,250	$60,356
Edmund No. 1	25.84%	42.28%	16.71%	12.15%	2.99%	$743,750	$110,822
Edmund No. 2	16.93%	40.12%	22.59%	16.34%	4.00%	$750,000	$143,989
Encinal	8.86%	37.42%	37.51%	13.17%	3.01%	$1,362,500	$250,829
Glenwood	6.53%	29.26%	31.13%	26.16%	6.89%	$1,162,500	$333,853
Goss Canyon	8.18%	32.55%	32.81%	21.43%	5.02%	$487,500	$119,082
Markridge	5.45%	31.59%	44.90%	15.00%	3.04%	$1,400,000	$284,963
Mills	3.21%	22.71%	38.79%	28.33%	6.93%	$1,600,000	$494,112
Oak Creek	9.24%	37.86%	36.76%	13.10%	3.01%	$1,312,500	$239,886
Ordunio	13.07%	40.93%	30.33%	12.64%	3.01%	$343,750	$59,091
Paschall	8.86%	37.42%	37.51%	13.17%	3.01%	$1,000,000	$184,095

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Rosemont	8.86%	37.42%	37.51%	13.17%	3.01%	$575,000	$105,855
Williams	3.36%	26.55%	50.29%	16.71%	3.07%	$1,243,750	$273,215
Potable Well	8.17%	36.57%	38.91%	13.31%	3.01%	$2,625,000	$489,851
Potable Well	7.39%	30.28%	29.41%	26.00%	6.89%	$2,625,000	$745,907
WEL-12100	13.07%	40.93%	30.33%	12.64%	3.01%	$2,625,000	$451,238
WEL-20100	8.26%	31.15%	27.81%	25.87%	6.89%	$2,625,000	$738,701
WEL-20101	7.39%	30.28%	29.41%	26.00%	6.89%	$2,625,000	$745,907
WEL-20102	9.72%	36.64%	32.72%	16.88%	4.01%	$2,625,000	$548,048
WEL-26100	9.24%	37.86%	36.76%	13.10%	3.01%	$2,625,000	$479,771
WEL-26101	6.53%	29.26%	31.13%	26.16%	6.89%	$2,625,000	$753,861
WEL-26102	8.34%	35.22%	35.30%	17.10%	4.01%	$2,625,000	$559,808
WEL-26103	7.69%	34.42%	36.62%	17.23%	4.01%	$2,625,000	$566,003
WEL-27100	8.17%	36.57%	38.91%	13.31%	3.01%	$2,625,000	$489,851
WEL-30100	7.39%	30.28%	29.41%	26.00%	6.89%	$2,625,000	$745,907

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Glenwood Aeration	36.60	66.40	73.00	74.90	80.40	95.50
Mills Air Tower	37.70	66.80	73.10	75.10	80.50	95.50
RAMSDELL	43.20	79.50	86.80	87.80	90.50	97.90
Cresta Heights - Motor Control Center	53.90	92.90	99.30	99.40	99.50	99.90
Eagle Canyon - Motor Control Center	52.60	92.40	99.20	99.30	99.50	99.90
Edmund No. 1 - Motor Control Center	58.40	84.10	87.60	88.50	91.00	98.00
Edmund No. 2 - Motor Control Center	50.20	78.70	83.40	84.60	88.00	97.30
Encinal - Motor Control Center	43.20	79.50	86.80	87.80	90.50	97.90
Glenwood - Motor Control Center	36.60	66.40	73.00	74.90	80.40	95.50
Goss Canyon - Motor Control Center	28.80	61.30	70.40	72.70	79.00	96.10
Markridge - Motor Control Center	38.10	76.70	85.30	86.40	89.50	97.90
Mills - Motor Control Center	31.30	63.20	71.20	73.40	79.20	95.40
Oak Creek - Motor Control Center	43.70	79.70	86.80	87.80	90.50	97.90
Ordunio - Motor Control Center	47.90	81.30	87.20	88.10	90.80	97.90
Paschall - Motor Control Center	19.20	43.00	51.50	55.30	65.70	93.90
Rosemont - Motor Control Center	43.20	79.50	86.80	87.80	90.50	97.90
Well 11 - Motor Control Center	43.70	79.70	86.80	87.80	90.50	97.90
Well 14 - Motor Control Center	42.30	79.20	86.70	87.70	90.40	97.90
Well 16 - Motor Control Center	42.30	79.20	86.70	87.70	90.40	97.90
Well 5 - Motor Control Center	37.70	66.80	73.10	75.10	80.50	95.50
Well 7 - Motor Control Center	38.80	67.20	73.20	75.20	80.50	95.50
Well 8 - Motor Control Center	37.70	66.80	73.10	75.10	80.50	95.50
Well 9 - Motor Control Center	38.80	67.20	73.20	75.20	80.50	95.50
Williams - Motor Control Center	43.20	79.50	86.80	87.80	90.50	97.90
Mills Plant - PWTP	37.70	66.80	73.10	75.10	80.50	95.50
Oak Creek Reservoir - PWTP	35.60	75.20	84.50	85.70	88.90	97.80

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Paschall Mixing Station - PWTP	43.20	79.50	86.80	87.80	90.50	97.90
Pickens Tunnel - PWTP	61.10	88.30	91.80	92.40	94.10	98.60
Pickens Tunnel - PWTP	61.10	88.30	91.80	92.40	94.10	98.60
Ramsdell Mixing Station - PWTP	43.20	79.50	86.80	87.80	90.50	97.90
Well 11 - PWTP	23.10	55.00	65.00	67.80	75.50	96.10
Well 2 - PWTP	47.90	81.30	87.20	88.10	90.80	97.90
Well 2 - PWTP	47.90	81.30	87.20	88.10	90.80	97.90
Well 5 - PWTP	21.20	47.00	55.60	59.00	68.40	93.90
2700 Block of Montrose	43.20	79.50	86.80	87.80	90.50	97.90
Community & Pennsylvania	43.20	79.50	86.80	87.80	90.50	97.90
Foothill & Cloud	43.20	79.50	86.80	87.80	90.50	97.90
Markridge Reservoir	45.90	80.60	87.00	88.00	90.70	97.90
Ocean View & Bristow	54.10	83.10	87.50	88.40	90.90	98.00
Ramsdell & Mayfield	43.20	79.50	86.80	87.80	90.50	97.90
Rosemont Reservoir	43.20	79.50	86.80	87.80	90.50	97.90
Cresta Heights # 1 Reservoir	15.00	21.50	31.30	34.30	38.00	56.10
Cresta Heights # 2 Reservoir	14.80	20.70	29.60	32.40	36.20	54.70
Dunsmore Reservoir	14.70	20.30	28.70	31.50	35.30	54.00
Eagle Canyon Reservoir	14.10	18.50	25.60	28.10	32.00	50.90
Edmund #1 Reservoir	27.40	51.60	71.00	74.80	76.30	83.80
Edmund #2 Reservoir	16.90	27.50	41.60	45.20	48.40	64.20
Encinal Reservoir	17.90	31.90	50.50	54.60	57.40	70.60
Glenwood Forebay Reservoir	13.00	15.80	20.30	22.40	26.30	45.30
Goss Canyon #1 Reservoir	15.40	22.50	32.70	35.80	39.50	57.40
Goss Canyon #2 Reservoir	15.40	22.50	32.70	35.80	39.50	57.40
Markridge Reservoir	12.50	14.30	17.40	19.30	23.20	42.20
Mills Forebay Reservoir	13.50	16.60	21.70	24.00	28.00	47.50
Oak Creek #1 Reservoir	11.90	13.20	15.50	17.20	20.90	39.40
Oak Creek #2 Reservoir	11.90	13.20	15.50	17.20	20.90	39.40
Ocean View Reservoir	17.20	29.30	46.20	50.10	53.00	67.50
Ordunio Reservoir	15.70	23.70	35.20	38.40	42.00	59.40
Pickens Reservoir	21.00	38.50	56.80	60.70	63.10	74.50
Rosemont Reservoir	11.50	12.40	14.10	15.70	19.30	37.20
Shields Reservoir	18.70	33.20	50.50	54.40	57.10	70.50
Cresta Heights	53.60	80.90	96.70	99.50	99.90	99.90
Eagle Canyon	52.20	79.80	96.50	99.50	99.90	99.90
Edmund No. 1	57.50	78.10	86.80	91.50	97.50	99.90
Edmund No. 2	49.00	70.50	82.40	88.60	96.70	99.90
Encinal	42.10	66.50	84.50	91.00	97.40	99.90
Glenwood	34.70	54.90	71.70	81.30	94.40	99.90
Goss Canyon	38.20	59.90	76.90	85.20	95.80	99.90
Markridge	36.80	61.10	82.60	90.10	97.30	99.90
Mills	29.20	49.10	69.50	80.20	94.30	99.90
Oak Creek	42.60	66.90	84.60	91.00	97.40	99.90
Ordunio	46.90	70.60	85.50	91.20	97.50	99.90

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Paschall	42.10	66.50	84.50	91.00	97.40	99.90
Rosemont	42.10	66.50	84.50	91.00	97.40	99.90
Williams	32.90	56.80	80.90	89.20	97.20	99.90
Potable Well	53.50	81.80	88.10	93.20	98.70	99.90
Potable Well	45.70	68.40	76.00	86.00	97.10	99.90
WEL-12100	59.10	83.20	88.60	93.50	98.70	99.90
WEL-20100	46.70	68.70	76.10	86.10	97.10	99.90
WEL-20101	45.70	68.40	76.00	86.00	97.10	99.90
WEL-20102	53.50	78.50	84.80	91.30	98.30	99.90
WEL-26100	54.90	82.20	88.30	93.30	98.70	99.90
WEL-26101	44.60	68.10	75.90	86.00	97.10	99.90
WEL-26102	51.80	78.00	84.60	91.20	98.30	99.90
WEL-26103	50.90	77.70	84.60	91.20	98.30	99.90
WEL-27100	53.50	81.80	88.10	93.20	98.70	99.90
WEL-30100	45.70	68.40	76.00	86.00	97.10	99.90

Northridge M6.89 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Glenwood Aeration	49.38%	29.80%	4.87%	12.74%	3.18%	$190,000	$24,785
Mills Air Tower	53.82%	26.56%	3.68%	12.74%	3.18%	$190,000	$24,138
RAMSDELL	58.67%	35.41%	5.78%	0.10%	0.01%	$510,000	$13,808
Cresta Heights - Motor Control Center	64.00%	31.59%	4.38%	0.01%	0.00%	$200,000	$4,485
Eagle Canyon - Motor Control Center	64.00%	31.59%	4.38%	0.01%	0.00%	$350,000	$7,849
Edmund No. 1 - Motor Control Center	88.12%	11.27%	0.59%	0.00%	0.00%	$350,000	$2,282
Edmund No. 2 - Motor Control Center	63.69%	19.61%	1.89%	11.83%	2.95%	$350,000	$39,592
Encinal - Motor Control Center	58.67%	35.41%	5.78%	0.10%	0.01%	$650,000	$17,599
Glenwood - Motor Control Center	49.38%	29.80%	4.87%	12.74%	3.18%	$500,000	$65,223
Goss Canyon - Motor Control Center	43.21%	22.46%	9.18%	20.15%	4.98%	$200,000	$39,140
Markridge - Motor Control Center	33.67%	43.20%	16.51%	5.32%	1.28%	$550,000	$50,097
Mills - Motor Control Center	38.71%	35.06%	10.21%	12.81%	3.18%	$750,000	$106,129
Oak Creek - Motor Control Center	45.69%	39.21%	8.64%	5.16%	1.28%	$500,000	$38,163
Ordunio - Motor Control Center	63.94%	31.56%	4.37%	0.09%	0.01%	$100,000	$2,298
Paschall - Motor Control Center	39.25%	36.35%	23.28%	1.06%	0.03%	$350,000	$20,914
Rosemont - Motor Control Center	53.59%	38.85%	7.41%	0.11%	0.01%	$250,000	$7,825
Well 11 - Motor Control Center	63.94%	31.56%	4.37%	0.09%	0.01%	$175,000	$4,021
Well 14 - Motor Control Center	58.67%	35.41%	5.78%	0.10%	0.01%	$175,000	$4,738
Well 16 - Motor Control Center	53.59%	38.85%	7.41%	0.11%	0.01%	$175,000	$5,478
Well 5 - Motor Control Center	53.82%	26.56%	3.68%	12.74%	3.18%	$175,000	$22,232
Well 7 - Motor Control Center	53.82%	26.56%	3.68%	12.74%	3.18%	$175,000	$22,232
Well 8 - Motor Control Center	53.82%	26.56%	3.68%	12.74%	3.18%	$175,000	$22,232
Well 9 - Motor Control Center	53.82%	26.56%	3.68%	12.74%	3.18%	$175,000	$22,232

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Williams - Motor Control Center	58.67%	35.41%	5.78%	0.10%	0.01%	$175,000	$4,738
Mills Plant - PWTP	53.82%	26.56%	3.68%	12.74%	3.18%	$168,750	$21,438
Oak Creek Reservoir - PWTP	29.64%	44.41%	19.25%	5.40%	1.28%	$75,000	$7,221
Paschall Mixing Station - PWTP	58.67%	35.41%	5.78%	0.10%	0.01%	$18,750	$508
Pickens Tunnel - PWTP	88.12%	11.27%	0.59%	0.00%	0.00%	$75,000	$489
Pickens Tunnel - PWTP	88.12%	11.27%	0.59%	0.00%	0.00%	$75,000	$489
Ramsdell Mixing Station - PWTP	58.67%	35.41%	5.78%	0.10%	0.01%	$718,750	$19,460
Well 11 - PWTP	45.32%	34.78%	19.11%	0.75%	0.01%	$75,000	$3,799
Well 2 - PWTP	63.94%	31.56%	4.37%	0.09%	0.01%	$131,250	$3,015
Well 2 - PWTP	63.94%	31.56%	4.37%	0.09%	0.01%	$100,000	$2,298
Well 5 - PWTP	38.14%	29.28%	16.08%	13.29%	3.18%	$75,000	$11,273
2700 Block of Montrose	53.59%	38.85%	7.41%	0.11%	0.01%	$375,000	$11,738
Community & Pennsylvania	50.21%	36.40%	6.94%	5.15%	1.28%	$375,000	$27,116
Foothill & Cloud	53.59%	38.85%	7.41%	0.11%	0.01%	$375,000	$11,738
Markridge Reservoir	50.21%	36.40%	6.94%	5.15%	1.28%	$250,000	$18,078
Ocean View & Bristow	84.88%	14.22%	0.89%	0.00%	0.00%	$375,000	$3,167
Ramsdell & Mayfield	58.67%	35.41%	5.78%	0.10%	0.01%	$375,000	$10,153
Rosemont Reservoir	53.59%	38.85%	7.41%	0.11%	0.01%	$250,000	$7,825
Cresta Heights # 1 Reservoir	18.04%	27.00%	46.40%	8.47%	0.07%	$1,000,000	$134,620
Cresta Heights # 2 Reservoir	18.04%	27.00%	46.40%	8.47%	0.07%	$1,000,000	$134,620
Dunsmore Reservoir	8.55%	19.53%	53.96%	17.60%	0.33%	$840,000	$167,668
Eagle Canyon Reservoir	18.04%	27.00%	46.40%	8.47%	0.07%	$3,000,000	$403,860
Edmund #1 Reservoir	70.86%	19.27%	9.41%	0.44%	0.00%	$1,562,500	$41,234
Edmund #2 Reservoir	29.53%	26.14%	26.96%	14.37%	2.97%	$1,000,000	$169,430
Encinal Reservoir	39.25%	36.35%	23.28%	1.06%	0.03%	$9,375,000	$560,203
Glenwood Forebay Reservoir	8.23%	17.92%	42.87%	27.57%	3.38%	$125,000	$34,061
Goss Canyon #1 Reservoir	26.46%	23.42%	24.16%	21.19%	4.74%	$840,000	$186,892
Goss Canyon #2 Reservoir	26.02%	23.04%	23.76%	22.16%	4.99%	$1,000,000	$230,020
Markridge Reservoir	1.53%	6.78%	44.50%	43.21%	3.96%	$1,000,000	$369,000
Mills Forebay Reservoir	15.17%	22.70%	39.01%	19.84%	3.25%	$312,500	$69,189
Oak Creek #1 Reservoir	3.67%	11.84%	50.32%	31.87%	2.28%	$3,200,000	$945,344
Oak Creek #2 Reservoir	3.67%	11.84%	50.32%	31.87%	2.28%	$3,200,000	$945,344
Ocean View Reservoir	39.25%	36.35%	23.28%	1.06%	0.03%	$11,250,000	$672,244
Ordunio Reservoir	18.03%	26.97%	46.35%	8.54%	0.09%	$5,500,000	$743,325
Pickens Reservoir	45.16%	19.44%	11.24%	19.40%	4.73%	$1,000,000	$190,280
Rosemont Reservoir	3.92%	12.64%	53.71%	28.68%	1.03%	$1,000,000	$269,265
Shields Reservoir	29.53%	26.14%	26.96%	14.37%	2.97%	$1,200,000	$203,316
Cresta Heights	64.00%	31.59%	4.38%	0.01%	0.00%	$487,500	$10,932
Eagle Canyon	64.00%	31.59%	4.38%	0.01%	0.00%	$706,250	$15,838
Edmund No. 1	88.12%	11.27%	0.59%	0.00%	0.00%	$743,750	$4,849
Edmund No. 2	63.69%	19.61%	1.89%	11.83%	2.95%	$750,000	$84,840
Encinal	58.67%	35.41%	5.78%	0.10%	0.01%	$1,362,500	$36,890
Glenwood	49.38%	29.80%	4.87%	12.74%	3.18%	$1,162,500	$151,642
Goss Canyon	43.50%	25.96%	5.57%	19.96%	4.98%	$487,500	$93,061

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Markridge	33.67%	43.20%	16.51%	5.32%	1.28%	$1,400,000	$127,519
Mills	38.71%	35.06%	10.21%	12.81%	3.18%	$1,600,000	$226,408
Oak Creek	45.69%	39.21%	8.64%	5.16%	1.28%	$1,312,500	$100,177
Ordunio	63.94%	31.56%	4.37%	0.09%	0.01%	$343,750	$7,898
Paschall	58.67%	35.41%	5.78%	0.10%	0.01%	$1,000,000	$27,075
Rosemont	53.59%	38.85%	7.41%	0.11%	0.01%	$575,000	$17,998
Williams	40.72%	44.21%	14.80%	0.23%	0.01%	$1,243,750	$56,945
Potable Well	53.59%	38.85%	7.41%	0.11%	0.01%	$2,625,000	$82,163
Potable Well	53.82%	26.56%	3.68%	12.74%	3.18%	$2,625,000	$333,480
WEL-12100	63.94%	31.56%	4.37%	0.09%	0.01%	$2,625,000	$60,309
WEL-20100	53.82%	26.56%	3.68%	12.74%	3.18%	$2,625,000	$333,480
WEL-20101	53.82%	26.56%	3.68%	12.74%	3.18%	$2,625,000	$333,480
WEL-20102	53.87%	26.59%	3.68%	12.67%	3.16%	$2,625,000	$331,892
WEL-26100	63.94%	31.56%	4.37%	0.09%	0.01%	$2,625,000	$60,309
WEL-26101	49.38%	29.80%	4.87%	12.74%	3.18%	$2,625,000	$342,418
WEL-26102	49.43%	29.83%	4.87%	12.68%	3.16%	$2,625,000	$340,988
WEL-26103	49.43%	29.83%	4.87%	12.68%	3.16%	$2,625,000	$340,988
WEL-27100	58.67%	35.41%	5.78%	0.10%	0.01%	$2,625,000	$71,072
WEL-30100	53.82%	26.56%	3.68%	12.74%	3.18%	$2,625,000	$333,480

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Glenwood Aeration	71.50	85.60	87.00	87.90	90.50	97.80
Mills Air Tower	73.60	85.80	87.00	87.90	90.60	97.90
RAMSDELL	82.30	98.80	99.80	99.80	99.90	99.90
Cresta Heights - Motor Control Center	84.90	99.10	99.90	99.90	99.90	99.90
Eagle Canyon - Motor Control Center	84.90	99.10	99.90	99.90	99.90	99.90
Edmund No. 1 - Motor Control Center	95.30	99.80	99.90	99.90	99.90	99.90
Edmund No. 2 - Motor Control Center	78.50	87.10	87.90	88.80	91.20	98.00
Encinal - Motor Control Center	82.30	98.80	99.80	99.80	99.90	99.90
Glenwood - Motor Control Center	71.50	85.60	87.00	87.90	90.50	97.80
Goss Canyon - Motor Control Center	63.00	77.10	79.50	81.00	85.10	96.70
Markridge - Motor Control Center	65.50	91.40	94.60	95.00	96.10	99.10
Mills - Motor Control Center	65.30	84.60	86.90	87.90	90.50	97.80
Oak Creek - Motor Control Center	73.20	92.90	94.70	95.10	96.10	99.10
Ordunio - Motor Control Center	84.80	99.10	99.80	99.80	99.90	99.90
Paschall - Motor Control Center	67.60	94.80	99.10	99.10	99.30	99.90
Rosemont - Motor Control Center	79.70	98.50	99.80	99.80	99.90	99.90
Well 11 - Motor Control Center	84.80	99.10	99.80	99.80	99.90	99.90
Well 14 - Motor Control Center	82.30	98.80	99.80	99.80	99.90	99.90
Well 16 - Motor Control Center	79.70	98.50	99.80	99.80	99.90	99.90
Well 5 - Motor Control Center	73.60	85.80	87.00	87.90	90.60	97.90
Well 7 - Motor Control Center	73.60	85.80	87.00	87.90	90.60	97.90

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Well 8 - Motor Control Center	73.60	85.80	87.00	87.90	90.60	97.90
Well 9 - Motor Control Center	73.60	85.80	87.00	87.90	90.60	97.90
Williams - Motor Control Center	82.30	98.80	99.80	99.80	99.90	99.90
Mills Plant - PWTP	73.60	85.80	87.00	87.90	90.60	97.90
Oak Creek Reservoir - PWTP	62.90	90.80	94.50	94.90	96.00	99.10
Paschall Mixing Station - PWTP	82.30	98.80	99.80	99.80	99.90	99.90
Pickens Tunnel - PWTP	95.30	99.80	99.90	99.90	99.90	99.90
Pickens Tunnel - PWTP	95.30	99.80	99.90	99.90	99.90	99.90
Ramsdell Mixing Station - PWTP	82.30	98.80	99.80	99.80	99.90	99.90
Well 11 - PWTP	71.70	95.90	99.30	99.40	99.50	99.90
Well 2 - PWTP	84.80	99.10	99.80	99.80	99.90	99.90
Well 2 - PWTP	84.80	99.10	99.80	99.80	99.90	99.90
Well 5 - PWTP	62.50	83.10	86.50	87.50	90.30	97.80
2700 Block of Montrose	79.70	98.50	99.80	99.80	99.90	99.90
Community & Pennsylvania	75.60	93.30	94.70	95.10	96.10	99.10
Foothill & Cloud	79.70	98.50	99.80	99.80	99.90	99.90
Markridge Reservoir	75.60	93.30	94.70	95.10	96.10	99.10
Ocean View & Bristow	94.00	99.80	99.90	99.90	99.90	99.90
Ramsdell & Mayfield	82.30	98.80	99.80	99.80	99.90	99.90
Rosemont Reservoir	79.70	98.50	99.80	99.80	99.90	99.90
Cresta Heights # 1 Reservoir	37.60	68.70	89.30	92.90	93.30	95.50
Cresta Heights # 2 Reservoir	37.60	68.70	89.30	92.90	93.30	95.50
Dunsmore Reservoir	28.80	56.80	80.80	85.10	86.10	90.60
Eagle Canyon Reservoir	37.60	68.70	89.30	92.90	93.30	95.50
Edmund #1 Reservoir	78.90	94.70	98.90	99.60	99.60	99.70
Edmund #2 Reservoir	45.70	71.10	83.10	85.50	86.30	90.40
Encinal Reservoir	55.70	87.00	97.30	99.00	99.10	99.40
Glenwood Forebay Reservoir	27.30	51.20	70.40	74.20	75.80	83.40
Goss Canyon #1 Reservoir	42.30	65.10	76.00	78.30	79.60	85.70
Goss Canyon #2 Reservoir	41.90	64.30	75.00	77.30	78.60	85.00
Markridge Reservoir	19.70	36.50	56.60	60.90	63.30	74.90
Mills Forebay Reservoir	33.70	60.00	77.40	80.70	81.90	87.40
Oak Creek #1 Reservoir	22.90	44.70	67.30	71.70	73.40	81.90
Oak Creek #2 Reservoir	22.90	44.70	67.30	71.70	73.40	81.90
Ocean View Reservoir	55.70	87.00	97.30	99.00	99.10	99.40
Ordunio Reservoir	37.60	68.70	89.20	92.80	93.30	95.50
Pickens Reservoir	56.70	73.30	78.50	79.80	80.90	86.60
Rosemont Reservoir	23.60	46.80	70.80	75.40	77.00	84.50
Shields Reservoir	45.70	71.10	83.10	85.50	86.30	90.40
Cresta Heights	84.80	97.70	99.60	99.90	99.90	99.90
Eagle Canyon	84.80	97.70	99.60	99.90	99.90	99.90
Edmund No. 1	95.30	99.60	99.90	99.90	99.90	99.90
Edmund No. 2	77.80	86.00	88.20	91.60	97.50	99.90
Encinal	82.20	96.80	99.40	99.90	99.90	99.90
Glenwood	70.60	83.50	87.10	91.00	97.40	99.90

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Goss Canyon	63.30	75.20	80.00	86.00	95.90	99.90
Markridge	65.10	85.70	93.60	96.30	98.90	99.90
Mills	64.40	80.70	86.70	91.00	97.30	99.90
Oak Creek	72.80	89.80	94.30	96.30	98.90	99.90
Ordunio	84.80	97.60	99.50	99.90	99.90	99.90
Paschall	82.20	96.80	99.40	99.90	99.90	99.90
Rosemont	79.70	96.00	99.30	99.90	99.90	99.90
Williams	71.80	92.10	98.60	99.80	99.90	99.90
Potable Well	88.70	99.00	99.80	99.90	99.90	99.90
Potable Well	78.80	85.80	88.40	93.30	98.60	99.90
WEL-12100	91.90	99.40	99.80	99.90	99.90	99.90
WEL-20100	78.80	85.80	88.40	93.30	98.60	99.90
WEL-20101	78.80	85.80	88.40	93.30	98.60	99.90
WEL-20102	78.90	85.90	88.40	93.30	98.60	99.90
WEL-26100	91.90	99.40	99.80	99.90	99.90	99.90
WEL-26101	77.50	85.70	88.40	93.30	98.60	99.90
WEL-26102	77.50	85.70	88.40	93.30	98.60	99.90
WEL-26103	77.50	85.70	88.40	93.30	98.60	99.90
WEL-27100	90.40	99.20	99.80	99.90	99.90	99.90
WEL-30100	78.80	85.80	88.40	93.30	98.60	99.90

Raymond M6.71 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Glenwood Aeration	28.11%	32.62%	9.40%	23.50%	6.34%	$190,000	$44,614
Mills Air Tower	40.55%	29.39%	5.60%	19.38%	5.05%	$190,000	$36,076
RAMSDELL	41.83%	41.96%	10.61%	4.47%	1.10%	$510,000	$38,105
Cresta Heights - Motor Control Center	69.38%	27.41%	3.18%	0.01%	0.00%	$200,000	$3,707
Eagle Canyon - Motor Control Center	64.00%	31.59%	4.38%	0.01%	0.00%	$350,000	$7,849
Edmund No. 1 - Motor Control Center	88.12%	11.27%	0.59%	0.00%	0.00%	$350,000	$2,282
Edmund No. 2 - Motor Control Center	78.70%	18.26%	1.43%	1.27%	0.31%	$350,000	$7,698
Encinal - Motor Control Center	46.12%	39.58%	8.72%	4.46%	1.10%	$650,000	$45,910
Glenwood - Motor Control Center	28.11%	32.62%	9.40%	23.50%	6.34%	$500,000	$117,405
Goss Canyon - Motor Control Center	43.24%	22.47%	9.19%	20.11%	4.97%	$200,000	$39,076
Markridge - Motor Control Center	40.74%	44.22%	14.81%	0.20%	0.01%	$550,000	$25,094
Mills - Motor Control Center	27.19%	34.88%	13.33%	19.51%	5.05%	$750,000	$153,746
Oak Creek - Motor Control Center	53.61%	38.87%	7.41%	0.08%	0.01%	$500,000	$15,565
Ordunio - Motor Control Center	69.34%	27.39%	3.18%	0.06%	0.01%	$100,000	$1,893
Paschall - Motor Control Center	22.07%	34.51%	35.15%	7.12%	1.13%	$350,000	$43,400
Rosemont - Motor Control Center	41.83%	41.96%	10.61%	4.47%	1.10%	$250,000	$18,679
Well 11 - Motor Control Center	50.68%	36.74%	7.00%	4.44%	1.10%	$175,000	$11,639
Well 14 - Motor Control Center	31.72%	42.17%	13.75%	9.89%	2.44%	$175,000	$21,954

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Well 16 - Motor Control Center	35.14%	40.78%	11.75%	9.87%	2.44%	$175,000	$21,286
Well 5 - Motor Control Center	40.55%	29.39%	5.60%	19.38%	5.05%	$175,000	$33,228
Well 7 - Motor Control Center	44.39%	26.79%	4.38%	19.37%	5.05%	$175,000	$32,670
Well 8 - Motor Control Center	28.11%	32.62%	9.40%	23.50%	6.34%	$175,000	$41,092
Well 9 - Motor Control Center	44.39%	26.79%	4.38%	19.37%	5.05%	$175,000	$32,670
Williams - Motor Control Center	41.83%	41.96%	10.61%	4.47%	1.10%	$175,000	$13,075
Mills Plant - PWTP	40.55%	29.39%	5.60%	19.38%	5.05%	$168,750	$32,041
Oak Creek Reservoir - PWTP	35.95%	46.12%	17.63%	0.26%	0.01%	$75,000	$3,837
Paschall Mixing Station - PWTP	41.83%	41.96%	10.61%	4.47%	1.10%	$18,750	$1,401
Pickens Tunnel - PWTP	88.12%	11.27%	0.59%	0.00%	0.00%	$75,000	$489
Pickens Tunnel - PWTP	88.12%	11.27%	0.59%	0.00%	0.00%	$75,000	$489
Ramsdell Mixing Station - PWTP	41.83%	41.96%	10.61%	4.47%	1.10%	$718,750	$53,701
Well 11 - PWTP	31.66%	35.15%	26.26%	5.78%	1.12%	$75,000	$7,713
Well 2 - PWTP	69.34%	27.39%	3.18%	0.06%	0.01%	$131,250	$2,484
Well 2 - PWTP	69.34%	27.39%	3.18%	0.06%	0.01%	$100,000	$1,893
Well 5 - PWTP	25.33%	28.12%	21.01%	20.44%	5.07%	$75,000	$16,419
2700 Block of Montrose	35.14%	40.78%	11.75%	9.87%	2.44%	$375,000	$45,613
Community & Pennsylvania	46.12%	39.58%	8.72%	4.46%	1.10%	$375,000	$26,486
Foothill & Cloud	46.12%	39.58%	8.72%	4.46%	1.10%	$375,000	$26,486
Markridge Reservoir	58.69%	35.42%	5.79%	0.07%	0.01%	$250,000	$6,729
Ocean View & Bristow	79.97%	18.56%	1.46%	0.00%	0.00%	$375,000	$4,301
Ramsdell & Mayfield	41.83%	41.96%	10.61%	4.47%	1.10%	$375,000	$28,018
Rosemont Reservoir	41.83%	41.96%	10.61%	4.47%	1.10%	$250,000	$18,679
Cresta Heights # 1 Reservoir	18.04%	27.00%	46.40%	8.47%	0.07%	$1,000,000	$134,620
Cresta Heights # 2 Reservoir	18.04%	27.00%	46.40%	8.47%	0.07%	$1,000,000	$134,620
Dunsmore Reservoir	18.03%	26.98%	46.37%	8.51%	0.08%	$840,000	$113,320
Eagle Canyon Reservoir	8.56%	19.55%	54.01%	17.54%	0.31%	$3,000,000	$597,390
Edmund #1 Reservoir	70.86%	19.27%	9.41%	0.44%	0.00%	$1,562,500	$41,234
Edmund #2 Reservoir	34.11%	30.19%	31.14%	4.21%	0.33%	$1,000,000	$90,365
Encinal Reservoir	26.66%	35.19%	30.65%	6.35%	1.12%	$9,375,000	$1,058,156
Glenwood Forebay Reservoir	2.08%	8.39%	39.44%	44.53%	5.53%	$125,000	$48,229
Goss Canyon #1 Reservoir	13.56%	20.28%	34.86%	26.24%	5.04%	$840,000	$227,027
Goss Canyon #2 Reservoir	13.56%	20.28%	34.86%	26.24%	5.04%	$1,000,000	$270,270
Markridge Reservoir	3.92%	12.65%	53.72%	28.66%	1.02%	$1,000,000	$269,065
Mills Forebay Reservoir	6.47%	14.78%	40.82%	32.55%	5.36%	$312,500	$99,225
Oak Creek #1 Reservoir	3.92%	12.65%	53.72%	28.66%	1.02%	$3,200,000	$861,008
Oak Creek #2 Reservoir	3.92%	12.65%	53.72%	28.66%	1.02%	$3,200,000	$861,008
Ocean View Reservoir	22.07%	34.51%	35.15%	7.12%	1.13%	$11,250,000	$1,395,000
Ordunio Reservoir	18.03%	26.98%	46.37%	8.51%	0.08%	$5,500,000	$741,978
Pickens Reservoir	45.44%	19.56%	11.31%	19.03%	4.63%	$1,000,000	$187,225
Rosemont Reservoir	1.54%	6.84%	44.93%	42.88%	3.79%	$1,000,000	$365,995
Shields Reservoir	34.11%	30.19%	31.14%	4.21%	0.33%	$1,200,000	$108,438
Cresta Heights	69.38%	27.41%	3.18%	0.01%	0.00%	$487,500	$9,036
Eagle Canyon	64.00%	31.59%	4.38%	0.01%	0.00%	$706,250	$15,838

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Edmund No. 1	88.12%	11.27%	0.59%	0.00%	0.00%	$743,750	$4,849
Edmund No. 2	78.70%	18.26%	1.43%	1.27%	0.31%	$750,000	$16,496
Encinal	46.12%	39.58%	8.72%	4.46%	1.10%	$1,362,500	$96,233
Glenwood	28.11%	32.62%	9.40%	23.50%	6.34%	$1,162,500	$272,967
Goss Canyon	43.53%	25.98%	5.58%	19.92%	4.97%	$487,500	$92,908
Markridge	40.74%	44.22%	14.81%	0.20%	0.01%	$1,400,000	$63,875
Mills	27.19%	34.88%	13.33%	19.51%	5.05%	$1,600,000	$327,992
Oak Creek	53.61%	38.87%	7.41%	0.08%	0.01%	$1,312,500	$40,858
Ordunio	69.34%	27.39%	3.18%	0.06%	0.01%	$343,750	$6,505
Paschall	41.83%	41.96%	10.61%	4.47%	1.10%	$1,000,000	$74,715
Rosemont	41.83%	41.96%	10.61%	4.47%	1.10%	$575,000	$42,961
Williams	26.29%	45.54%	22.26%	4.79%	1.10%	$1,243,750	$119,276
Potable Well	35.14%	40.78%	11.75%	9.87%	2.44%	$2,625,000	$319,292
Potable Well	40.55%	29.39%	5.60%	19.38%	5.05%	$2,625,000	$498,422
WEL-12100	69.34%	27.39%	3.18%	0.06%	0.01%	$2,625,000	$49,678
WEL-20100	44.39%	26.79%	4.38%	19.37%	5.05%	$2,625,000	$490,048
WEL-20101	40.55%	29.39%	5.60%	19.38%	5.05%	$2,625,000	$498,422
WEL-20102	42.91%	31.11%	5.93%	16.02%	4.00%	$2,625,000	$421,496
WEL-26100	50.68%	36.74%	7.00%	4.44%	1.10%	$2,625,000	$174,589
WEL-26101	28.11%	32.62%	9.40%	23.50%	6.34%	$2,625,000	$616,376
WEL-26102	32.04%	37.17%	10.71%	16.07%	4.00%	$2,625,000	$449,059
WEL-26103	32.04%	37.17%	10.71%	16.07%	4.00%	$2,625,000	$449,059
WEL-27100	31.72%	42.17%	13.75%	9.89%	2.44%	$2,625,000	$329,306
WEL-30100	28.11%	32.62%	9.40%	23.50%	6.34%	$2,625,000	$616,376

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Glenwood Aeration	55.00	73.00	75.60	77.40	82.20	95.80
Mills Air Tower	63.80	78.30	80.00	81.50	85.50	96.60
RAMSDELL	71.40	93.30	95.40	95.70	96.60	99.20
Cresta Heights - Motor Control Center	87.30	99.40	99.90	99.90	99.90	99.90
Eagle Canyon - Motor Control Center	84.90	99.10	99.90	99.90	99.90	99.90
Edmund No. 1 - Motor Control Center	95.30	99.80	99.90	99.90	99.90	99.90
Edmund No. 2 - Motor Control Center	90.70	98.30	98.60	98.70	99.00	99.70
Encinal - Motor Control Center	73.80	93.70	95.40	95.70	96.70	99.20
Glenwood - Motor Control Center	55.00	73.00	75.60	77.40	82.20	95.80
Goss Canyon - Motor Control Center	63.00	77.10	79.50	81.00	85.20	96.70
Markridge - Motor Control Center	72.00	97.10	99.80	99.80	99.80	99.90
Mills - Motor Control Center	55.60	76.80	79.90	81.40	85.40	96.60
Oak Creek - Motor Control Center	79.80	98.50	99.90	99.90	99.90	99.90
Ordunio - Motor Control Center	87.30	99.30	99.90	99.90	99.90	99.90
Paschall - Motor Control Center	53.00	86.70	93.30	93.80	95.20	99.10
Rosemont - Motor Control Center	71.40	93.30	95.40	95.70	96.60	99.20

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Well 11 - Motor Control Center	76.20	94.00	95.40	95.70	96.70	99.20
Well 14 - Motor Control Center	63.10	87.00	89.90	90.60	92.70	98.30
Well 16 - Motor Control Center	65.20	87.40	89.90	90.70	92.70	98.30
Well 5 - Motor Control Center	63.80	78.30	80.00	81.50	85.50	96.60
Well 7 - Motor Control Center	65.70	78.50	80.00	81.50	85.50	96.70
Well 8 - Motor Control Center	55.00	73.00	75.60	77.40	82.20	95.80
Well 9 - Motor Control Center	65.70	78.50	80.00	81.50	85.50	96.70
Williams - Motor Control Center	71.40	93.30	95.40	95.70	96.60	99.20
Mills Plant - PWTP	63.80	78.30	80.00	81.50	85.50	96.60
Oak Creek Reservoir - PWTP	69.00	96.50	99.70	99.70	99.80	99.90
Paschall Mixing Station - PWTP	71.40	93.30	95.40	95.70	96.60	99.20
Pickens Tunnel - PWTP	95.30	99.80	99.90	99.90	99.90	99.90
Pickens Tunnel - PWTP	95.30	99.80	99.90	99.90	99.90	99.90
Ramsdell Mixing Station - PWTP	71.40	93.30	95.40	95.70	96.60	99.20
Well 11 - PWTP	60.70	89.40	94.30	94.80	95.90	99.10
Well 2 - PWTP	87.30	99.30	99.90	99.90	99.90	99.90
Well 2 - PWTP	87.30	99.30	99.90	99.90	99.90	99.90
Well 5 - PWTP	51.40	74.60	79.10	80.70	84.90	96.60
2700 Block of Montrose	65.20	87.40	89.90	90.70	92.70	98.30
Community & Pennsylvania	73.80	93.70	95.40	95.70	96.70	99.20
Foothill & Cloud	73.80	93.70	95.40	95.70	96.70	99.20
Markridge Reservoir	82.30	98.80	99.90	99.90	99.90	99.90
Ocean View & Bristow	92.00	99.70	99.90	99.90	99.90	99.90
Ramsdell & Mayfield	71.40	93.30	95.40	95.70	96.60	99.20
Rosemont Reservoir	71.40	93.30	95.40	95.70	96.60	99.20
Cresta Heights # 1 Reservoir	37.60	68.70	89.30	92.90	93.30	95.50
Cresta Heights # 2 Reservoir	37.60	68.70	89.30	92.90	93.30	95.50
Dunsmore Reservoir	37.60	68.70	89.20	92.80	93.30	95.50
Eagle Canyon Reservoir	28.80	56.80	80.80	85.20	86.10	90.70
Edmund #1 Reservoir	78.90	94.70	98.90	99.60	99.60	99.70
Edmund #2 Reservoir	50.80	80.00	93.80	96.20	96.40	97.50
Encinal Reservoir	45.20	77.70	91.30	93.70	94.10	95.90
Glenwood Forebay Reservoir	20.00	36.60	54.50	58.40	60.90	73.10
Goss Canyon #1 Reservoir	31.50	55.00	70.70	73.90	75.40	82.90
Goss Canyon #2 Reservoir	31.50	55.00	70.70	73.90	75.40	82.90
Markridge Reservoir	23.60	46.80	70.80	75.40	77.00	84.50
Mills Forebay Reservoir	25.00	46.30	64.60	68.40	70.30	79.40
Oak Creek #1 Reservoir	23.60	46.80	70.80	75.40	77.00	84.50
Oak Creek #2 Reservoir	23.60	46.80	70.80	75.40	77.00	84.50
Ocean View Reservoir	41.50	74.70	90.30	93.10	93.50	95.50
Ordunio Reservoir	37.60	68.70	89.20	92.80	93.30	95.50
Pickens Reservoir	57.00	73.70	78.90	80.20	81.30	86.90
Rosemont Reservoir	19.80	36.70	57.00	61.30	63.70	75.20
Shields Reservoir	50.80	80.00	93.80	96.20	96.40	97.50
Cresta Heights	87.30	98.30	99.70	99.90	99.90	99.90

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Eagle Canyon	84.80	97.70	99.60	99.90	99.90	99.90
Edmund No. 1	95.30	99.60	99.90	99.90	99.90	99.90
Edmund No. 2	90.60	97.80	98.60	99.00	99.70	99.90
Encinal	73.40	90.60	94.90	96.80	99.00	99.90
Glenwood	53.40	68.90	75.80	83.10	94.90	99.90
Goss Canyon	63.30	75.30	80.10	86.00	95.90	99.90
Markridge	71.80	92.10	98.70	99.80	99.90	99.90
Mills	54.30	71.50	79.70	86.10	95.90	99.90
Oak Creek	79.70	96.00	99.30	99.90	99.90	99.90
Ordunio	87.30	98.20	99.60	99.90	99.90	99.90
Paschall	71.10	89.60	94.80	96.80	99.00	99.90
Rosemont	71.10	89.60	94.80	96.80	99.00	99.90
Williams	60.40	83.30	93.70	96.70	99.00	99.90
Potable Well	74.50	88.10	91.00	94.80	98.90	99.90
Potable Well	69.30	78.20	82.10	89.60	97.90	99.90
WEL-12100	93.40	99.50	99.90	99.90	99.90	99.90
WEL-20100	70.50	78.40	82.20	89.70	97.90	99.90
WEL-20101	69.30	78.20	82.10	89.60	97.90	99.90
WEL-20102	72.80	82.00	85.40	91.60	98.30	99.90
WEL-26100	84.40	94.40	95.90	97.60	99.50	99.90
WEL-26101	61.30	73.10	78.20	87.30	97.40	99.90
WEL-26102	68.70	81.50	85.40	91.60	98.30	99.90
WEL-26103	68.70	81.50	85.40	91.60	98.30	99.90
WEL-27100	72.90	87.80	91.00	94.80	98.90	99.90
WEL-30100	61.30	73.10	78.20	87.30	97.40	99.90

100-Year Probabilistic Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Glenwood Aeration	52.17%	18.68%	7.32%	17.37%	4.43%	$190,000	$32,080
Mills Air Tower	64.81%	15.75%	5.35%	11.26%	2.81%	$190,000	$21,196
RAMSDELL	64.57%	23.12%	9.06%	2.61%	0.62%	$510,000	$23,975
Cresta Heights - Motor Control Center	74.74%	18.60%	6.38%	0.22%	0.04%	$200,000	$4,118
Eagle Canyon - Motor Control Center	65.94%	24.05%	9.50%	0.41%	0.06%	$350,000	$10,267
Edmund No. 1 - Motor Control Center	77.25%	16.95%	5.57%	0.18%	0.03%	$350,000	$6,374
Edmund No. 2 - Motor Control Center	66.03%	16.43%	5.63%	9.51%	2.37%	$350,000	$34,097
Encinal - Motor Control Center	64.57%	23.12%	9.06%	2.61%	0.62%	$650,000	$30,557
Glenwood - Motor Control Center	52.17%	18.68%	7.32%	17.37%	4.43%	$500,000	$84,420
Goss Canyon - Motor Control Center	44.34%	15.39%	12.72%	22.20%	5.33%	$200,000	$42,655
Markridge - Motor Control Center	50.07%	27.44%	17.44%	4.20%	0.83%	$550,000	$40,359
Mills - Motor Control Center	52.27%	21.12%	11.73%	11.97%	2.88%	$750,000	$96,581
Oak Creek - Motor Control Center	63.85%	23.29%	9.20%	2.94%	0.70%	$500,000	$25,043

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Ordunio - Motor Control Center	63.85%	23.29%	9.20%	2.94%	0.70%	$100,000	$5,009
Paschall - Motor Control Center	50.40%	21.65%	20.14%	6.63%	1.15%	$350,000	$32,310
Rosemont - Motor Control Center	63.85%	23.29%	9.20%	2.94%	0.70%	$250,000	$12,521
Well 11 - Motor Control Center	64.57%	23.12%	9.06%	2.61%	0.62%	$175,000	$8,227
Well 14 - Motor Control Center	64.57%	23.12%	9.06%	2.61%	0.62%	$175,000	$8,227
Well 16 - Motor Control Center	64.57%	23.12%	9.06%	2.61%	0.62%	$175,000	$8,227
Well 5 - Motor Control Center	52.17%	18.68%	7.32%	17.37%	4.43%	$175,000	$29,547
Well 7 - Motor Control Center	64.81%	15.75%	5.35%	11.26%	2.81%	$175,000	$19,523
Well 8 - Motor Control Center	52.17%	18.68%	7.32%	17.37%	4.43%	$175,000	$29,547
Well 9 - Motor Control Center	52.17%	18.68%	7.32%	17.37%	4.43%	$175,000	$29,547
Williams - Motor Control Center	64.57%	23.12%	9.06%	2.61%	0.62%	$175,000	$8,227
Mills Plant - PWTP	64.81%	15.75%	5.35%	11.26%	2.81%	$168,750	$18,826
Oak Creek Reservoir - PWTP	50.07%	27.44%	17.44%	4.20%	0.83%	$75,000	$5,504
Paschall Mixing Station - PWTP	64.57%	23.12%	9.06%	2.61%	0.62%	$18,750	$881
Pickens Tunnel - PWTP	74.74%	18.60%	6.38%	0.22%	0.04%	$75,000	$1,544
Pickens Tunnel - PWTP	74.74%	18.60%	6.38%	0.22%	0.04%	$75,000	$1,544
Ramsdell Mixing Station - PWTP	64.57%	23.12%	9.06%	2.61%	0.62%	$718,750	$33,788
Well 11 - PWTP	50.40%	21.65%	20.14%	6.63%	1.15%	$75,000	$6,924
Well 2 - PWTP	63.85%	23.29%	9.20%	2.94%	0.70%	$131,250	$6,574
Well 2 - PWTP	63.85%	23.29%	9.20%	2.94%	0.70%	$100,000	$5,009
Well 5 - PWTP	40.73%	17.50%	16.27%	20.54%	4.95%	$75,000	$15,442
2700 Block of Montrose	64.57%	23.12%	9.06%	2.61%	0.62%	$375,000	$17,629
Community & Pennsylvania	63.85%	23.29%	9.20%	2.94%	0.70%	$375,000	$18,782
Foothill & Cloud	63.85%	23.29%	9.20%	2.94%	0.70%	$375,000	$18,782
Markridge Reservoir	63.85%	23.29%	9.20%	2.94%	0.70%	$250,000	$12,521
Ocean View & Bristow	77.25%	16.95%	5.57%	0.18%	0.03%	$375,000	$6,829
Ramsdell & Mayfield	64.57%	23.12%	9.06%	2.61%	0.62%	$375,000	$17,629
Rosemont Reservoir	63.85%	23.29%	9.20%	2.94%	0.70%	$250,000	$12,521
Cresta Heights # 1 Reservoir	15.41%	14.14%	35.17%	28.84%	6.42%	$1,000,000	$297,065
Cresta Heights # 2 Reservoir	37.33%	18.96%	29.24%	13.30%	1.14%	$1,000,000	$144,540
Dunsmore Reservoir	14.92%	13.69%	34.05%	30.30%	7.01%	$840,000	$260,249
Eagle Canyon Reservoir	15.41%	14.14%	35.17%	28.84%	6.42%	$3,000,000	$891,195
Edmund #1 Reservoir	48.16%	17.75%	22.58%	11.07%	0.42%	$1,562,500	$177,133
Edmund #2 Reservoir	32.97%	16.75%	25.83%	20.97%	3.45%	$1,000,000	$207,440
Encinal Reservoir	50.40%	21.65%	20.14%	6.63%	1.15%	$9,375,000	$865,453
Glenwood Forebay Reservoir	22.87%	14.55%	24.55%	32.19%	5.81%	$125,000	$36,918
Goss Canyon #1 Reservoir	28.07%	14.26%	21.99%	29.62%	6.05%	$840,000	$233,801
Goss Canyon #2 Reservoir	28.07%	14.26%	21.99%	29.62%	6.05%	$1,000,000	$278,335
Markridge Reservoir	14.92%	13.69%	34.05%	30.30%	7.01%	$1,000,000	$309,820
Mills Forebay Reservoir	32.46%	16.35%	25.05%	22.27%	3.85%	$312,500	$68,084
Oak Creek #1 Reservoir	14.92%	13.69%	34.05%	30.30%	7.01%	$3,200,000	$991,424
Oak Creek #2 Reservoir	14.92%	13.69%	34.05%	30.30%	7.01%	$3,200,000	$991,424
Ocean View Reservoir	50.40%	21.65%	20.14%	6.63%	1.15%	$11,250,000	$1,038,544
Ordunio Reservoir	14.92%	13.69%	34.05%	30.30%	7.01%	$5,500,000	$1,704,010

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Pickens Reservoir	28.07%	14.26%	21.99%	29.62%	6.05%	$1,000,000	$278,335
Rosemont Reservoir	14.92%	13.69%	34.05%	30.30%	7.01%	$1,000,000	$309,820
Shields Reservoir	32.97%	16.75%	25.83%	20.97%	3.45%	$1,200,000	$248,928
Cresta Heights	74.74%	18.60%	6.38%	0.22%	0.04%	$487,500	$10,038
Eagle Canyon	65.94%	24.05%	9.50%	0.41%	0.06%	$706,250	$20,718
Edmund No. 1	77.25%	16.95%	5.57%	0.18%	0.03%	$743,750	$13,544
Edmund No. 2	66.03%	16.43%	5.63%	9.51%	2.37%	$750,000	$73,065
Encinal	64.57%	23.12%	9.06%	2.61%	0.62%	$1,362,500	$64,051
Glenwood	52.17%	18.68%	7.32%	17.37%	4.43%	$1,162,500	$196,277
Goss Canyon	45.25%	18.61%	10.41%	20.63%	5.07%	$487,500	$97,208
Markridge	50.07%	27.44%	17.44%	4.20%	0.83%	$1,400,000	$102,732
Mills	52.27%	21.12%	11.73%	11.97%	2.88%	$1,600,000	$206,040
Oak Creek	63.85%	23.29%	9.20%	2.94%	0.70%	$1,312,500	$65,737
Ordunio	63.85%	23.29%	9.20%	2.94%	0.70%	$343,750	$17,217
Paschall	64.57%	23.12%	9.06%	2.61%	0.62%	$1,000,000	$47,010
Rosemont	63.85%	23.29%	9.20%	2.94%	0.70%	$575,000	$28,799
Williams	50.69%	27.39%	17.30%	3.84%	0.74%	$1,243,750	$87,168
Potable Well	64.57%	23.12%	9.06%	2.61%	0.62%	$2,625,000	$123,401
Potable Well	52.17%	18.68%	7.32%	17.37%	4.43%	$2,625,000	$443,205
WEL-12100	63.85%	23.29%	9.20%	2.94%	0.70%	$2,625,000	$131,473
WEL-20100	52.17%	18.68%	7.32%	17.37%	4.43%	$2,625,000	$443,205
WEL-20101	52.17%	18.68%	7.32%	17.37%	4.43%	$2,625,000	$443,205
WEL-20102	53.66%	19.21%	7.53%	15.67%	3.90%	$2,625,000	$404,040
WEL-26100	64.57%	23.12%	9.06%	2.61%	0.62%	$2,625,000	$123,401
WEL-26101	52.17%	18.68%	7.32%	17.37%	4.43%	$2,625,000	$443,205
WEL-26102	53.66%	19.21%	7.53%	15.67%	3.90%	$2,625,000	$404,040
WEL-26103	53.66%	19.21%	7.53%	15.67%	3.90%	$2,625,000	$404,040
WEL-27100	64.57%	23.12%	9.06%	2.61%	0.62%	$2,625,000	$123,401
WEL-30100	52.17%	18.68%	7.32%	17.37%	4.43%	$2,625,000	$443,205

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Glenwood Aeration	68.60	80.20	82.20	83.50	87.10	97.00
Mills Air Tower	77.90	87.10	88.50	89.30	91.60	98.10
RAMSDELL	81.60	95.60	97.30	97.50	98.00	99.50
Cresta Heights - Motor Control Center	87.90	98.60	99.70	99.70	99.80	99.90
Eagle Canyon - Motor Control Center	83.30	97.80	99.50	99.60	99.60	99.90
Edmund No. 1 - Motor Control Center	89.20	98.80	99.80	99.80	99.80	99.90
Edmund No. 2 - Motor Control Center	79.30	88.90	90.20	91.00	92.90	98.40
Encinal - Motor Control Center	81.60	95.60	97.30	97.50	98.00	99.50
Glenwood - Motor Control Center	68.60	80.20	82.20	83.50	87.10	97.00
Goss Canyon - Motor Control Center	60.80	74.40	77.50	79.20	83.80	96.40
Markridge - Motor Control Center	72.00	92.60	95.90	96.20	97.00	99.40

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Mills - Motor Control Center	70.30	85.30	87.80	88.70	91.20	98.00
Oak Creek - Motor Control Center	81.10	95.20	97.00	97.20	97.80	99.50
Ordunio - Motor Control Center	81.10	95.20	97.00	97.20	97.80	99.50
Paschall - Motor Control Center	69.70	89.80	93.60	94.10	95.50	99.10
Rosemont - Motor Control Center	81.10	95.20	97.00	97.20	97.80	99.50
Well 11 - Motor Control Center	81.60	95.60	97.30	97.50	98.00	99.50
Well 14 - Motor Control Center	81.60	95.60	97.30	97.50	98.00	99.50
Well 16 - Motor Control Center	81.60	95.60	97.30	97.50	98.00	99.50
Well 5 - Motor Control Center	68.60	80.20	82.20	83.50	87.10	97.00
Well 7 - Motor Control Center	77.90	87.10	88.50	89.30	91.60	98.10
Well 8 - Motor Control Center	68.60	80.20	82.20	83.50	87.10	97.00
Well 9 - Motor Control Center	68.60	80.20	82.20	83.50	87.10	97.00
Williams - Motor Control Center	81.60	95.60	97.30	97.50	98.00	99.50
Mills Plant - PWTP	77.90	87.10	88.50	89.30	91.60	98.10
Oak Creek Reservoir - PWTP	72.00	92.60	95.90	96.20	97.00	99.40
Paschall Mixing Station - PWTP	81.60	95.60	97.30	97.50	98.00	99.50
Pickens Tunnel - PWTP	87.90	98.60	99.70	99.70	99.80	99.90
Pickens Tunnel - PWTP	87.90	98.60	99.70	99.70	99.80	99.90
Ramsdell Mixing Station - PWTP	81.60	95.60	97.30	97.50	98.00	99.50
Well 11 - PWTP	69.70	89.80	93.60	94.10	95.50	99.10
Well 2 - PWTP	81.10	95.20	97.00	97.20	97.80	99.50
Well 2 - PWTP	81.10	95.20	97.00	97.20	97.80	99.50
Well 5 - PWTP	59.00	75.50	79.20	80.70	85.00	96.70
2700 Block of Montrose	81.60	95.60	97.30	97.50	98.00	99.50
Community & Pennsylvania	81.10	95.20	97.00	97.20	97.80	99.50
Foothill & Cloud	81.10	95.20	97.00	97.20	97.80	99.50
Markridge Reservoir	81.10	95.20	97.00	97.20	97.80	99.50
Ocean View & Bristow	89.20	98.80	99.80	99.80	99.80	99.90
Ramsdell & Mayfield	81.60	95.60	97.30	97.50	98.00	99.50
Rosemont Reservoir	81.10	95.20	97.00	97.20	97.80	99.50
Cresta Heights # 1 Reservoir	32.10	51.40	67.20	70.50	72.20	80.60
Cresta Heights # 2 Reservoir	51.50	72.50	85.50	88.00	88.70	92.30
Dunsmore Reservoir	31.50	50.20	65.60	68.80	70.60	79.40
Eagle Canyon Reservoir	32.10	51.40	67.20	70.50	72.20	80.60
Edmund #1 Reservoir	60.10	78.50	88.50	90.40	91.00	93.90
Edmund #2 Reservoir	47.00	65.60	77.20	79.60	80.80	86.70
Encinal Reservoir	62.50	82.90	91.80	93.40	93.80	95.70
Glenwood Forebay Reservoir	37.70	54.50	65.70	68.30	70.20	79.30
Goss Canyon #1 Reservoir	42.00	57.90	67.90	70.20	72.00	80.40
Goss Canyon #2 Reservoir	42.00	57.90	67.90	70.20	72.00	80.40
Markridge Reservoir	31.50	50.20	65.60	68.80	70.60	79.40
Mills Forebay Reservoir	46.40	64.50	75.80	78.20	79.50	85.80
Oak Creek #1 Reservoir	31.50	50.20	65.60	68.80	70.60	79.40
Oak Creek #2 Reservoir	31.50	50.20	65.60	68.80	70.60	79.40
Ocean View Reservoir	62.50	82.90	91.80	93.40	93.80	95.70

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Ordunio Reservoir	31.50	50.20	65.60	68.80	70.60	79.40
Pickens Reservoir	42.00	57.90	67.90	70.20	72.00	80.40
Rosemont Reservoir	31.50	50.20	65.60	68.80	70.60	79.40
Shields Reservoir	47.00	65.60	77.20	79.60	80.80	86.70
Cresta Heights	87.80	96.40	99.30	99.80	99.90	99.90
Eagle Canyon	83.20	94.60	98.80	99.70	99.90	99.90
Edmund No. 1	89.10	96.90	99.40	99.80	99.90	99.90
Edmund No. 2	78.60	86.60	90.20	93.30	98.00	99.90
Encinal	81.40	92.40	96.70	98.10	99.40	99.90
Glenwood	67.50	77.10	82.30	87.70	96.40	99.90
Goss Canyon	61.50	72.10	79.10	85.60	95.80	99.90
Markridge	71.60	86.60	94.70	97.20	99.20	99.90
Mills	69.40	80.90	87.50	91.60	97.60	99.90
Oak Creek	80.80	92.00	96.40	97.90	99.40	99.90
Ordunio	80.80	92.00	96.40	97.90	99.40	99.90
Paschall	81.40	92.40	96.70	98.10	99.40	99.90
Rosemont	80.80	92.00	96.40	97.90	99.40	99.90
Williams	72.10	87.00	95.10	97.40	99.30	99.90
Potable Well	87.30	96.20	97.60	98.60	99.70	99.90
Potable Well	72.30	80.30	84.10	90.80	98.10	99.90
WEL-12100	86.80	95.80	97.30	98.40	99.60	99.90
WEL-20100	72.30	80.30	84.10	90.80	98.10	99.90
WEL-20101	72.30	80.30	84.10	90.80	98.10	99.90
WEL-20102	74.10	82.20	85.70	91.80	98.30	99.90
WEL-26100	87.30	96.20	97.60	98.60	99.70	99.90
WEL-26101	72.30	80.30	84.10	90.80	98.10	99.90
WEL-26102	74.10	82.20	85.70	91.80	98.30	99.90
WEL-26103	74.10	82.20	85.70	91.80	98.30	99.90
WEL-27100	87.30	96.20	97.60	98.60	99.70	99.90
WEL-30100	72.30	80.30	84.10	90.80	98.10	99.90

EARTHQUAKE IMPACTS ON WASTEWATER ASSETS

Sierra Madre M7.1 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Sewer Flow Meter NS-53600	40.05%	46.46%	13.38%	0.08%	0.00%	$150,000	$6,567
Wastewater Lift Station	9.11%	34.35%	30.68%	20.82%	5.01%	$850,000	$202,483
Wastewater Lift Station	11.98%	40.25%	31.99%	12.74%	3.01%	$850,000	$148,453
Los Angeles-Glendale WWRP	32.04%	37.17%	10.71%	16.07%	4.00%	—	—

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Sewer Flow Meter NS-53600	56.30	88.80	98.70	99.80	99.90	99.90
Wastewater Lift Station	24.40	59.90	76.60	80.00	90.60	99.10
Wastewater Lift Station	28.90	68.70	85.60	87.80	94.30	99.40
Los Angeles-Glendale WWRP	45.30	71.30	79.40	80.70	82.50	95.10

Verdugo M6.9 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Sewer Flow Meter NS-53600	16.98%	48.95%	33.40%	0.65%	0.00%	$150,000	$11,771
Wastewater Lift Station	8.16%	33.40%	32.44%	20.97%	5.01%	$850,000	$205,088
Wastewater Lift Station	8.17%	36.57%	38.91%	13.31%	3.01%	$850,000	$158,619
Los Angeles-Glendale WWRP	15.17%	39.73%	24.66%	16.42%	4.00%	—	—

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Sewer Flow Meter NS-53600	37.00	76.20	96.40	99.30	99.40	99.90
Wastewater Lift Station	23.30	58.90	76.40	79.90	90.60	99.10
Wastewater Lift Station	24.50	64.80	85.10	87.40	94.10	99.40
Los Angeles-Glendale WWRP	31.30	62.50	77.80	80.40	82.20	95.10

Puente Hills M6.95 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Sewer Flow Meter NS-53600	7.84%	40.40%	49.71%	2.00%	0.02%	$150,000	$16,045
Wastewater Lift Station	10.57%	35.52%	28.23%	20.65%	5.01%	$850,000	$198,989
Wastewater Lift Station	10.33%	38.94%	34.77%	12.94%	3.01%	$850,000	$152,460
Los Angeles-Glendale WWRP	6.27%	32.32%	39.77%	17.60%	4.02%	—	—

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Sewer Flow Meter NS-53600	27.70	65.70	93.60	98.00	98.20	99.70
Wastewater Lift Station	26.00	61.30	76.70	80.20	90.60	99.10
Wastewater Lift Station	27.10	67.20	85.50	87.70	94.20	99.50
Los Angeles-Glendale WWRP	22.40	52.80	75.40	79.20	81.20	95.00

Northridge M6.89 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Sewer Flow Meter NS-53600	58.73%	35.44%	5.79%	0.02%	0.00%	$150,000	$3,979
Wastewater Lift Station	48.06%	23.72%	3.29%	19.94%	4.98%	$850,000	$158,300
Wastewater Lift Station	69.38%	27.41%	3.18%	0.01%	0.00%	$850,000	$15,755
Los Angeles-Glendale WWRP	49.43%	29.83%	4.87%	12.68%	3.16%	—	—

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Sewer Flow Meter NS-53600	70.50	94.10	99.40	99.90	99.90	99.90
Wastewater Lift Station	57.20	74.60	77.50	80.70	90.80	99.10
Wastewater Lift Station	78.80	98.10	99.90	99.90	99.90	99.90
Los Angeles-Glendale WWRP	59.50	79.40	84.00	84.70	86.10	96.10

Raymond M6.71 Scenario Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Sewer Flow Meter NS-53600	16.98%	48.95%	33.40%	0.65%	0.00%	$150,000	$11,771
Wastewater Lift Station	52.13%	20.59%	2.39%	19.90%	4.97%	$850,000	$155,533
Wastewater Lift Station	38.85%	38.98%	9.86%	9.84%	2.44%	$850,000	$100,062
Los Angeles-Glendale WWRP	15.17%	39.73%	24.66%	16.42%	4.00%	—	—

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Sewer Flow Meter NS-53600	37.00	76.20	96.40	99.30	99.40	99.90
Wastewater Lift Station	60.20	75.10	77.50	80.70	90.90	99.10
Wastewater Lift Station	53.20	83.10	88.80	90.40	95.40	99.50
Los Angeles-Glendale WWRP	31.30	62.50	77.80	80.40	82.20	95.10

100-Year Probabilistic Event

Damage Probability and Estimated Loss

Facility Name	Probability of Experiencing Listed Level of Damage					Structure Replacement Cost	Estimated Total Loss
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage		
Sewer Flow Meter NS-53600	66.62%	23.65%	9.24%	0.40%	0.06%	$150,000	$4,303
Wastewater Lift Station	49.47%	18.04%	7.13%	20.29%	5.06%	$850,000	$163,247
Wastewater Lift Station	67.30%	22.32%	8.49%	1.51%	0.35%	$850,000	$30,987
Los Angeles-Glendale WWRP	53.91%	19.14%	7.48%	15.57%	3.87%	—	—

Functionality

Facility Name	Probability of Being Fully Functional at Indicated Number of Days After Event					
	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Sewer Flow Meter NS-53600	75.30	92.40	98.70	99.50	99.50	99.80
Wastewater Lift Station	57.10	72.30	77.10	80.40	90.70	99.10
Wastewater Lift Station	75.60	93.70	98.20	98.50	99.30	99.90
Los Angeles-Glendale WWRP	61.10	75.10	80.30	81.30	83.00	95.30

EARTHQUAKE IMPACTS ON PIPELINES

Sierra Madre M7.1 Scenario Event

	Replacement Cost	Number of Required Repairs			Days to Perform Repairs			Economic Loss
		Leaks	Breaks	Total	Leaks	Breaks	Total	
Potable Water Pipelines	$231,919,364	168.7	49.9	218.6	48.2	28.5	76.7	$1,592,008
Wastewater Pipelines	$181,863,150	108.4	31.8	140.3	31.0	18.2	49.2	$1,019,510

Verdugo M6.9 Scenario Event

	Replacement Cost	Number of Required Repairs			Days to Perform Repairs			Economic Loss
		Leaks	Breaks	Total	Leaks	Breaks	Total	
Potable Water Pipelines	$231,919,364	143.3	46.5	189.8	40.9	26.6	67.5	$1,414,099
Wastewater Pipelines	$181,863,150	93.6	30.8	124.5	26.8	17.6	44.4	$930,592

Puente Hills M6.95 Scenario Event

	Replacement Cost	Number of Required Repairs			Days to Perform Repairs			Economic Loss
		Leaks	Breaks	Total	Leaks	Breaks	Total	
Potable Water Pipelines	$231,919,364	72.7	27.9	100.6	20.8	16.0	36.7	$782,375
Wastewater Pipelines	$181,863,150	49.7	19.8	69.5	14.2	11.3	25.5	$545,426

Northridge M6.89 Scenario Event

	Replacement Cost	Number of Required Repairs			Days to Perform Repairs			Economic Loss
		Leaks	Breaks	Total	Leaks	Breaks	Total	
Potable Water Pipelines	$231,919,364	17.4	5.7	23.1	5.0	3.2	8.2	$172,249
Wastewater Pipelines	$181,863,150	11.2	3.5	14.7	3.2	2.0	5.2	$107,913

Raymond M6.71 Scenario Event

	Replacement Cost	Number of Required Repairs			Days to Perform Repairs			Economic Loss
		Leaks	Breaks	Total	Leaks	Breaks	Total	
Potable Water Pipelines	$231,919,364	25.8	9.1	34.9	7.4	5.2	12.6	$265,379
Wastewater Pipelines	$181,863,150	21.3	8.5	29.7	6.1	4.8	10.9	$233,037

100-Year Probabilistic Event

	Replacement Cost	Number of Required Repairs			Days to Perform Repairs			Economic Loss
		Leaks	Breaks	Total	Leaks	Breaks	Total	
Potable Water Pipelines	$231,919,364	18.2	6.3	24.5	5.2	3.6	8.8	$185,378
Wastewater Pipelines	$181,863,150	12.2	4.5	16.6	3.5	2.6	6.0	$127,972

Appendix D. Hazard Mitigation Plan Adoption Resolution

D. HAZARD MITIGATION PLAN ADOPTION RESOLUTION

To Be Provided with Final Draft

Appendix M: 2025 Recycled Water Feasibility Study

Crescenta Valley Water District 2025 Urban Water Management Plan

JOHN ROBINSON Consulting, Inc.

Kennedy Jenks

1055 E. Colorado Blvd, Suite 500
Pasadena, CA 91101
626-375-9389

2025 Recycled Water Feasibility Study

29 August 2025

Project M-1081

Prepared for

Crescenta Valley Water District
2700 Foothill Boulevard
La Crescenta, CA 91214

KJ Project No. 2444512*00

Table of Contents

List of Tables ..... *iv*

List of Figures ..... *iv*

List of Appendices ..... *v*

Executive Summary *1-1*

Section 1: Introduction 1-2

1.1 Background 1-2

Section 2: Project Area 2-1

2.1 Study Area Characteristics 2-1
2.1.1 Los Angeles County 2-1
2.1.2 Crescenta Valley Water District 2-1
2.1.3 Study Area Boundaries 2-1
2.2 Surface Hydrology and Groundwater Basins 2-4
2.3 Water Quality 2-4
2.4 Land Use 2-5
2.5 Population Projections 2-5

Section 3: Water Supply Characteristics and Facilities 3-1

3.1 Water Sources and Supply Facilities 3-1
3.2 Beneficial Uses of Receiving Waters 3-1
3.3 Groundwater Management 3-1
3.4 Historical and Projected Water Use Trends 3-2
3.5 Quality of Water Supplies 3-2
3.6 Potential Future Water Sources 3-2

Section 4: Wastewater Characteristics and Facilities 4-1

4.1 CVWD Wastewater Treatment and Collection Facilities 4-1
4.2 Commercial and Industrial Treatment Facilities 4-2
4.3 Existing Recycled Water System 4-2

Section 5: Treatment Requirements 5-1

5.1 Multi-Barrier Approach and Overview of Regulatory Requirements 5-1

Table of Contents (cont'd)

5.2 Non-Potable Reuse Requirements....5-1
5.3 Potable Reuse Treatment Requirement....5-1

Section 6: Recycled Water Market....6-1

6.1 Non-Potable Reuse Market Assessment....6-1
6.2 Potable Reuse Market Assessment....6-1

Section 7: Project Alternative Analysis....7-1

7.1 Conceptual-Level Engineering Analysis....7-1
7.2 Preliminary Design Criteria and Description of Recycled Water Alternatives....7-1
7.2.1 Conveyance Pumps....7-2
7.2.2 Two Strike Park - Purple Pipe Irrigation....7-2
7.2.2.1 Irrigation Demands....7-5
7.2.2.2 Pumping Requirements....7-5
7.2.3 Glenwood Treatment Plant - Groundwater recharge....7-6
7.2.3.1 Pumping Requirements....7-1
7.2.4 Montrose Parking Lot 3 - Groundwater recharge, underground facilities....7-2
7.2.5 Glendale Sports Complex - Groundwater recharge, CVWD Wastewater flows only....7-4
7.2.5.1 Pumping Requirements....7-7
7.2.6 Glendale Sports Complex - Groundwater recharge, regional partnership with Pasadena and Glendale....7-7
7.2.6.1 Pumping Requirements....7-9
7.2.7 Glendale Civic Auditorium - Groundwater recharge, underground facilities....7-9
7.2.8 Injection Wells....7-0
7.3 Engineer's Opinion of Probable Costs....7-0
7.4 Alternatives Screening Approach....7-1
7.5 Alternative Ranking Results....7-2
7.6 No Project Alternative....7-3
7.7 Preferred Alternative Projects....7-3
7.8 Non-Recycled Water Alternatives....7-3
7.9 Water Conservation/Reduction Analysis....7-3

Section 8: Recommended Project....8-1

8.1 Description of Recommended Project and Potential Users....8-1
8.2 Implementation and Operational Plan....8-1

References....i

Table of Contents (cont'd)

List of Tables

Table 2-1: 2020 UWMP Population – Current and Projected
Table 4-1: Sewer Pipe Size and Length Distribution
Table 4-2: Sewer Pipe Material and Length Distribution
Table 4-3: Sewer Pipe Age – Year Installed by Length
Table 7-1: 2020 UWMP Demand Projections and Sewer Flow Projections
Table 7-2. Alternative 1 Pump Design Criteria
Table 7-3. Wastewater Flow Meter - 02
Table 7-4. Alternative 2 Pump Design Criteria
Table 7-5. InfoSewer Wastewater Flows
Table 7-6. Wastewater Flow Meter – Elk Avenue
Table 7-7. Alternative 2 Pump Design Criteria
Table 7-8. Alternative 2 Pump Design Criteria
Table 7-9. Wastewater Flow Meter – Elk Avenue
Table 7-10. Class 5 OPCC
Table 7-11. Long List Lifecycle Costs
Table 7-12. Short List Lifecycle Costs
Table 7-13: Short List Alternative Scoring Criteria

List of Figures

Figure 1-1: CVWD Service Area Overview
Figure 2-1: CVWD Wastewater Collection System Overview
Figure 2-2: ULARA Watershed Boundary
Figure 4-1: ULARA Watershed Boundary
Figure 7-1: Alternative 1 Process Flow Diagram
Figure 7-2: Proposed Project Alternative 1 Location
Figure 7-3: Alternative 1 Project Site Assumed Layout
Figure 7-4: Alternative 2 Process Flow Diagram
Figure 7-5: Alternative 2 Project Site Location
Figure 7-6: Alternative 2 Project Site Assumed Layout
Figure 7-7: Alternative 2 Proposed demolition plan
Figure 7-8: Alternative 3 Process Flow Diagram
Figure 7-9: Alternative 3 Project Site Location
Figure 7-10: Alternative 3 Project Site Assumed Layout
Figure 7-11: Alternative 4 and 5 Process Flow Diagram
Figure 7-12: Alternative 4 and 5 Project Location
Figure 7-13: Alternative 4 Project Site Assumed Layout
Figure 7-14: Alternative 5 Project Site Assumed Layout
Figure 7-15: Alternative 4 and 5 Process Flow Diagram
Figure 7-16: Alternative 4 and 5 Project Location

Table of Contents (cont'd)

Figure 7-17: Alternative 6 Project Site Assumed Layout

List of Appendices

Appendix A - Engineer’s Opinion of Probable Costs

Executive Summary

The Crescenta Valley Water District (CVWD) has prepared the 2024 Recycled Water Feasibility Study to evaluate the potential for developing a local recycled water program. The study focuses on assessing the technical, regulatory, and economic viability of implementing a wastewater treatment facility capable of producing recycled water for non-potable and potable reuse applications.

As part of this effort, the study examines multiple alternatives for the treatment and beneficial reuse of wastewater generated within CVWD's service area. These alternatives include tertiary treatment processes suitable for landscape irrigation and other non-potable uses, as well as potential facility locations and opportunities for regional collaboration.

The analysis considers key factors such as treatment requirements, infrastructure needs, potential end users, regulatory compliance, and long-term water supply reliability. The study also evaluates the financial implications of each alternative, including capital and operational costs, funding opportunities, and cost-benefit comparisons relative to continued reliance on imported water.

Seven project alternatives were developed and evaluated:

- **Alternative 1:** A non-potable reuse system at Two Strike Park using a membrane bioreactor (MBR), storage tank, and irrigation distribution to serve the park and nearby school.
- **Alternative 2:** A local groundwater recharge project at the Glenwood Treatment Plant site, including MBR and advanced water purification facility (AWPF) systems with three injection wells.
- **Alternative 3**: An underground treatment facility beneath Montrose Parking Lot 3, with one injection well and a restored surface parking area.
- **Alternative 4:** A groundwater recharge project at the Glendale Sports Complex using CVWD wastewater flows, with four injection wells.
- **Alternative 5:** A regional partnership at the Glendale Sports Complex incorporating flows from the Cities of Pasadena and Glendale, requiring seven injection wells.
- **Alternative 6:** A groundwater recharge project at the Glendale Civic Auditorium with four injection wells and underground treatment facilities.
- **Alternative 7:** The No Project alternative, representing continued reliance on imported water and no recycled water development.

Following a comprehensive evaluation, CVWD determined that the capital and lifecycle costs associated with all project alternatives exceeded its current financial capacity and did not offer sufficient cost-benefit advantages under present conditions. As a result, CVWD has elected to proceed with the No Project alternative at this time. However, the planning-level work completed through this study provides a foundation for future consideration should conditions change.

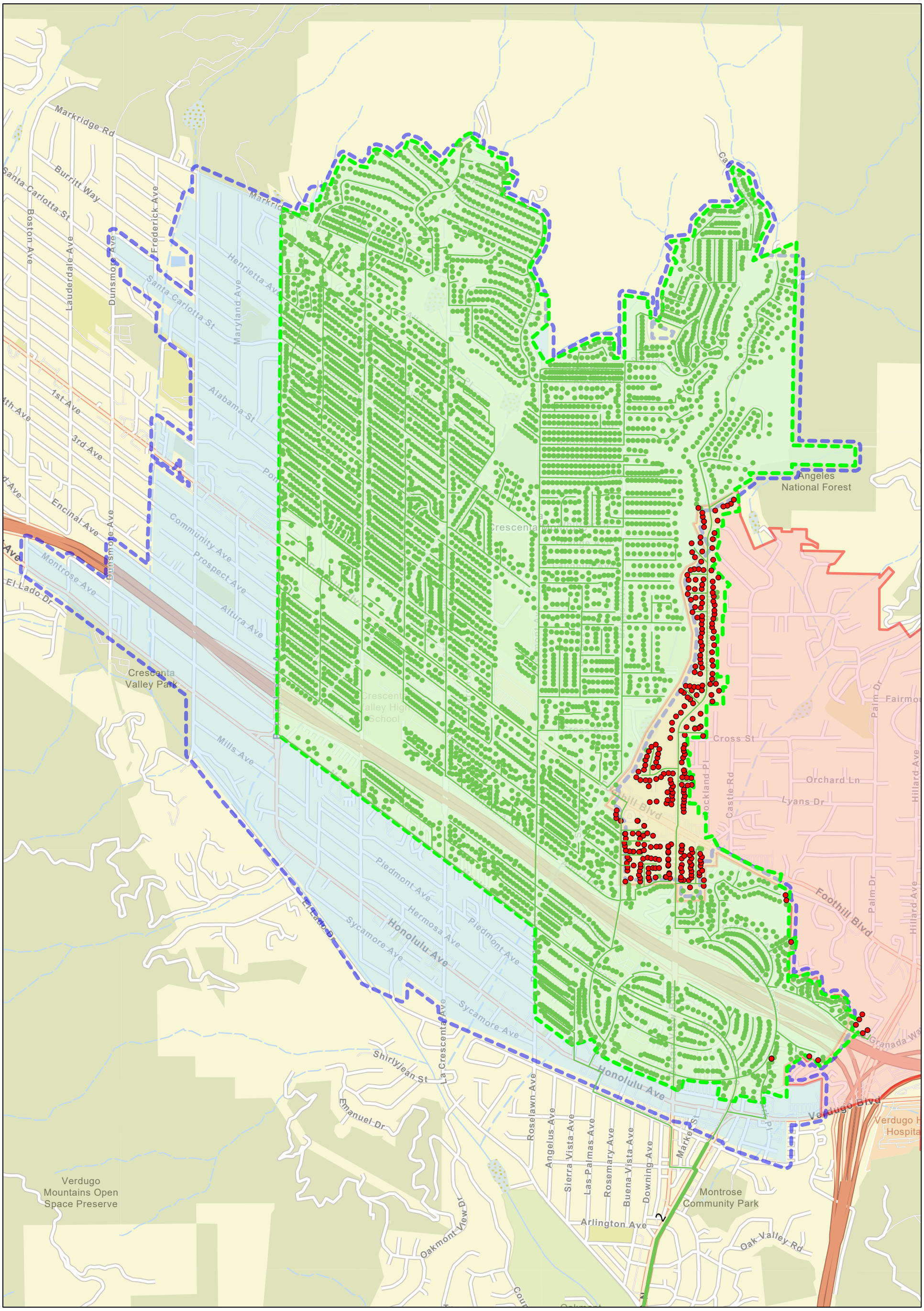
Section 1: Introduction

1.1 Background

CVWD serves communities situated along the foothills of the San Gabriel and Verdugo Mountains in Los Angeles County. These include La Crescenta and parts of La Cañada Flintridge and Glendale. As shown in Figure 1-1, the service area of CVWD spans approximately four square miles, with elevations ranging from 1,200 to nearly 3,000 feet. The area is primarily residential, with limited commercial activity.

CVWD provides potable water to around 8,300 connections, serving approximately 36,000 residents. Wastewater collection is provided to about 6,500 accounts, encompassing a population of roughly 22,000. CVWD water sources include both local groundwater from the Verdugo Basin and imported water from the Metropolitan Water District (MWD) via the Foothill Municipal Water District.

Over the past two decades, conservation initiatives and shifts in consumer habits have significantly reduced water demand, leading to a corresponding decrease in wastewater flows—from 1.7 million gallons per day (MGD) in 1996 to 1.5 MGD in 2022. Given that CVWD is largely developed with minimal room for expansion, wastewater volumes are expected to remain steady or gradually decline. This report explores alternatives for utilizing wastewater flows for non-potable and potable reuse applications.



Legend

- LCID Sewer Customers
- CVWD Sewer Customer
- Sewer Gravity Mains
- Sewer Service Area
- Water Service Area
- La Canada Irrigation District

Notes:

1. LCID Customers are sewer only customers

N

0 500 1,000

Scale: Feet

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Crescenta Valley Water District
Recycled Water Feasibility Study

Service Area Overview

2244512*00

Figure 1-1

Section 2: Project Area

This section provides a description of study area characteristics, including project setting, hydrologic features, groundwater basins, water quality, land use, and population projections.

2.1 Study Area Characteristics

2.1.1 Los Angeles County

CVWD is located in northern Los Angeles County, nestled in the foothills of the San Gabriel and Verdugo Mountains. CVWD serves the unincorporated community of La Crescenta and La Cañada Flintridge. The surrounding region is suburban in character, with residential neighborhoods interspersed with commercial corridors and public facilities. The area is largely built out, with limited opportunities for new development due to topographic constraints and zoning regulations.

The region is characterized by steep hillsides, narrow canyons, and limited flat land. The San Gabriel Mountains to the north and the Verdugo Mountains to the south define the local geography, creating a distinct microclimate and influencing stormwater runoff and groundwater recharge patterns. The total service area of CVWD is approximately four-square miles, with elevations ranging from 1,200 to nearly 3,000 feet above sea level.

The Mediterranean climate includes hot, dry summers and mild, wet winters, with most precipitation falling between November and March. While snowfall is rare, intense winter storms can cause flooding. The region also experiences Santa Ana winds, which heighten wildfire risk.

2.1.2 Crescenta Valley Water District

CVWD's service area is located in a developed suburban corridor in the Crescenta Valley, which provides water and wastewater services to approximately 8,300 water accounts and 6,500 sewer accounts, serving a population of approximately 36,000 and 22,000, respectively. The area is predominantly residential, with some commercial and institutional land uses. Due to the built-out nature of the community, future population growth is expected to be minimal.

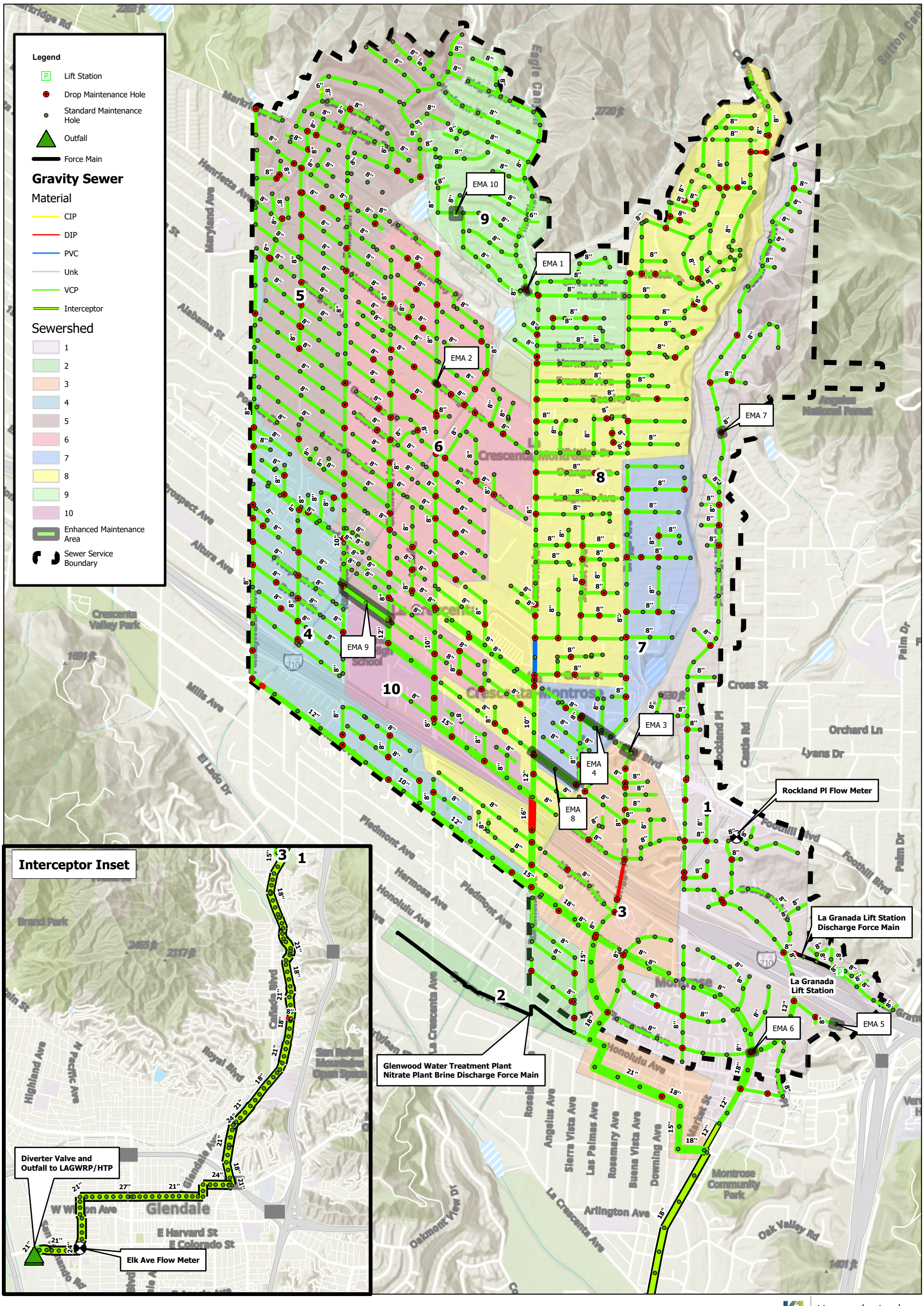
Topographically, CVWD lies on a series of alluvial fans and foothill slopes, with drainage generally flowing southward toward the Los Angeles River watershed. The soils in the area are a mix of sandy loams and clay, with varying infiltration capacities. The region is seismically active, with several faults in proximity, including the Sierra Madre and Verdugo faults, which pose risks of ground shaking and potential liquefaction in certain areas.

2.1.3 Study Area Boundaries

The study area boundary for this Recycled Water Feasibility Study (RWFS) is shown in Figure 2-1. The boundary corresponds to CVWD's sewer service area and includes the communities of

La Crescenta and portions of La Cañada Flintridge and Glendale. This boundary was selected to encompass potential recycled water users within and adjacent to CVWD's existing infrastructure. The study area includes public parks, schools, and other public facilities that may be suitable for non-potable water use, as well as opportunities for future partnerships with local institutions and agencies.

In addition to sites within the CVWD service area, located outside of CVWD's boundaries, two sites within the City of Glendale have been identified as potential locations for facilities. CVWD's interceptor that conveys wastewater from CVWD to the Los Angeles-Glendale Water Reclamation Plan is located adjacent to the potential sites.



Notes:

1. Gravity Sewer symbol thickness varies by pipe diameter

N

0 1,000 2,000

Scale: Feet

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Crescenta Valley Water District
Recycled Water Feasibility Study

Wastewater Collection System Overview

2244512*00

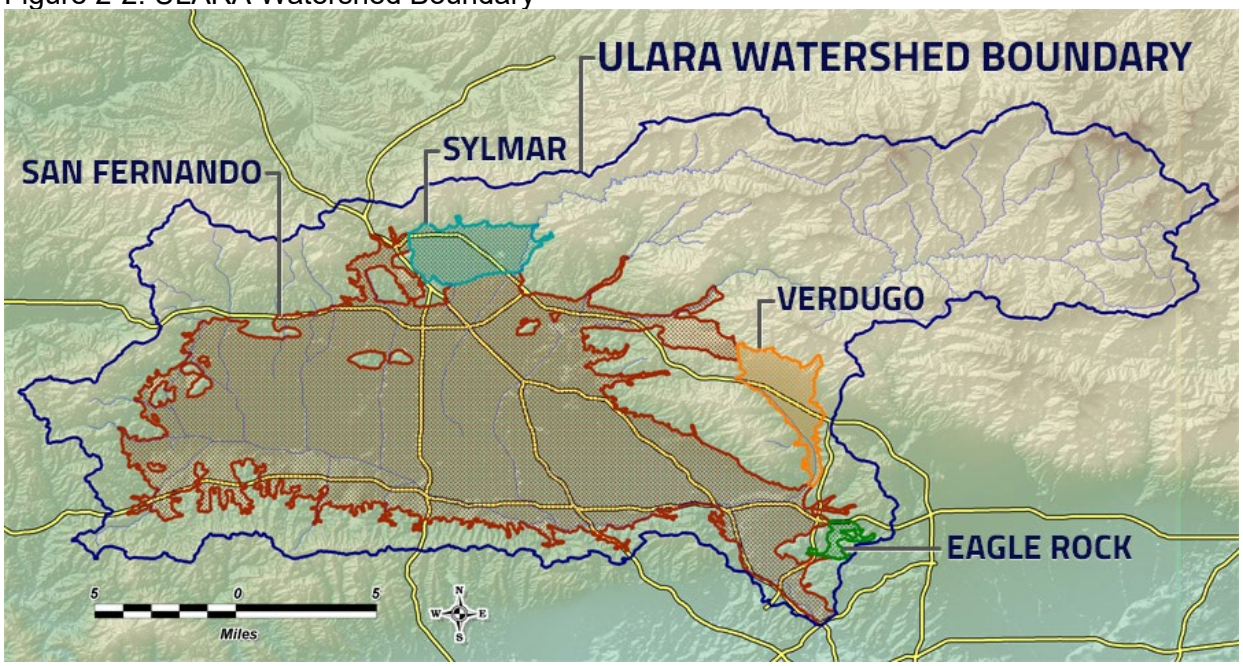
Figure 2-1

2.2 Surface Hydrology and Groundwater Basins

CVWD is located in the Los Angeles River watershed, where steep terrain influences rapid stormwater runoff during precipitation events. Natural drainage courses, such as the Verdugo Wash, typically remain dry except during the winter months and can contribute to localized flooding due to limited stormwater infrastructure.

CVWD overlies the Verdugo Groundwater Basin, a small and isolated basin recharged mainly by local rainfall and runoff. This basin provides about half of CVWD's water supply. While groundwater quality is generally good, the basin's limited capacity and sensitivity to drought underscore the need for conservation and diversified water sources. Figure 2-2 shows the extent of the basin within the ULARA Watershed boundary.

Figure 2-2: ULARA Watershed Boundary



These conditions support CVWD's exploration of recycled water and advanced treatment technologies to enhance long-term supply reliability.

2.3 Water Quality

CVWD's water quality is generally high, with both imported and local groundwater sources meeting or exceeding state and federal drinking water standards. CVWD conducts regular monitoring and testing in accordance with the California State Water Resources Control Board Division of Drinking Water (DDW) requirements to ensure the safety and reliability of its potable water supply.

Local groundwater extracted from the Verdugo Basin is disinfected with chlorine and blended with imported surface water from the Metropolitan Water District to ensure compliance with drinking water standards. Groundwater in the basin contains elevated nitrate levels, likely resulting from historical agricultural practices and legacy septic systems in the Crescenta Valley.

To address this, CVWD operates a nitrate removal system at its Glenwood facility. Groundwater not treated at Glenwood is blended with imported water to reduce nitrate concentrations below the maximum contaminant level (MCL). However, due to the basin's limited recharge capacity and vulnerability to drought, groundwater levels and quality can fluctuate over time. CVWD has implemented groundwater management practices to monitor basin health and ensure sustainable use.

Imported water is supplied by the Metropolitan Water District of Southern California (MWD) and delivered through the Foothill Municipal Water District. This water originates from the Colorado River and the State Water Project and is treated at regional facilities before delivery. MWD water is consistently high in quality, though it may have higher TDS levels compared to local groundwater.

Wastewater collected in the CVWD service area is mainly conveyed to the Los Angeles-Glendale Water Reclamation Plant (LAGWRP). Less than 1% of CVWD's wastewater is conveyed to the City of Los Angeles' Hyperion Water Reclamation Plant for treatment and disposal. This only occurs while CVWD is backwashing their ion exchange system at their GWTP, producing a highly concentrated brine that LAGWRP is not able to receive and treat. CVWD does not currently operate its own wastewater treatment facility. Wastewater quality is influenced by residential and institutional discharges, with limited industrial input. As a result, the wastewater stream is relatively consistent and well-suited for potential future treatment and reuse applications.

The high quality of both potable and wastewater sources supports the feasibility of implementing advanced water treatment technologies for recycled water production. Continued monitoring and source control will be essential to maintaining water quality standards and protecting public health as CVWD explores opportunities for water reuse.

2.4 Land Use

Land use within the CVWD service area is primarily residential, with limited commercial and institutional development. The area includes the communities of La Crescenta and La Cañada Flintridge and is largely built out due to topographic constraints and zoning regulations.

Public facilities such as parks and schools are distributed throughout the service area and may offer future opportunities for non-potable water use. Given the stable land use and minimal expected growth, infrastructure planning focuses on system maintenance and long-term sustainability.

2.5 Population Projections

CVWD's population growth within its service area is expected to remain modest over the coming decades. According to the 2020 Urban Water Management Plan (UWMP), the service area population is projected to increase by approximately 8% over the next 25 years, reflecting an average annual growth rate of 0.3%. Population estimates were developed using the California Department of Water Resources (DWR) Population Tool, which incorporates U.S. Census data, service area boundaries, and the number of residential service connections. This method calculates population by applying a person's-per-connection factor to the current and projected

number of service connections. Table 2-1 summarizes the current and projected population figures for the CVWD service area through 2045.

Table 2-1: 2020 UWMP Population – Current and Projected

Year	2020	2025	2030	2035	2040	2045
Service Population	32,462	32,974	33,494	34,022	34,558	35,103

As of 2024, updated population data reported in the State Water Board's Electronic Annual Report (EAR), based on Division of Drinking Water (DDW) records, indicates a current water service area population of 35,841. This figure is notably higher than the population projected for 2024 in the 2020 Urban Water Management Plan (UWMP), suggesting that infill development has led to faster than anticipated growth. While this increase is significant, it is not expected to substantially impact the overall recommendations or planning assumptions. The reported population reflects water service customers only, which differ from the wastewater service population. Given these factors, the 2024 value serves as a revised baseline, and future projections are expected to follow a similar trajectory unless further accelerated growth trends emerge.

Section 3: Water Supply Characteristics and Facilities

This section provides an overview of CVWD's current water supply characteristics and facilities. A more detailed description and analysis for CVWD's current water supply characteristics and facilities can be found in the 2020 Urban Water Master Plan.

3.1 Water Sources and Supply Facilities

CVWD relies on a combination of local groundwater and imported water to meet its potable water demands. CVWD's water supply system is designed to provide operational flexibility and reliability, particularly during periods of drought or supply interruptions.

As previously mentioned, local groundwater is extracted from the Verdugo Groundwater Basin, a small, isolated basin that underlies much of the CVWD service area. Groundwater is pumped from CVWD-owned wells and treated as necessary to meet drinking water standards. The Verdugo Basin typically supplies approximately 50% of CVWD's annual water demand, although this percentage can vary depending on hydrologic conditions.

Imported water is purchased from MWD and delivered through the Foothill Municipal Water District. This water originates from the Colorado River and the State Water Project and is treated at regional facilities before entering CVWD's distribution system. Imported water supplements local supplies, particularly during dry years when groundwater recharge is limited.

CVWD's water supply infrastructure includes groundwater wells, booster pump stations, storage reservoirs, and a network of transmission and distribution pipelines. The system is designed to operate efficiently under varying demand conditions and to ensure adequate pressure and fire flow throughout the service area.

3.2 Beneficial Uses of Receiving Waters

CVWD conveys its wastewater to LAGWRP for treatment and is discharged into the Los Angeles River. While CVWD does not discharge directly to surface waters, the receiving waters support beneficial uses such as recreation, marine habitat, and commercial fishing, as designated by the Los Angeles Regional Water Quality Control Board. Any future recycled water or advanced treatment projects would need to consider these downstream uses and applicable water quality regulations.

3.3 Groundwater Management

CVWD relies on the Verdugo Groundwater Basin for approximately half of its water supply. The basin is recharged primarily by local rainfall and is sensitive to drought conditions. CVWD monitors groundwater levels and quality regularly and manages pumping to maintain long-term sustainability.

Although the Verdugo Basin is not part of an adjudicated groundwater basin, CVWD follows best practices for groundwater management and coordinates with regional agencies to ensure responsible use. Continued monitoring and conservation are essential to preserving this local resource.

3.4 Historical and Projected Water Use Trends

CVWD's water use within the has generally declined over the past two decades due to conservation efforts and drought-related mandates. Looking forward, total water demand is expected to increase modestly, in line with projected population growth of approximately 8% over 25 years. Assuming the per capita water use remains constant, overall demand is projected to rise gradually through 2045. This trend reflects the built-out nature of the service area and CVWD's ongoing commitment to water efficiency.

3.5 Quality of Water Supplies

CVWD's water supply meets all state and federal drinking water standards. Local groundwater from the Verdugo Basin is generally of high quality, with low levels of total dissolved solids (TDS), nitrates, and other common contaminants. Imported water from the Metropolitan Water District (MWD) is also treated to meet regulatory requirements before delivery.

CVWD conducts routine water quality monitoring in compliance with the California State Water Resources Control Board, Division of Drinking Water. Results consistently confirm that both groundwater and imported supplies are safe and reliable for public consumption.

3.6 Potential Future Water Sources

To enhance long-term water supply reliability, CVWD is exploring alternative water sources that reduce dependence on imported water and improve drought resilience. Potential future sources include:

- Recycled Water: CVWD is evaluating the feasibility of implementing a recycled water program for non-potable uses such as landscape irrigation. This may involve constructing a satellite treatment facility or partnering with nearby agencies.
- Advanced Water Treatment: Opportunities for indirect potable reuse are being considered, including groundwater injection.
- Regional Partnerships: CVWD continues to coordinate with Foothill Municipal Water District and other regional agencies to identify shared infrastructure and supply opportunities.

These strategies support CVWD's goal of developing a more diversified and sustainable water portfolio.

Section 4: Wastewater Characteristics and Facilities

The following sections provide details about CVWD's existing wastewater collection and treatment facilities.

4.1 CVWD Wastewater Treatment and Collection Facilities

CVWD does not own or operate any wastewater treatment facilities. All wastewater collected within CVWD is conveyed to LAGWRP.

CVWD's sewer system is primarily a gravity-based collection system, with one exception: the La Granada Lift Station, which serves a small neighborhood within CVWD. CVWD's existing wastewater collection system consists of approximately 68 miles of gravity sewer mains and over 1,200 maintenance holes. Due to the significant elevation changes across the service area, the system includes more than 270 drop maintenance holes. The gravity sewer network ranges in size from 4 inches to 27 inches in diameter, with approximately 83% of the system consisting of 8-inch or smaller pipe. The most critical component of the collection system is the gravity sewer interceptor, which conveys all system flows to the outfall in the City of Glendale. This interceptor is composed of 6.6 miles of vitrified clay pipe (VCP) ranging from 18 to 27 inches in diameter.

Figure 2-1 illustrates the alignment of the interceptor and provides pipe material and diameter information. The tables below summarize the distribution of gravity sewer pipe length by diameter, material, and year of installation. The majority of the system consists of 8-inch VCP installed during the 1980s, reflecting the predominant era of system development.

Table 4-1: Sewer Pipe Size and Length Distribution

Diameter (in)	Length (mi)	Percentage
4	0.14	0.21%
6	0.04	0.06%
8	56.07	82.90%
10	1.14	1.68%
12	1.25	1.84%
15	1.23	1.82%
16	0.09	0.13%
18	3.14	4.64%
21	4.09	6.04%
24	0.41	0.61%
27	0.04	0.06%

Table 4-2: Sewer Pipe Material and Length Distribution

Material	Length (mi)	Percentage
VCP	67.04	99.13%
PVC	0.133	0.20%
DIP	0.289	0.43%
CIP	0.004	0.01%
Unknown	0.164	0.24%

Table 4-3: Sewer Pipe Age – Year Installed by Length

Year Installed (Decades)	Linear Footage (ft)	Percentage
Unknown	21	1.14%
1950s	6	0.31%
1960s	135	5.61%
1970s	22	0.83%
1980s	1449	91.63%
1990s	4	0.15%
2000s	12	0.32%

Figure 4-1: ULARA Watershed Boundary

4.2 Commercial and Industrial Treatment Facilities

CVWD's service area is primarily residential, with minimal commercial activity and no significant industrial users. Wastewater from commercial establishments is domestic in nature and conveyed through the public sewer system to the Hyperion Water Reclamation Plant for treatment. No on-site or specialized pretreatment facilities currently exist within CVWD.

4.3 Existing Recycled Water System

CVWD does not currently operate a recycled water system. All wastewater collected within CVWD is conveyed to the City of Los Angeles for treatment and disposal, with no infrastructure in place for local reuse.

As part of long-term planning, CVWD is evaluating the feasibility of developing a recycled water program to support non-potable uses, such as landscape irrigation, and indirect potable reuse, such as groundwater injection. Future implementation would require new treatment, storage, and distribution infrastructure, as well as coordination with regional partners.

Section 5: Treatment Requirements

5.1 Multi-Barrier Approach and Overview of Regulatory Requirements

Recycled water projects in California are subject to a comprehensive regulatory framework designed to protect public health and the environment. The Division of Drinking Water (DDW), under the State Water Resources Control Board (SWRCB) requires a multi-barrier approach for both non-potable and potable reuse applications. This approach includes source control, advanced treatment processes, monitoring, and operational safeguards. Any future recycled water initiative pursued by CVWD would be required to comply with Title 22 of the California Code of Regulations and applicable regional permits issued by the Los Angeles Regional Water Quality Control Board (LARWQCB).

5.2 Non-Potable Reuse Requirements

Non-potable reuse involves the use of recycled water for applications such as landscape irrigation, industrial processes, and toilet flushing. Title 22 specifies treatment levels based on the intended use, with tertiary treatment (including filtration and disinfection) required for most urban applications. Although CVWD does not currently operate a recycled water system, potential opportunities for non-potable reuse may exist in public parks, schools, and other large, irrigated landscapes. Implementation would require coordination with a regional recycled water provider and the development of a dedicated distribution system.

5.3 Potable Reuse Treatment Requirement

Potable reuse involves the use of highly treated recycled water to augment drinking water supplies. There are two primary forms: indirect potable reuse (IPR) and direct potable reuse (DPR), each subject to distinct regulatory requirements.

Indirect Potable Reuse (IPR) is the planned introduction of recycled water into an environmental buffer—such as a groundwater aquifer or surface water reservoir—prior to its extraction and treatment for potable use. IPR projects must meet stringent treatment and monitoring requirements, including blending ratios, minimum retention times, and retreatment at a drinking water treatment plant. Regulations for groundwater replenishment using recycled water became effective on June 18, 2014, and surface water augmentation regulations were adopted on March 6, 2018.

Direct Potable Reuse (DPR) refers to the introduction of advanced treated recycled water directly into a potable water supply system, either upstream of a drinking water treatment plant (raw water augmentation) or directly into the distribution system (treated water augmentation). In California, DPR regulations were finalized and approved by the Office of Administrative Law in 2024, with an effective date of October 1, 2024. These regulations establish uniform water recycling criteria for DPR and are designed to ensure public health protection through robust treatment, monitoring, and operational controls.

While CVWD does not currently have access to a local source of treated effluent, planning efforts—such as a potential advanced treatment facility—may offer future opportunities for participation in IPR or DPR projects. Any such participation would require detailed feasibility analysis, interagency coordination, and long-term investment planning. In addition to meeting regulatory thresholds, public outreach and transparent communication will be critical to building community trust in any future potable reuse initiatives.

Section 6: Recycled Water Market

6.1 Non-Potable Reuse Market Assessment

The potential for non-potable recycled water use within CVWD is limited due to its compact, built-out service area and the relatively small number of large, irrigated landscapes. However, targeted opportunities may exist in select public and institutional sites.

As part of this study, Alternative 1 as described in Section 7.2.1 of this report, was the only project alternative developed specifically for non-potable reuse. This alternative focused on serving Two Strike Park and the adjacent Rosemont Middle Elementary School, both of which have consistent landscape irrigation demands. The project evaluated the feasibility of constructing a satellite treatment facility using Membrane Bioreactor (MBR) technology, along with appropriately sized storage to meet daily irrigation needs.

The analysis included:

- Estimating combined irrigation demand for the park and school
- Sizing the MBR system to produce tertiary-quality recycled water
- Designing a storage tank to balance diurnal demand fluctuations
- Assessing site constraints and proximity to existing sewer infrastructure

While the scale of the project is modest, Alternative 1 demonstrates a viable model for decentralized non-potable reuse within CVWD. It also provides a potential pilot project that could inform future efforts or be expanded to serve additional nearby sites.

Despite limited market size, non-potable reuse remains a valuable tool for offsetting potable water use in targeted applications. Future implementation would depend on available funding, community support, and coordination with local stakeholders.

6.2 Potable Reuse Market Assessment

Although CVWD does not currently operate a recycled water system, potable reuse presents a long-term opportunity to enhance water supply reliability and reduce dependence on imported water. According to CVWD's 2020 Urban Water Management Plan, CVWD imports approximately 3,000 to 3,500 acre-feet per year (AFY) of water through the Foothill Municipal Water District, which purchases supplies from MWD. This imported water typically accounts for 60–70% of CVWD's total annual supply.

Participation in a water reuse project such as one involving advanced treatment and groundwater replenishment could offset a significant portion of this imported demand. For example, a project capable of producing around 1,000 AFY of advanced treated recycled water could reduce CVWD's reliance on imported water by up to 40%, depending on annual hydrologic conditions and local groundwater availability.

Potable reuse offers several strategic benefits:

- Supply Reliability: Provides a drought-resilient, locally controlled water source.
- Infrastructure Efficiency: Integrates with existing potable systems, avoiding the need for separate distribution networks.
- Regional Collaboration: Aligns with broader efforts to develop sustainable water supplies in Los Angeles County.

While implementation would require interagency coordination, regulatory compliance, and long-term investment, potable reuse represents a scalable and sustainable solution to support CVWD's future water supply needs.

Section 7: Project Alternative Analysis

7.1 Conceptual-Level Engineering Analysis

A conceptual-level engineering analysis was conducted to evaluate the technical feasibility of the recycled water alternatives identified in this study. The analysis focused on key infrastructure components, treatment requirements, and site-specific constraints for each alternative. This level of analysis is intended to inform planning decisions and support comparative evaluation, rather than provide detailed design specifications.

For each alternative, the following elements were considered:

- Treatment Technology: Selection of appropriate treatment processes based on intended end use (e.g., membrane bioreactor [MBR] for non-potable reuse, advanced treatment for groundwater injection as indirect potable reuse).
- Facility Siting: Identification of potential treatment and storage locations, including proximity to existing sewer infrastructure, available land, and hydraulic feasibility.
- Distribution and Conveyance: Preliminary routing of pipelines for recycled water delivery or injection, including elevation considerations and potential conflicts with existing utilities.
- Operational Assumptions: Estimation of flow rates, storage volumes, and system redundancy based on projected demand and regulatory requirements.
- Regulatory and Environmental Constraints: Initial screening of permitting pathways, environmental sensitivities, and potential stakeholder concerns.

The analysis was conducted at a planning-level using available GIS data, utility maps, and engineering judgment. While not intended to replace detailed design, this assessment provides a foundation for understanding the relative complexity, cost, and implementation requirements of each alternative.

7.2 Preliminary Design Criteria and Description of Recycled Water Alternatives

This section provides a summary of key assumptions and criteria applied to size the facilities required to treat, deliver, convey, and store recycled water. All facility sizing is assumed to be preliminary and would be further evaluated and refined during project design. Costs are provided at a conceptual level, based on industry standard unit costs and recent project experience, to reflect facility requirements and operational activities to produce and deliver recycled water.

A total of 6 alternatives were preliminarily developed to offer a balanced set of projects. The 6 alternatives were selected based on location, potential wastewater flow available, and

economies of scale. The potential wastewater flows were calculated based on the 2020 Urban Water Management Plan sewer flow projections as seen in the table below. These flows were utilized to proportionally increase the flows from the sewer flow meters that were used to develop the 2024 Wastewater Master Plan.

Table 7-1: 2020 UWMP Demand Projections and Sewer Flow Projections

Year	Population	Per Capita Water Demand (GPCD)	Projected Water Demands (MGD)[1]	Project Water Demands in SSA (MGD)[2]	Projected Sewer Flows (MGD)
2020	32,462	115.9	3.76	2.49	1.62
2025	32,974	107.7	3.55	2.35	1.45
2030	33,494	107.7	3.61	2.38	1.47
2035	34,022	107.7	3.66	2.42	1.49
2040	34,558	107.7	3.72	2.46	1.52
2045	35,103	107.7	3.78	2.50	1.54

Notes:

1. 2020 Water Demand based on actual total billing data for the year 2020. The 5-year average system demand from 2015-2020 was 3.45 MGD. Because demand projections use the 5-year average as the starting point, the UWMP shows a dip in projected demands between 2020 and 2025 before continuing to climb to 2045.
2. The Water Service Area (WSA) to Sewer Service Area (SSA) reduction factor of 0.6606 was used to convert projected WSA water demands SSA water demands.

7.2.1 Conveyance Pumps

Pumps were assumed to be required at storage tanks to transport recycled water to irrigation sites or to the Injection Well. No pump redundancy was assumed but may be included in future design plans if desired. Pump total dynamic head (TDH) was calculated by summing the elevation head, frictional losses, and dynamic losses associated with the piping. The frictional losses were calculated using the Hazen-Williams equation[1] using a coefficient, *C*, of 150. Minor losses were assumed to be 5% of the frictional losses. The size of the pumps at the treatment systems were calculated using average day irrigation demand flows. The size of the pumps at the storage tanks were calculated using peak hourly demand flows. The calculated motor horsepower for the pumps was rounded up to the nearest compatible motor size.

7.2.2 Two Strike Park - Purple Pipe Irrigation

This alternative consists of the construction of a prefabricated MBR treatment facility at Two Strike Park. Additionally, the alternative includes construction of a water storage tank, pump station, and new irrigation lines to water the Two Strike Park and the nearby Rosemont Middle School. The irrigation demand was calculated using existing water meter flow data and is described in Section 7.2.1.1. Consecutively, the required wastewater flows were determined by

[1] Hazen-Williams formula for frictional loss in a pipeline:

$$H_f = \frac{3.022 v^{1.85} L}{C^{1.85} D^{1.165}}$$

Where v is the velocity (in feet per second), L is the pipeline length (in feet), C is the Hazen-Williams coefficient, and D is the pipeline diameter (in feet).

using associated percentage decreases of volume during the MBR treatment process. The wastewater flows exceeded the required amount needed, which overall would produce an estimated 39 AFY. This system would operate on the MBR's minimum hydraulic retention time to maintain its microbiology during wet weather season. Any excess treated effluent will be sent back to the sewer system. This alternative would operate independently with relatively minor maintenance; a Class III operator would be needed to facilitate the work. A process flow diagram can be found in Figure 7-1; additionally, see Figure 7-2 and Figure 7-3 for the project location and site layout respectively.

Figure 7-1: Alternative 1 Process Flow Diagram

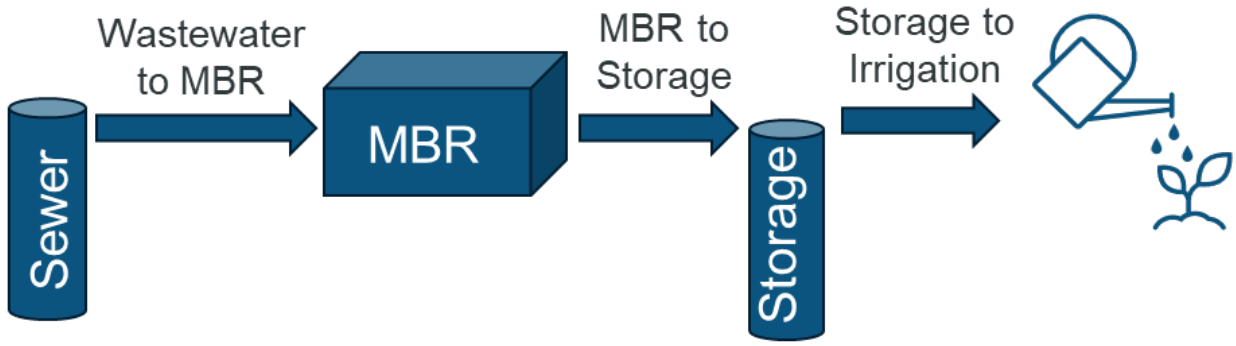


Figure 7-2: Proposed Project Alternative 1 Location

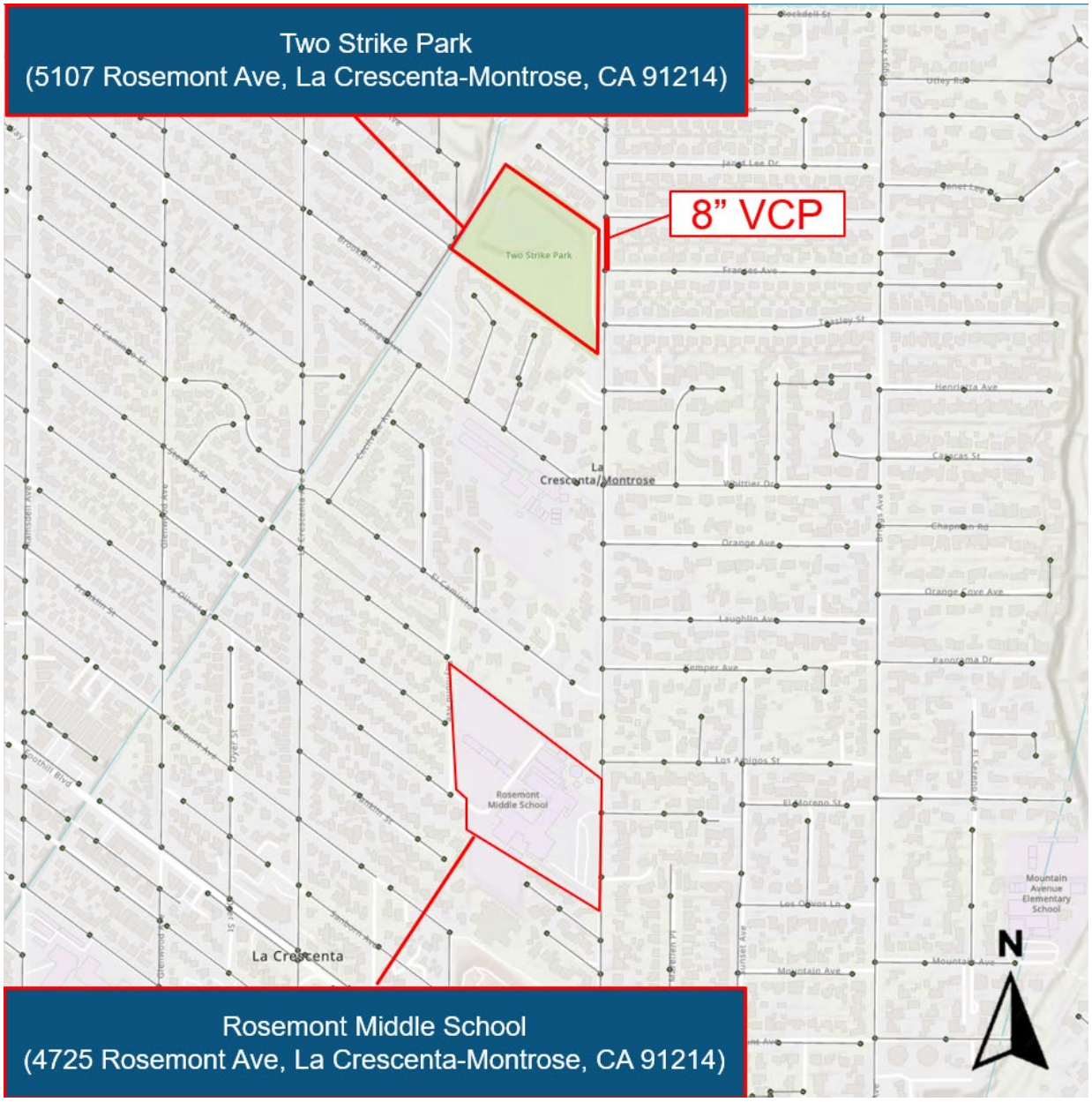


Figure 7-3: Alternative 1 Project Site Assumed Layout

7.2.2.1 Irrigation Demands

Irrigation demands were determined using historical flowmeter data and an estimated 1,200 hours of total irrigation time per year. This is equivalent to irrigating 3 times per day during an 8-hour period to target different sections. Since the flowmeter data was used to determine irrigation demand, seasonal variations, such as differences between wet and dry periods, were taken into account.

Alternative 1 is the only project which utilized RW for irrigation. As so, the demands for Two Strike Park and Rosemont Middle School are around 23 AFY and 16 AFY, respectively. These volumes were used to determine the MBR facility sizing and necessary storage tank to meet irrigation demand during peak hours. The necessary pump station and connecting piping was also designed with peak irrigation demand as the basis for its sizing.

7.2.2.2 Pumping Requirements

Due to the proximity of the proposed site to the sewer, the wastewater flows can be obtained with a gravity connection to the MBR system. This is due to the MBR packaged plant including a small lift station which will suffice the flows needed to produce the 39 AFY of treated water.

After treatment and storage of recycled water, a pump station would be needed to convey the effluent to both the Middle School and the park. This pump was sized using the criteria shown in the table below.

Table 7-2. Alternative 1 Pump Design Criteria

	Irrigation Pump
Pump Efficiency	80%
Conveyance Pipe Roughness (C Factor)	150
Minor Pipeline Losses (as a percentage of calculated frictional losses)	5%
Design Flow (Average Day Demand) (GPM)	85

7.2.3 Glenwood Treatment Plant - Groundwater recharge

The Glenwood Treatment Plant (GTP) Alternative begins with the demolition of the existing facilities building, followed by the construction of three groundwater injection wells, an underground AWPF, and an above-ground MBR treatment system. This alternative also requires a wastewater lift station to convey collected flows uphill to the treatment facilities at the proposed site. As mentioned previously, the wastewater flows for this alternative were obtained from the nearby flow meter, adjusted with a projected growth factor to account for future population growth increases (see Table 7-3).

Table 7-3. Wastewater Flow Meter - 02

	Wastewater Flows
Flow Average for 2024	1.01 MGD
Project 2045 Flow Average	1.07 MGD

After the influent is treated by the MBR and AWPF, the recycled water requires a pump station and new pipelines to be redirected to the Injection Wells. A process flow diagram can be found in Figure 7-4; additionally, see Figure 7-5 and Figure 7-6 for the project location and site layout, respectively. See Figure 7-6 for proposed demolition assumptions per planning arrangements with CVWD. The proposed demolition was put together in accordance with CVWD's plans to upgrade their building as it is their main site for operations.

Figure 7-4: Alternative 2 Process Flow Diagram

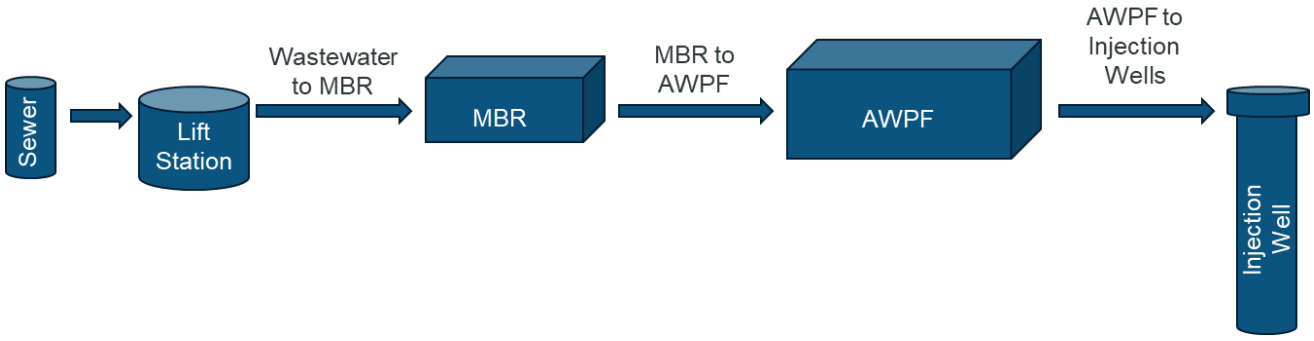


Figure 7-5: Alternative 2 Project Site Location

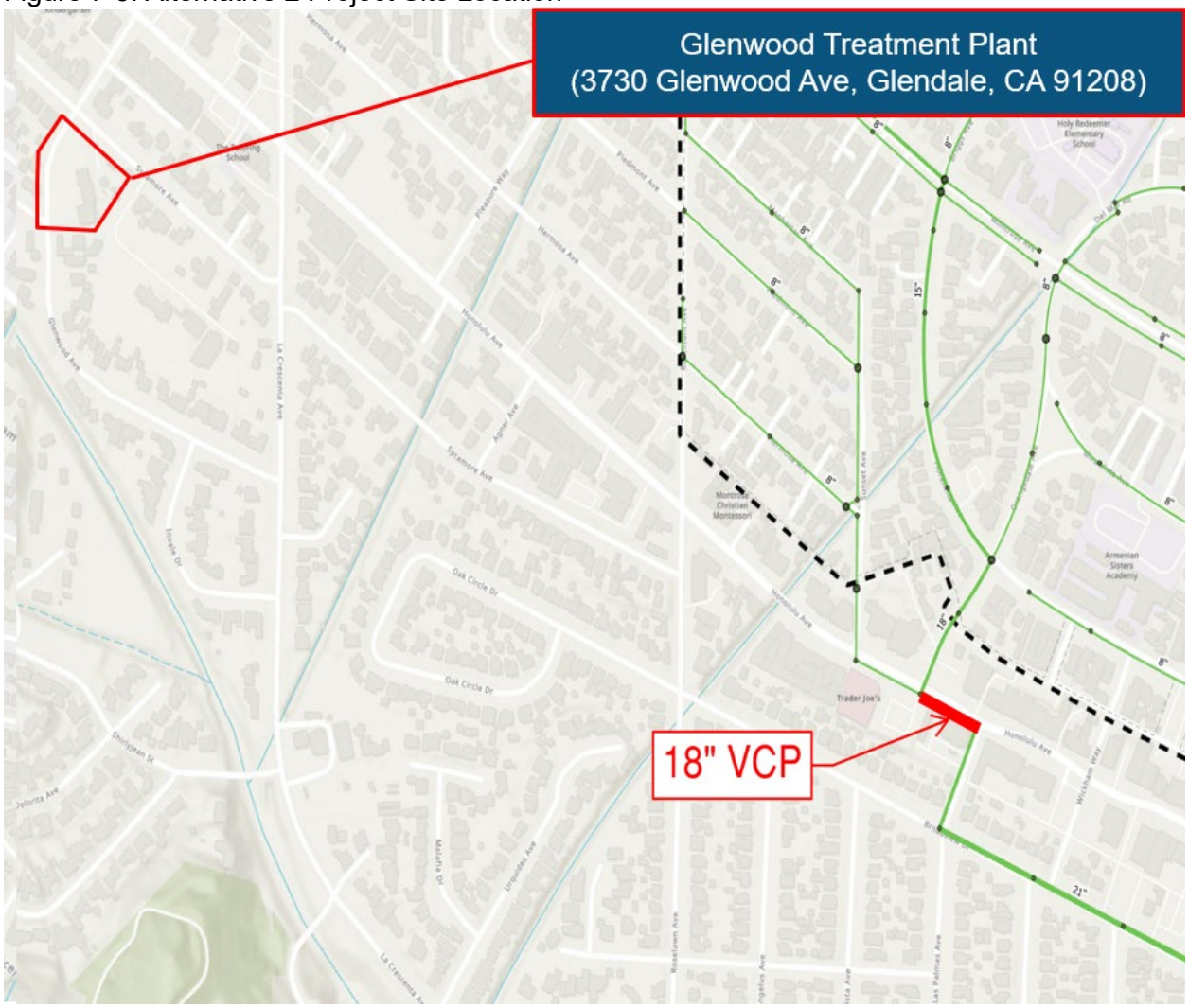
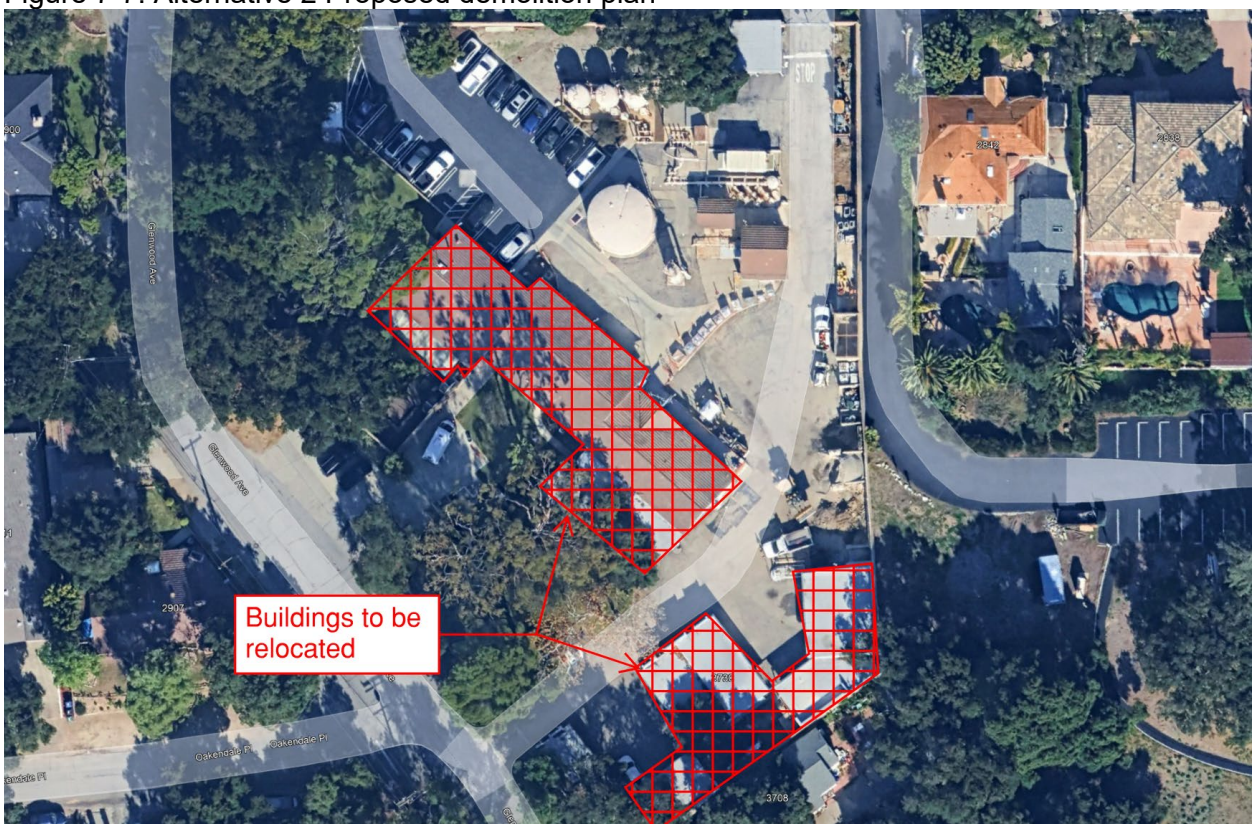


Figure 7-6: Alternative 2 Project Site Assumed Layout

Figure 7-7: Alternative 2 Proposed demolition plan



7.2.3.1 Pumping Requirements

For this alternative, the nearest sewer main from which wastewater flows would be collected is approximately 4,200 linear feet from the proposed treatment facility. Therefore, a sewer lift station is needed to convey the sewer flows uphill for about 23 feet in elevation.

Additionally, a second pump station will be needed to deliver the treated effluent to the three groundwater injection wells. This can be seen in Figure 7-6.

Table 7-4. Alternative 2 Pump Design Criteria

	Lift Station Pump	Effluent Pump
Pump Efficiency	80%	80%
Conveyance Pipe Roughness (C Factor)	130	150
Minor Pipeline Losses (as a percentage of calculated frictional losses)	5%	5%
Design Flow (Average Day Demand) (GPM)	475	355

7.2.4 Montrose Parking Lot 3 - Groundwater recharge, underground facilities

The parking lot for this alternative would be demolished to construct an underground MBR and AWPF. A new parking lot would then be built above the treatment systems to restore surface use. This alternative also includes a pump station for recycled water and one groundwater injection well. A process flow diagram can be found in Figure 7-8; additionally, see Figure 7-9 and Figure 7-10 for the project location and site layout, respectively.

This underground configuration is preferred due to space constraints and the high utilization of the parking lot, which is located in CVWD's primary private business corridor. The City of Glendale is currently considering re-zoning the parking lots along Honolulu Avenue, including Montrose Parking Lot 3, to allow for mixed-use redevelopment combining commercial and residential uses. If this re-zoning is approved, it would significantly reduce the feasibility of this alternative.

This alternative is the only one that does not utilize sewer flow meter data. The flows for this sewer section were obtained by reviewing the InfoSewer model of CVWD's sewer system. This is due to no sewer flow meter being located close enough to this site to get an accurate measurement. Table 7-5 uses the Dry Weather Flows (DWF) of the system.

Table 7-5. InfoSewer Wastewater Flows

	Wastewater Flows
Existent 2025 DWF	0.39 MGD
Project 2045 DWF	0.41 MGD

Figure 7-8: Alternative 3 Process Flow Diagram

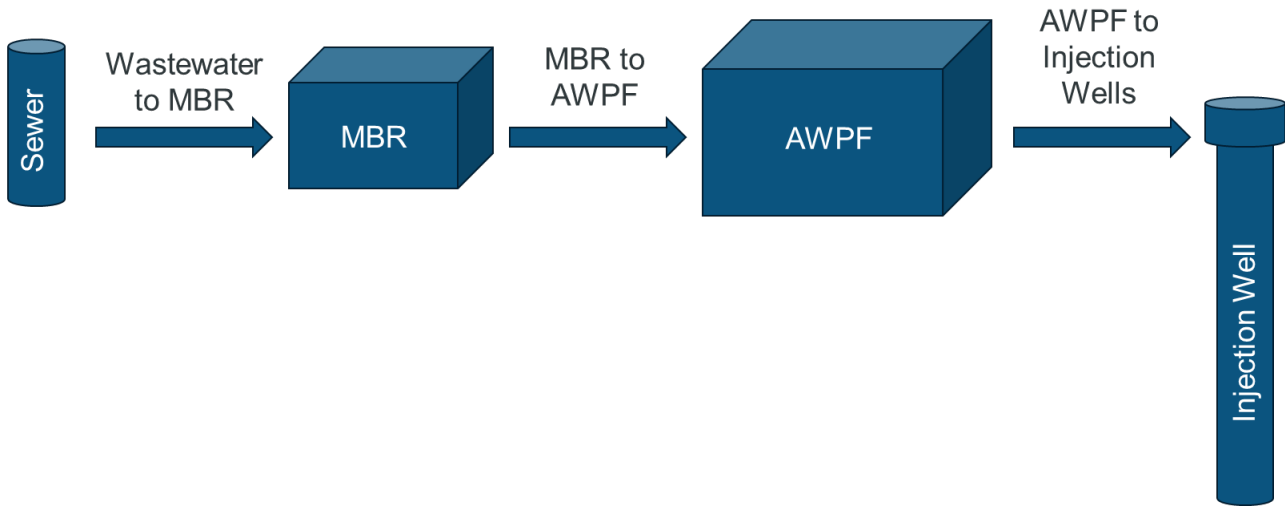


Figure 7-9: Alternative 3 Project Site Location

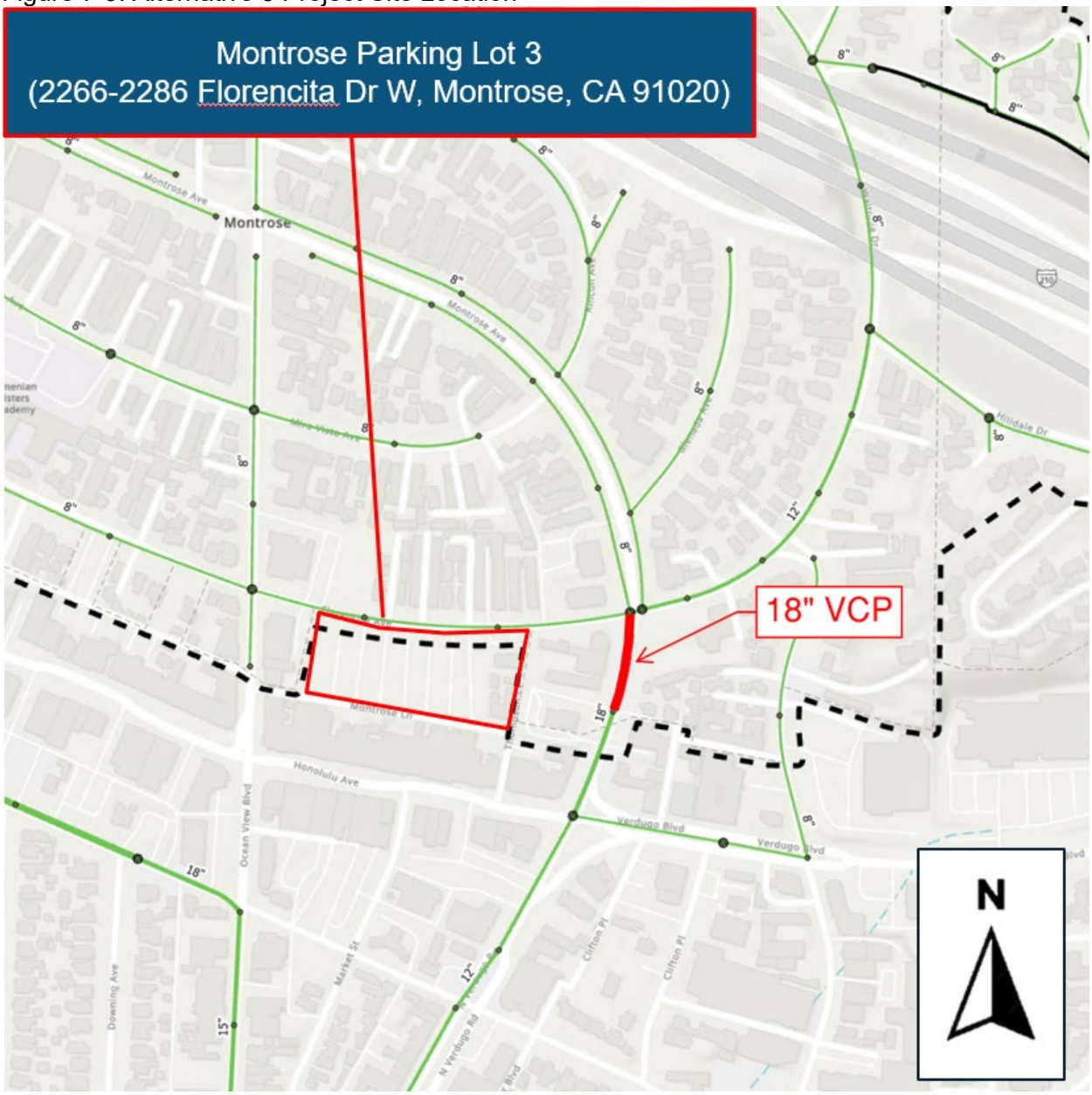


Figure 7-10: Alternative 3 Project Site Assumed Layout

7.2.5 Glendale Sports Complex - Groundwater recharge, CVWD Wastewater flows only

Located outside CVWD's sewer service area, this alternative consists of a sewer lift station connected to the sewer interceptor which connects CVWD to Los Angeles-Glendale Water Reclamation Plant (LAGWRP). The sewer lift station would pump around 1.5 MGD up to the Glendale Sports Complex to be treated by the MBR and the AWPF for groundwater injection. Four injection wells were estimated to be needed for the recycled water groundwater injection. A process flow diagram can be found in Figure 7-11; additionally, see Figure 7-12 and Figure 7-13 for the project location and site layout, respectively. The wastewater flows for this alternative were obtained by using the last sewer flow meter in the system, located close to LAGWRP. The Elk Avenue Flow Meter conveys all of the sewer flows that CVWD produces; see Table 7-6.

Table 7-6. Wastewater Flow Meter – Elk Avenue

	Wastewater Flows
Flow Average for 2024	1.45 MGD
Project 2045 Flow Average	1.54 MGD

Figure 7-11: Alternative 4 and 5 Process Flow Diagram

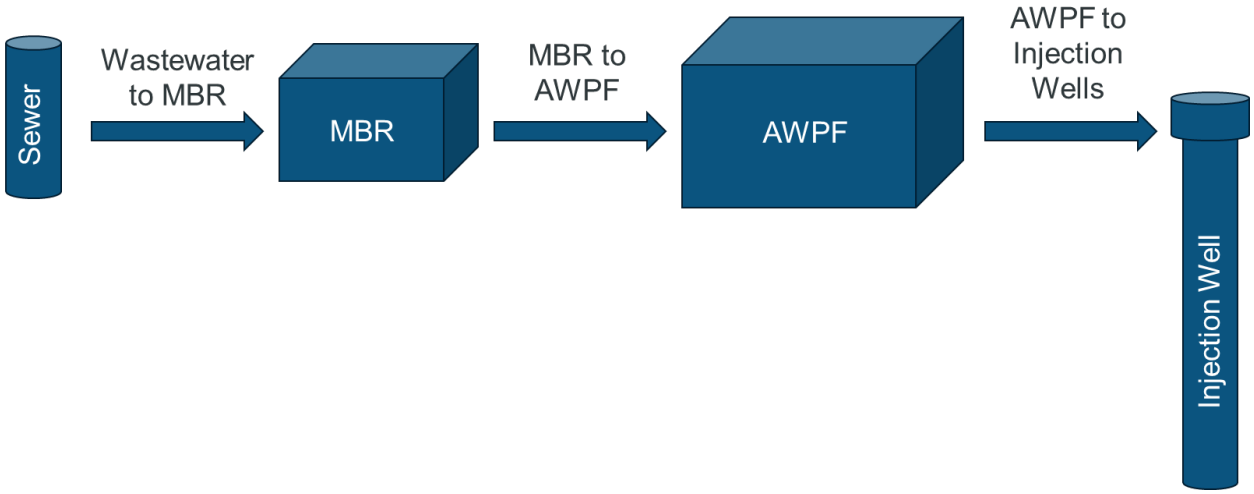


Figure 7-12: Alternative 4 and 5 Project Location

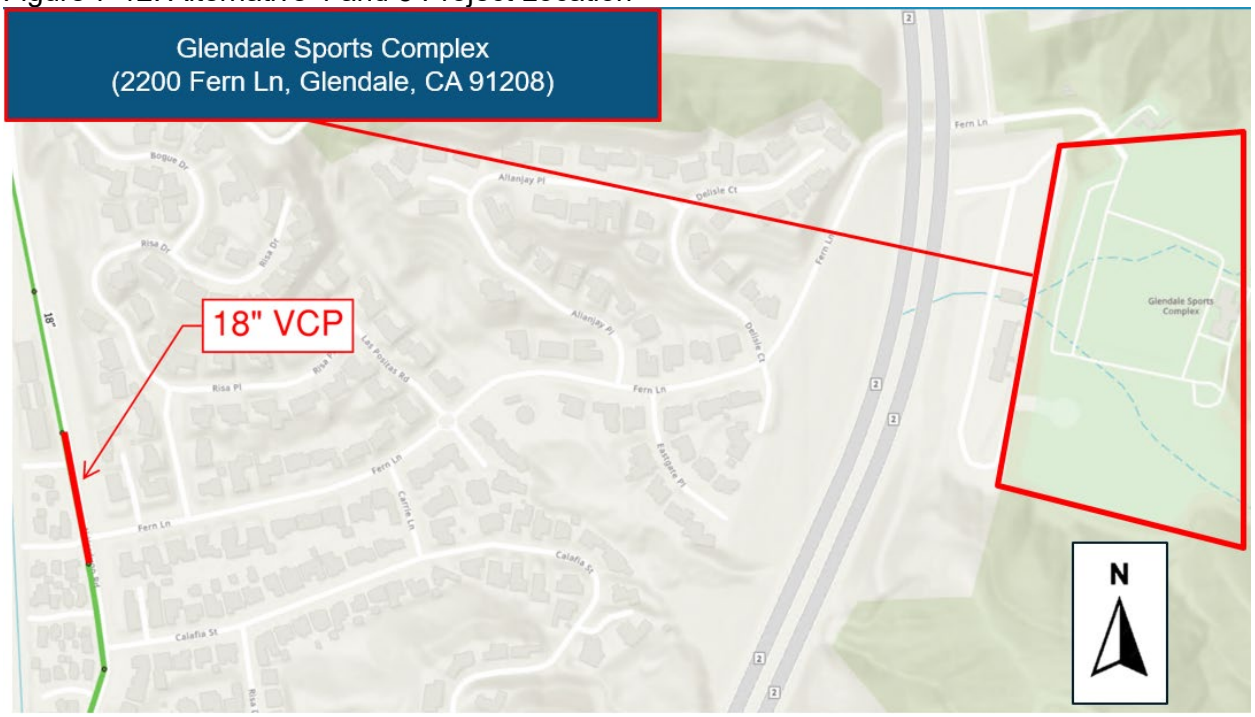
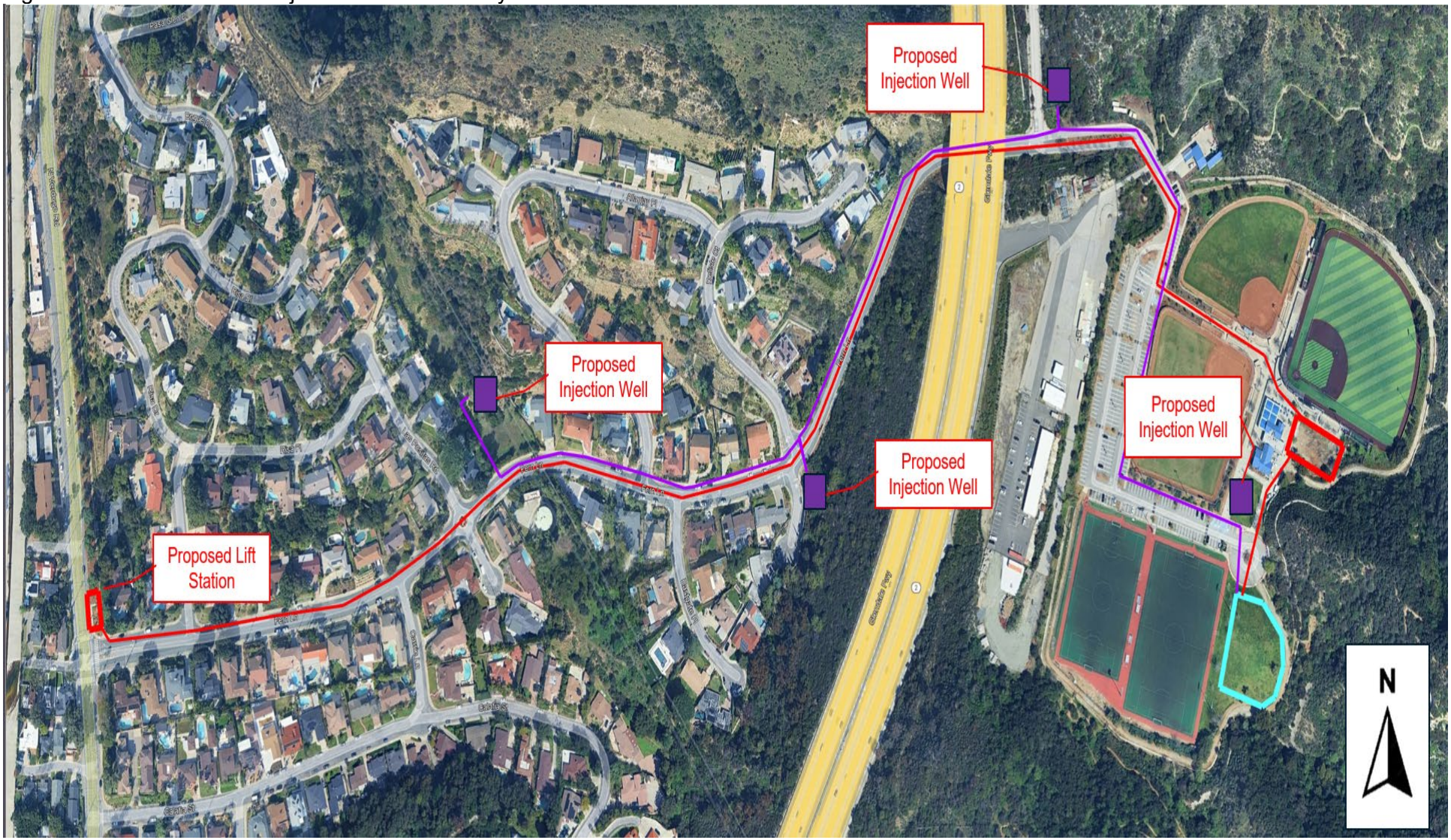


Figure 7-13: Alternative 4 Project Site Assumed Layout



7.2.5.1 Pumping Requirements

For this alternative, the closest sewer main that wastewater flows could be obtained from is around 4,400 linear feet from the treatment facility. Therefore, a sewer lift station is needed to convey the sewer flows uphill for about 380 feet in elevation.

Additionally, a second pump station will be needed to transport the treated effluent to four injection wells. This can be seen in Figure 7-13.

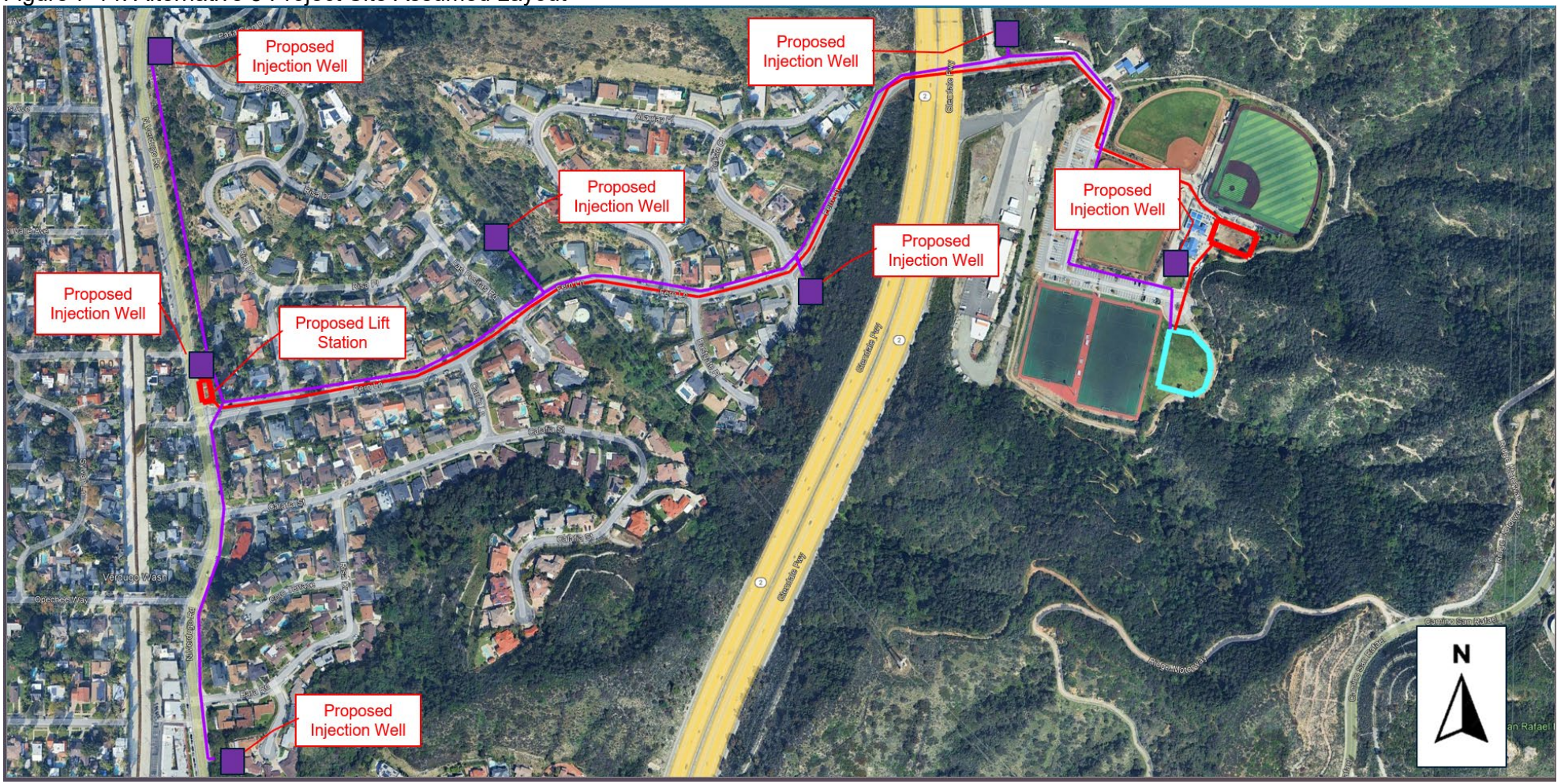
Table 7-7. Alternative 2 Pump Design Criteria

	Lift Station Pump	Effluent Pump
Pump Efficiency	80%	80%
Conveyance Pipe Roughness (C Factor)	130	150
Minor Pipeline Losses (as a percentage of calculated frictional losses)	5%	5%
Design Flow (Average Day Demand) (GPM)	700	440

7.2.6 Glendale Sports Complex - Groundwater recharge, regional partnership with Pasadena and Glendale

Similar to Alternative 4, this option assumes an additional 1 MGD of wastewater flow from a regional partnership with the Cities of Pasadena and Glendale. These flows are expected to be treated to the same quality standards as the effluent produced by the on-site MBR system. To accommodate the increased AWPF effluent, this alternative requires seven groundwater injection wells. See Figure 7-14 for the project site layout and general facility location. See section 7.2.4, Table 7-6, Figures 7-12, and 7-13 for the Available Sewer Flows, Process Flow Diagram, and Project Location as they are the same for both Alternative 4 and Alternative 5.

Figure 7-14: Alternative 5 Project Site Assumed Layout



7.2.6.1 Pumping Requirements

For this alternative, the nearest sewer main that wastewater flows could be obtained from is around 4,400 linear feet from the treatment facility. Therefore, a sewer lift station is needed to convey the sewer flows uphill for about 380 feet in elevation.

Additionally, a second pump station will be needed to pump the treated effluent to seven injection wells. This can be seen in Figure 7-14. As noted previously, this Alternative would treat around 1.5 MGD of sewage via a MBR system, and a total of approximately 2.2 MGD of tertiary effluent with the help of the regional partnership.

Table 7-8. Alternative 2 Pump Design Criteria

	Lift Station Pump	Effluent Pump
Pump Efficiency	80%	80%
Conveyance Pipe Roughness (C Factor)	130	150
Minor Pipeline Losses (as a percentage of calculated frictional losses)	5%	5%
Design Flow (Average Day Demand) (GPM)	700	880

7.2.7 Glendale Civic Auditorium - Groundwater recharge, underground facilities

Similar to Alternative 4 and 5, the Glendale Civic Auditorium obtained the sewer flow from the sewer interceptor going to LAGWRP. A sewer lift station was not necessary, as the elevation of the proposed system location was not higher than the interceptor. This alternative also requires an MBR and AWPF facility with four groundwater injection wells. A process flow diagram can be found in Figure 7-15; additionally see Figure 7-16 and Figure 7-17 for the project location and site layout, respectively.

Table 7-9. Wastewater Flow Meter – Elk Avenue

	Wastewater Flows
Flow Average for 2024	1.45 MGD
Project 2045 Flow Average	1.54 MGD

Figure 7-15: Alternative 4 and 5 Process Flow Diagram

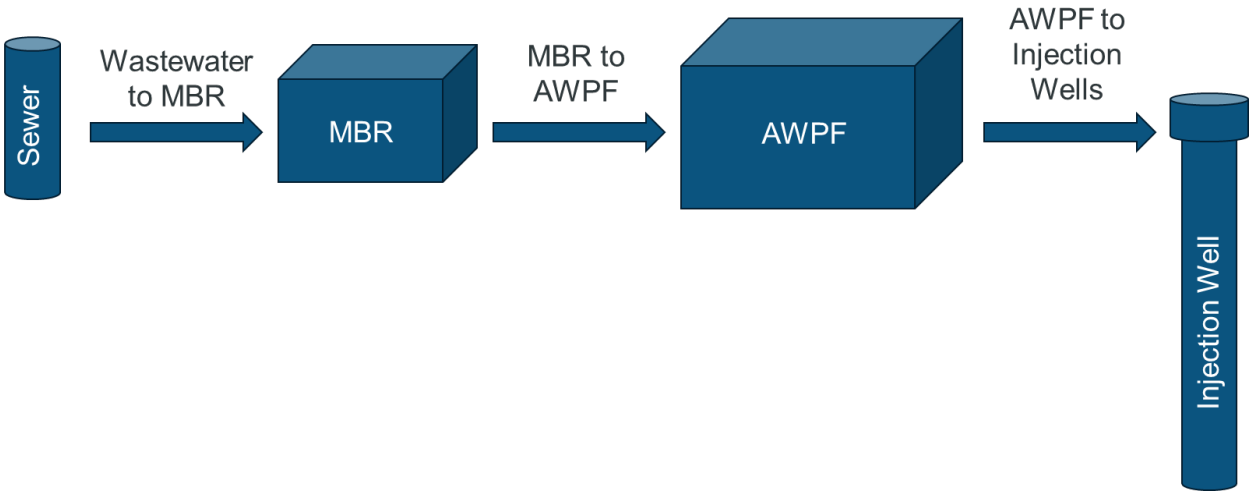


Figure 7-16: Alternative 4 and 5 Project Location

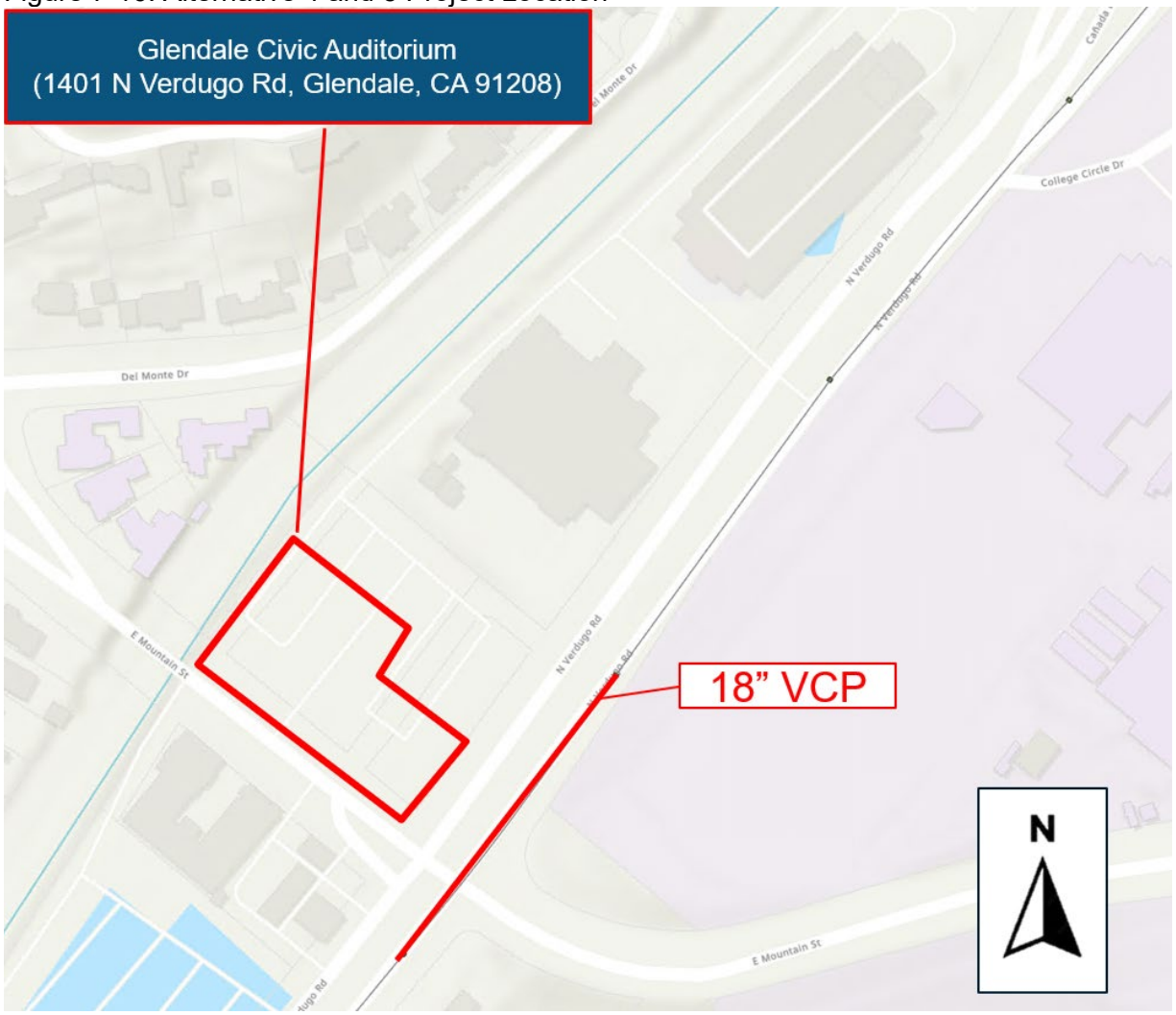


Figure 7-17: Alternative 6 Project Site Assumed Layout

7.2.8 Injection Wells

Groundwater injection wells for Alternatives 2 through 6 were sized based on an assumed injection flow rate of 171 gallons per minute (gpm) per well, which represents 50% of the estimated production capacity of 342 gpm per well, as provided by WSP Consultants. Typical design criteria for these wells include a casing diameter of 10 to 16 inches, screen intervals tailored to the target aquifer, and gravel pack and seal materials selected to prevent formation migration and ensure vertical isolation. Injection zones should have sufficient transmissivity, with hydraulic conductivity generally exceeding 10 feet per day. Wells are typically spaced 300 to 1,000 feet apart to avoid hydraulic interference, and the total number of wells is determined by dividing the required system flow by the 171 gpm per-well capacity. Surface infrastructure includes flow control, monitoring ports, and backflow prevention, with all systems designed to comply with applicable regulatory requirements, including those of the Regional Water Quality Control Board and the Underground Injection Control (UIC) program.

7.3 Engineer's Opinion of Probable Costs

An Engineer's Opinion of Probable Costs was developed for each of the recycled water alternatives evaluated in this study. These planning-level estimates include capital construction costs, annual operations and maintenance (O&M) costs, and lifecycle costs expressed in dollars per acre-foot per year (AFY). The estimates are based on conceptual designs, unit cost assumptions, and industry-standard methodologies. See Table 7-10 for a summary of the OPCC, and Tables 7-11 and 7-12 for a summary of the Lifecycle Costs

Table 7-10. Class 5 OPCC

	Estimated Range of Probable Cost		
Alternative	-30%	Total Calculated Estimate	+50%
1	$11,200,000	**$16,000,000**	$24,000,000
2	$140,630,000	**$200,900,000**	$301,350,000
3	$73,360,000	**$104,800,000**	$157,200,000
4	$222,880,000	**$318,400,000**	$477,600,000
5	$292,880,000	**$418,400,000**	$627,600,000
6	$249,830,000	**$356,900,000**	$535,350,000

Table 7-11. Long List Lifecycle Costs

Alternative	Unit Water Cost ($/AF)
1	**$31,500**
2	**$12,100**
3	**$18,100**
4	**$14,100**
5	**$10,300**
6	**$14,100**

Table 7-12. Short List Lifecycle Costs

Alternative	Unit Water Cost ($/AF)
1	**$27,700**
2	**$8,000**
6	**$10,000**

A lifecycle cost analysis was conducted over a 30-year planning horizon, incorporating capital amortization, O&M, energy, and equipment replacement costs. To assess the financial competitiveness of recycled water relative to imported water, a cost sensitivity analysis was performed for the three short-listed alternatives: Alternative 1 (Two Strike Park), Alternative 2 (Local Advanced Treatment with Injection), and Alternative 6 (Local Advanced Treatment with Injection). This analysis evaluated how changes in the cost of imported water, currently a major component of CVWD's supply, could affect the cost-effectiveness of each alternative.

The results indicate that while capital costs vary significantly across alternatives, lifecycle costs for some options may become competitive with or favorable to imported water under certain pricing scenarios. This is particularly relevant given CVWD's reliance on imported water from the Metropolitan Water District, which is subject to long-term cost escalation and supply variability.

The cost estimates presented are conceptual and intended for comparative planning purposes. They do not include site-specific contingencies. Detailed cost breakdowns, lifecycle assumptions, and sensitivity results are provided in Appendix B.

7.4 Alternatives Screening Approach

The six alternatives were analyzed using a two-step screening process. The first step consisted of an internal screening by CVWD, in order to see what aligns best with their goals and the total impact of the project. This includes, but is not limited to project locations, sewer flows available, space needed, and overall project costs which also included an initial lifecycle breakdown. After the preliminary screening was completed, KJ further developed the 3 alternatives selected by CVWD as the short-list set of project alternatives. These alternatives varied by lowest and highest costs, complexity of the project, and potential work sequence with planned projects that CVWD is currently working on. The short list consists of:

1. Alternative 1: Two Strike Park - Purple pipe irrigation only
2. Alternative 2: Glenwood Treatment Plant - Groundwater recharge
3. Alternative 6: Glendale Civic Auditorium - Groundwater recharge, underground facilities

These 3 alternatives were defined to more closely determine the equipment and space necessary, in addition to a more developed Class 5 cost estimate along with cost comparisons and sensitivity analysis.

7.5 Alternative Ranking Results

To develop the Alternative ranking, six criteria were selected, each of the criteria was weighted at different percentages in coordination with City staff. The criteria was then scored on a scale from 0 to 5. Table 7-1 indicated the criteria, weight, and score for each of the short-list alternatives. The scoring includes a proportional ratio which was dependent on the OPCC, Unit water cost, and the total water supply produced for each alternative. The criteria selected is as follows with the first three being weighted based on quantitative values:

- Capital Costs: Proportional scoring based on estimated construction costs
    - This criterion used the lowest Capital Cost as the base line of comparison giving Alternative 1 a score of 5. This Capital Cost was then used as a ratio to score the other two alternatives.
- Net Lifecycle Cost: Proportional scoring based on lifecycle costs of project and offset of potable water and waste disposal costs
    - For this criterion, the same process as before was used, except that now the lowest lifecycle is equated to the highest score.
- Water Supply Benefit: Proportional scoring based on annual water supply benefit
    - Similarly to the previous two criteria, this scoring went in favor of the alternative with the highest production of AFY of effluent water.
- Ease of Implementation: Subjective scoring based on construction difficulty
- Operational Complexity: Subjective scoring based on operational complexity of project
- Construction Impacts to Community: Subjective scoring based on disruption to community during construction

Table 7-13: Short List Alternative Scoring Criteria

Alternative Scoring Criteria				
Criteria (Scoring 0-5)	**Weighting**	**Alt 1 - Two Strike Park**	**Alt 2 - Glenwood Treatment Plant**	**Alt 6 - Glendale Civic Center**
Capital Cost	25%	5	0.4	0.2
Net Lifecycle Cost	30%	1.4	5	4
Water Supply Benefit	20%	0.2	3.5	5
Ease of Implementation	10%	5	1	2
Operational Complexity	10%	5	3	3
Construction Impacts to Community	5%	3	2	1
Total Score	**100%**	**2.86**	**2.79**	**3.81**

7.6 No Project Alternative

An additional project alternative that can be considered is no alternative at all. CVWD could continue to serve the identified potential recycled water customers with potable water from the Foothill Municipal Water District and local groundwater.

7.7 Preferred Alternative Projects

CVWD opted to go with the no project alternative option. This is due to the high upfront costs of all the alternatives, the combination of space constraints, long term financial efforts, and the risk of not being able to obtain all the groundwater injected back due to the Basin's flow direction.

7.8 Non-Recycled Water Alternatives

There was no non-recycled water alternatives developed. CVWD currently does not treat any of its wastewater and depends on groundwater and purchased water from Foothill Municipal Water District and Metropolitan Water District for its water supply.

7.9 Water Conservation/Reduction Analysis

CVWD has implemented a comprehensive water conservation program designed to reduce water demand and improve long-term supply reliability. The program is structured around a six-stage Water Shortage Contingency Plan (WSCP), which outlines escalating conservation measures in response to varying levels of water supply shortage.

Permanent Conservation Measures are in effect at all times under Phase 1 and include prohibitions on water waste such as overspray, runoff, and inefficient irrigation practices. These measures are supported by public education, leak detection, and enforcement mechanisms.

Water Shortage Stages range from Phase 1 (Standard Conservation) to Phase 6 (Emergency), with each stage corresponding to a projected supply shortfall ranging from up to 10% to greater than 50%. As conditions worsen, CVWD imposes increasingly stringent restrictions, including limits on outdoor irrigation, vehicle washing, and water use for decorative features.

The WSCP also includes demand reduction targets and response actions tailored to each phase. For example, Phase 3 calls for extraordinary conservation, while Phase 5 limits water use to essential needs. These stages are triggered by supply conditions reported by the Foothill Municipal Water District and Metropolitan Water District.

CVWD's conservation strategy is designed to be adaptive, data-driven, and enforceable. It complements regional efforts to manage demand and supports CVWD's broader goals of sustainability and drought resilience.

Section 8: Recommended Project

8.1 Description of Recommended Project and Potential Users

CVWD initially evaluated six project alternatives based on criteria such as recycled water production, lifecycle cost, and overall feasibility. While some alternatives demonstrated strong technical performance, CVWD ultimately decided not to move forward with any of the proposed project options.

This decision was based on a combination of factors, including high upfront construction costs, limited space for infrastructure, long-term financial commitments, and the risk of not being able to recover all injected groundwater due to the basin's flow direction. As a result, CVWD opted to proceed with the No Project alternative.

8.2 Implementation and Operational Plan

An implementation and operational plan is not provided due to the selection of the No Project alternative. While several project options were evaluated, CVWD ultimately determined that none were feasible at this time due to high lifecycle costs, space limitations, long-term financial implications, and uncertainties related to groundwater recovery. As a result, no further planning or operational steps are being pursued at this stage.

References

Crescenta Valley Water District. (2020). 2020 Urban Water Management Plan. Prepared by SA Associates. Retrieved from https://wuedata.water.ca.gov/uwmp_plans.asp?cmd=2020

Crescenta Valley Water District. (2019). Sewer System Management Plan.

Crescenta Valley Water District. (2024). Wastewater Master Plan.

County of Los Angeles. (2022). Revised County of Los Angeles Housing Element (2021–2029).

State of California Department of Water Resources. (2020). Urban Water Management Plans – Guidebook and Requirements. Retrieved from https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans

California State Water Resources Control Board. Regulations Related to Recycled Water Use for Groundwater Replenishment and Surface Water Augmentation. Available at: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Recentregs.html.

California State Water Resources Control Board. Direct Potable Reuse Regulations. Effective October 1, 2024. Available at: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/direct_potable_reuse.html.

Appendix A: Engineer's Opinion of Probable Cost

KENNEDY/JENKS CONSULTANTS

OPINION OF PROBABLE CONSTRUCTION COST

BASIS OF ESTIMATE

PROJECT INFORMATION

Client:	Crescenta Valley Water District
Project:	JRC - CVWD Recycled Water Feasibility Study
KJ Job No.:	2444512*00
Estimate Date:	2/1/2025
Prepared By:	DK
Reviewed By:	PC
Estimate Type:	Conceptual
AACEI Class Level Estimate :	5

PROJECT DESCRIPTION:

The scope of work for this project includes: Planning level assessment for the construction of different alternatives for a wastewater treatment plant at different locations near the sewer service area of Crescenta Valley Water District.

ESTIMATE DOCUMENTS:

DRAWINGS: None
DOCUMENTS: Google Earth Site locations.

COSTS PROVIDED BY OTHERS: None

SOURCE OF COST DATA:

ESTIMATE ASSUMPTIONS:

The following assumptions were made in the preparation of this estimate:

Public Bid
Assumes geotechnical conditions allow for Standard foundations. Geotechnical studies have not yet been completed.
Assumes some alternatives will have the MBR underground
Assumes wet well will be underground
Assumes all sites are currently level and within 1' of future finished grade elevation. No large cut / fill or retaining wall is included.

SPECIFIC INCLUSIONS:

Design, Administration, and Construction Management expenses are included as a percentage of overall construction cost as shown on the summary sheets.

SPECIFIC EXCLUSIONS:

The estimate does not include the following:

- Hazardous or Special Waste Removal or Disposal
- Asbestos abatement

- Provision of trailers or facilites for Owners use during construction

MAJOR CHANGES FROM PREVIOUS ESTIMATE:

N/A .

DESIGN CONTINGENCY:

A design contingency of 30% has been included.

Note: This allowance is intended to provide a Design Contingency allowance. It is not intended to provide for a Construction Contingency for change orders during construction or to cover unforeseen conditions.

ESCALATION:

No escalation factor has been applied to this estimate

ACCURACY:

The level of accuracy is commensurate with levels developed by the AACE, the Association for the Advancement of Cost Engineering International. At increasing levels of design completion, the narrower the range between upper and lower limits and the greater the accuracy of the estimate. This estimate is considered a Class 5 Concept screening level estimate in accordance with AACE guidelines. Typically this level of estimate has an expected accuracy range of +30 to +100% and -20% to -50%. This estimate is based upon competitive bidding, which assumes receipt of multiple bids from five or more General Contractors. Without competitive bidding, pricing can vary significantly from the prices assumed in this estimate.
The enclosed Engineer's Estimate of Probable Construction Cost is only an opinion of possible items that maybe considered for budgeting purposes. This Project Estimate is limited to the conditions existing at issuance and is not a guaranty of actual construction cost or schedule. Uncertain market conditions such as, but not limited to, local labor or contractor availability, wages, other work, material market fluctuations, price escalations, force majeure events and developing bidding conditions, etc. may affect the accuracy of this review. Kennedy/Jenks is not responsible for any variance from this Project Estimate or actual prices and conditions obtained.

OPINION OF PROBABLE CONSTRUCTION COST

Client: Crescenta Valley Water District
Project: JRC - CVWD Recycled Water Feasibility Study
Location: Crescenta Valley Water District
Estimate Type: Conceptual

Alternative 1			Alternative 2		
MBR Facility	$	4,175,000	MBR Facility	$	15,725,000
RW Storage	$	768,000	Sewer Lift Station	$	2,516,000
Irrigation Coveyance	$	1,080,000	Connection back to sewer	$	240,000
Additional Faciltiy Costs	$	2,139,000	AWPF	$	31,030,000
Taxes @ 10.25%	$	418,000	Injection Well	$	16,870,000
Mobilization/Demobilization/Permits @ 10%	$	816,000	Building Demolition	$	1,020,000
Contractor Overhead & Profit @ 15%	$	1,224,000	Underground Construction	$	31,030,000
Estimate Contingency @ 40%	$	3,265,000	Additional Faciltiy Costs	$	22,239,000
Engineering @ 10%	$	816,000	Taxes @ 10.25%	$	6,184,000
ROW/Land Acquisition @ 5%	$	408,000	Mobilization/Demobilization/Permits @ 10%	$	618,000
Construction Management @ 10%	$	816,000	Contractor Overhead & Profit @ 15%	$	928,000
			Estimate Contingency @ 40%	$	48,268,000
			Engineering @ 10%	$	12,067,000
			ROW/Land Acquisition @ 5%	$	-
			Construction Management @ 10%	$	12,067,000
TOTAL	**$**	**16,000,000**	**TOTAL**	**$**	**200,900,000**

Notes:

1. Total cost is rounded to the nearest $100,000.

Alternative 3		Alternative 4	
MBR Facility	$ 9,493,000	MBR Facility	$ 27,364,760
Connection back to sewer	$ 240,000	Sewer Lift Station	$ 3,750,000
AWPF	$ 13,760,000	Connection back to sewer	$ 1,200,000
Injection Well	$ 5,054,000	AWPF	$ 29,000,000
Underground Construction	$ 23,253,000	Injection Well	$ 21,440,000
Additional Faciltiy Costs	$ 9,301,000	Underground Construction	$ 56,364,760
Taxes @ 10.25%	$ 3,131,000	Additional Faciltiy Costs	$ 24,046,000
Mobilization/Demobilization/Permits @ 10%	$ 306,000	Taxes @ 10.25%	$ 8,362,000
Contractor Overhead & Profit @ 15%	$ 458,000	Mobilization/Demobilization/Permits @ 10%	$ 16,317,000
Estimate Contingency @ 40%	$ 24,440,000	Contractor Overhead & Profit @ 15%	$ 24,475,000
Engineering @ 10%	$ 6,110,000	Estimate Contingency @ 40%	$ 65,266,000
ROW/Land Acquisition	$ 3,055,000	Engineering @ 10%	$ 16,317,000
Construction Management @ 10%	$ 6,110,000	ROW/Land Acquisition @ 5%	$ 8,158,000
		Construction Management @ 10%	$ 16,317,000
TOTAL	**$ 104,800,000**	**TOTAL**	**$ 318,400,000**

Notes:

1. Total cost is rounded to the nearest $100,000.

Notes:

1. Total cost is rounded to the nearest $100,000.

Kennedy Jenks

Alternative 5			Alternative 6		
MBR Facility	$	27,364,760	MBR Facility	$	31,005,000
Sewer Lift Station	$	3,750,000	Connection back to sewer	$	144,000
Connection back to sewer	$	1,200,000	AWPF	$	35,728,000
AWPF	$	43,500,000	Injection Well	$	22,582,000
Injection Well	$	37,880,000	Underground Construction	$	66,733,000
Underground Construction	$	70,864,760	Additional Faciltiy Costs	$	26,693,000
Additional Faciltiy Costs	$	29,846,000	Taxes @ 10.25%	$	9,373,000
Taxes @ 10.25%	$	10,988,000	Mobilization/Demobilization/Pe	$	18,289,000
Mobilization/Demobilization/Permits @ 10%	$	21,441,000	Contractor Overhead & Profit @	$	27,433,000
Contractor Overhead & Profit @ 15%	$	32,161,000	Estimate Contingency @ 40%	$	73,154,000
Estimate Contingency @ 40%	$	85,762,000	Engineering @ 10%	$	18,289,000
Engineering @ 10%	$	21,441,000	ROW/Land Acquisition @ 5%	$	9,144,000
ROW/Land Acquisition @ 5%	$	10,720,000	Construction Management @ 10	$	18,289,000
Construction Management @ 10%	$	21,441,000			
TOTAL	**$**	**418,400,000**	**TOTAL**	**$**	**356,900,000**

Notes:

1. Total cost is rounded to the nearest $100,000.

Notes:

1. Total cost is rounded to the nearest $100,000.

	Estimated Range of Probable Cost		
Alternative	-30%	Total Calculated	+50%
1	$11,200,000	**$16,000,000**	$24,000,000
2	$140,630,000	**$200,900,000**	$301,350,000
3	$73,360,000	**$104,800,000**	$157,200,000
4	$222,880,000	**$318,400,000**	$477,600,000
5	$292,880,000	**$418,400,000**	$627,600,000
6	$249,830,000	**$356,900,000**	$535,350,000

Alternative	Unit Water Cost ($/AF)
1	**$31,500**
2	**$12,100**
3	**$18,100**
4	**$14,100**
5	**$10,300**
6	**$14,100**

ALTERNATIVE 1

Engineers Opinion of Probable Cost
CVWD - Recycled Water Feasibilty Study

Kennedy Jenks

Project: JRC - CVWD - 2024 RW Feasibility Study
Estimate: Conceptual

Prepared By: DK
Date Prepared: Dec-2024
K/J Proj. No. 2444512*00

Max Daily Flow: 0.04 mgd
Design Capacity: 25 Max Day Demand (gpm)
13 Max Annual Demand (MG/yr)

Item No.	Description	Qty	Units	Total Costs $/Unit	Total Capital Cost	Notes/Source
Capital Costs						
1.0	**MBR Facility**				**$ 4,175,000**	
1.1	Cloacina MEMPAC-M1 Package Treatment Plan	1	EA	$ 1,850,000	$ 1,850,000	
1.2	Packaged Lift Station	1	LS	$ 130,654	$ 131,000	
1.3	EQ Storag	1	LS	$ 357,935	$ 358,000	
1.4	Duplex Influent Screens	1	LS	$ 121,459	$ 121,000	
1.5	Sound Attenuation	1	LS	$ 49,936	$ 50,000	
1.6	Effluent Disposal Pumps	1	LS	$ 84,518	$ 85,000	
1.7	Low-Flow Configuration	1	LS	$ 48,891	$ 49,000	
1.8	UV Disinfection	1	LS	$ 619,807	$ 620,000	
1.9	Sludge Storage Tank	1	LS	$ 24,000	$ 24,000	
1.10	Spare Parts	1	LS	$ 195,222	$ 195,000	
1.11	Installation of above	1	LS	$ 500,000	$ 500,000	
1.12	Connection to Sewer - 8" PVC	400	LF	$ 480	$ 192,000	
2.0	**RW Storage**				**$ 768,000**	
2.1	RW Storage Tank	1	LS	$ 657,813	$ 658,000	50,000 Gal Tank
5.2	2 HP Pump Station	1	LS	$ 50,000	$ 50,000	Assuming $25k per hP
2.3	6" Flowmeter, vault piping & valves, vault	1	LS	$ 40,000	$ 40,000	
2.4	Air gap/potable connection	1	LS	$ 20,000	$ 20,000	Air gap connection, backflow preenter, air gap with screen, tie into existing potable
3.0	**Irrigation Coveyance**				**$ 1,080,000**	
3.1	6" PVC Pipe	3,000	LF	$ 360	$ 1,080,000	Includes trenching, repaving, and retorfit costs
	Subtotal Facility Capital Costs - Part 1				**$ 6,023,000**	
Additional Facility Capital Costs						
4.0	Site Development Costs	@	15%		903,000	% of Subtotal facility costs (Includes grading, erosion control, cut/fill, etc.)
5.0	Electrical, I&C, and Remote (high-tech) Control	@	25%		1,236,000	% of Equipment
	Subtotal Facility Capital Costs - Part 2				**$ 2,139,000**	
	Total Capital Cost				**$ 8,162,000**	
	Taxes	@	10.25%		$ 418,000	Assumed 50% of cost is materials
	Mobilization/Demobilization/Permits	@	10%		$ 816,000	
	Contractor Overhead & Profit	@	15%		$ 1,224,000	
	Estimate Contingency	@	40%		$ 3,265,000	
	Subtotal w/ Contractor Markups and Contingency				**$ 13,885,000**	
	Engineering	@	10%		$ 816,000	
	ROW/Land Acquisition	@	5%		$ 408,000	
	Construction Management	@	10%		$ 816,000	
Total					**$15,925,000**	

O&M Costs

Annual Operations and Maintenance Costs

Item No.	Description	Qty	Units						
1.0	**Energy Costs**				**$ 45,810.35**				
1.1	Energy - MBR Treatment	43,769	kWh	$ 0.25	$ 10,942.34	Treatment Operat	24	hours per day	
1.2	Energy - Pump Station	130,746	kWh	$ 0.25	$ 32,686.57		8760	hours operated per year	
1.3	Energy - Other	@	5%	$ 2,181.45	$ 2,181.45		3331	kWh/MG	from SV proposal
						Influent PS HP (TB	20	assume total motor HP required	
2.0	**Chemicals**								
2.1	**Clean in Place**				**$ 2,600.00**				
2.11	Sodium Hypochlorite	400	gal	$ 6.50	$ 2,600.00	100 gal hypo per clean quarterly per email from Kubota rep			
2.12	Citric Acid	0	gal	$ 24.00	$ -				
3.0	**Labor Costs**				**$ 175,000.00**				
3.1	Labor	1	staff	$ 175,000.00	$ 175,000.00	full time staff at	$175,000	average salary + benefits per year	
4.0	**Dewatering Facility O&M**								
4.1	Polymer Dosing		--						
4.2	Solids Handling Fee		--	$ 60.00					
5.0	**Maintenance:**				**$ 301,150.00**				
5.1	Other (Replacement/Repair)	@	5%	$ 301,150.00	$ 301,150.00	% of facility direct costs			
					$ 250,827.59				
6.0	**Contingency**	@	25%	$ 250,827.59	$ 250,827.59	% of above O&M costs			
				Total O&M Costs	**775,387.93**				

Life Cycle Analysis
CVWD - Recycled Water Feasibility Study

Project: CVWD - Recycled Water Feasibility Study

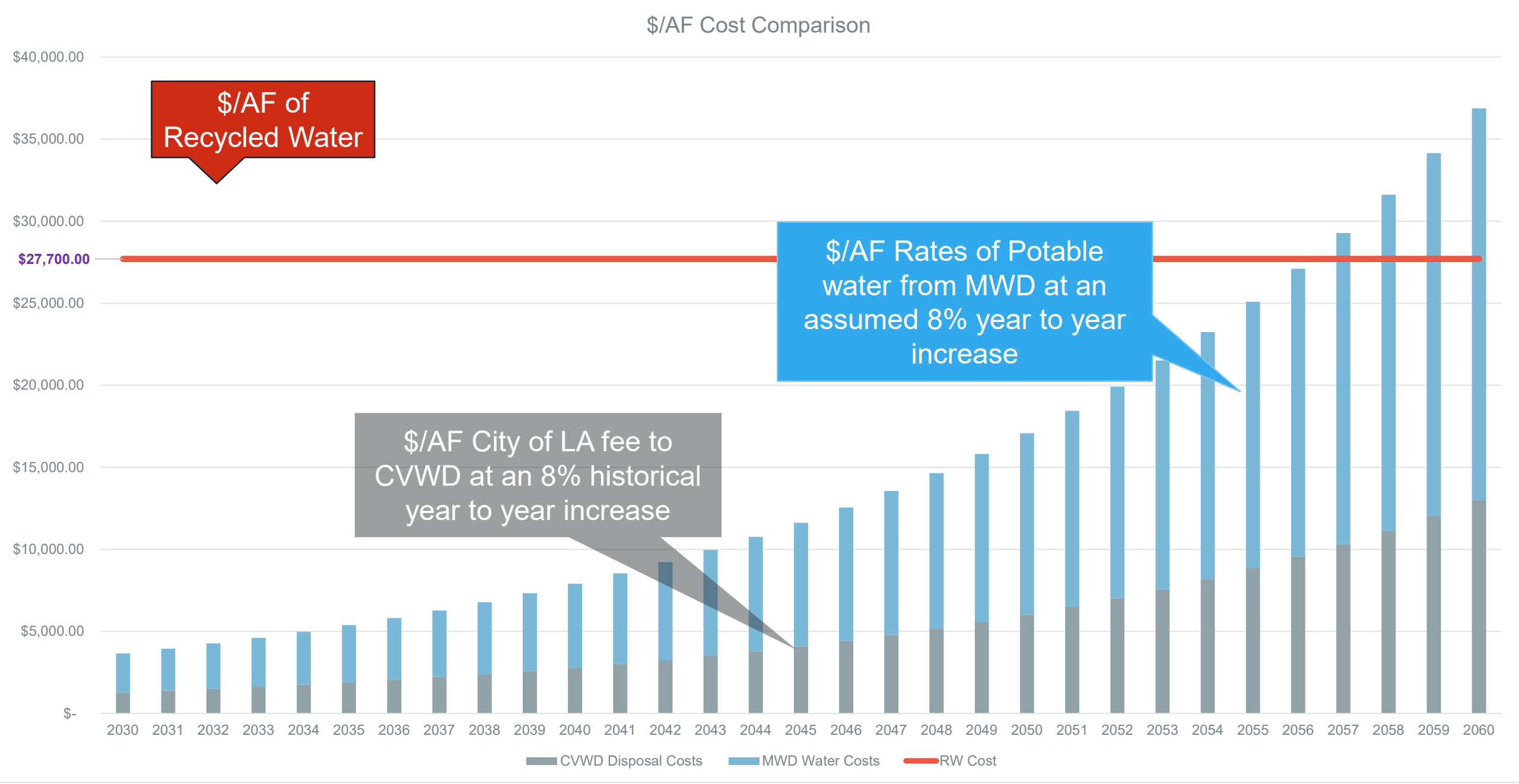
Prepared By: DK
Date Prepared: Feb-2024
K/J Proj. No.

Date	Construction Cost ($)	Annual Power Consumption Cost ($)	Annaul Chemical Cost ($)	Annual Labor Cost ($)	Annual Maintenance Costs ($)	Annual Contingency ($)	Annual O&M Cost ($)	Recycled Water (AFY)	WW Disposal Cost Savings	FMWD Water Rates and Charges Savings
2030	$3,981,250	$45,810	$2,600	$175,000	$301,150	$250,828	$775,388	39	($35,205)	($78,134)
2031	$570,644	$47,185	$2,678	$180,250	$310,185	$258,352	$798,650	39	($36,965)	($82,041)
2032	$570,644	$48,600	$2,758	$185,658	$319,490	$266,103	$822,609	39	($38,813)	($86,143)
2033	$570,644	$50,058	$2,841	$191,227	$329,075	$274,086	$847,287	39	($40,754)	($90,450)
2034	$570,644	$51,560	$2,926	$196,964	$338,947	$282,309	$872,706	39	($42,792)	($94,973)
2035	$570,644	$53,107	$3,014	$202,873	$349,115	$290,778	$898,887	39	($44,931)	($99,721)
2036	$570,644	$54,700	$3,105	$208,959	$359,589	$299,501	$925,854	39	($47,178)	($104,707)
2037	$570,644	$56,341	$3,198	$215,228	$370,377	$308,486	$953,629	39	($49,537)	($109,943)
2038	$570,644	$58,031	$3,294	$221,685	$381,488	$317,741	$982,238	39	($52,014)	($115,440)
2039	$570,644	$59,772	$3,392	$228,335	$392,932	$327,273	$1,011,705	39	($54,614)	($121,212)
2040	$570,644	$61,565	$3,494	$235,185	$404,720	$337,091	$1,042,057	39	($57,345)	($127,273)
2041	$570,644	$63,412	$3,599	$242,241	$416,862	$347,204	$1,073,318	39	($60,212)	($133,636)
2042	$570,644	$65,315	$3,707	$249,508	$429,368	$357,620	$1,105,518	39	($63,223)	($140,318)
2043	$570,644	$67,274	$3,818	$256,993	$442,249	$368,349	$1,138,683	39	($66,384)	($147,334)
2044	$570,644	$69,292	$3,933	$264,703	$455,516	$379,399	$1,172,844	39	($69,703)	($154,701)
2045	$570,644	$71,371	$4,051	$272,644	$469,182	$390,781	$1,208,029	39	($73,189)	($162,436)
2046	$570,644	$73,512	$4,172	$280,824	$483,257	$402,505	$1,244,270	39	($76,848)	($170,557)
2047	$570,644	$75,718	$4,297	$289,248	$497,755	$414,580	$1,281,598	39	($80,690)	($179,085)
2048	$570,644	$77,989	$4,426	$297,926	$512,688	$427,017	$1,320,046	39	($84,725)	($188,039)
2049	$570,644	$80,329	$4,559	$306,864	$528,068	$439,828	$1,359,647	39	($88,961)	($197,441)
2050	$570,644	$82,739	$4,696	$316,069	$543,910	$453,023	$1,400,437	39	($93,409)	($207,313)
2051	$570,644	$85,221	$4,837	$325,552	$560,228	$466,613	$1,442,450	39	($98,080)	($217,679)
2052	$570,644	$87,777	$4,982	$335,318	$577,035	$480,612	$1,485,723	39	($102,984)	($228,563)
2053	$570,644	$90,411	$5,131	$345,378	$594,346	$495,030	$1,530,295	39	($108,133)	($239,991)
2054	$570,644	$93,123	$5,285	$355,739	$612,176	$509,881	$1,576,204	39	($113,539)	($251,991)
2055	$570,644	$95,917	$5,444	$366,411	$630,541	$525,177	$1,623,490	39	($119,216)	($264,590)
2056	$570,644	$98,794	$5,607	$377,403	$649,457	$540,933	$1,672,195	39	($125,177)	($277,820)
2057	$570,644	$101,758	$5,775	$388,726	$668,941	$557,161	$1,722,361	39	($131,436)	($291,711)
2058	$570,644	$104,811	$5,949	$400,387	$689,009	$573,875	$1,774,032	39	($138,008)	($306,296)
2059	$570,644	$107,955	$6,127	$412,399	$709,680	$591,092	$1,827,252	39	($144,908)	($321,611)
2060	$570,644	$111,194	$6,311	$424,771	$730,970	$608,824	$1,882,070	39	($152,154)	($337,692)
Total	**$14,724,396**	**$1,378,758**	**$78,252**	**$5,266,990**	**$9,063,738**	**$7,549,180**	**$23,336,918**	**1,209**	**($1,434,879)**	**($3,184,587)**

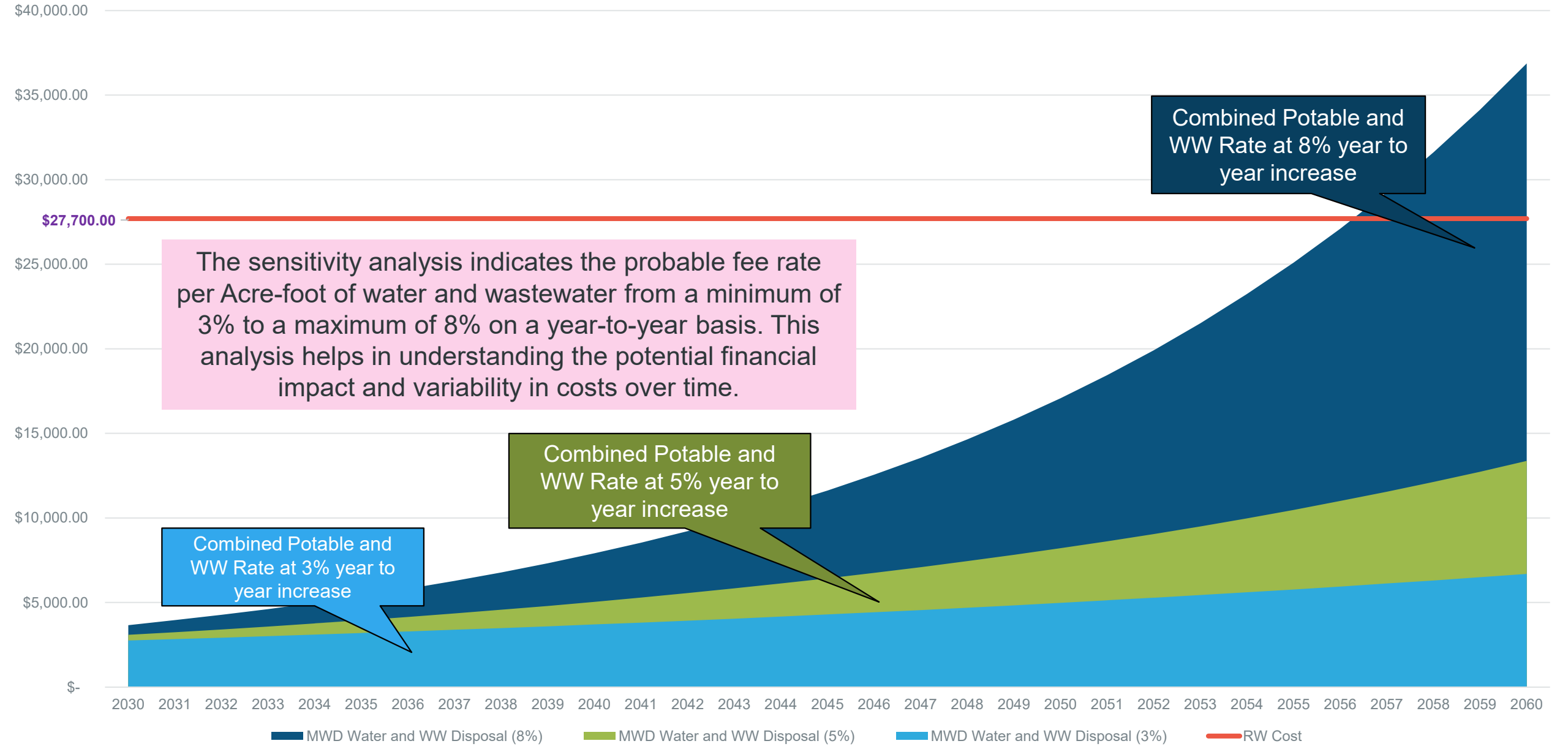
Line Item	Total Net Present Costs
Total Project Probable Capital Cost	$14,720,000
Construction Cost Subtotal	***$14,720,000***
Annual Power Consumption Cost	$45,810
Annual Chemical Cost	$2,600
Annual Labor Cost	$175,000
Annual Maintenance Cost	$301,150
Annual Contingency	$250,828
Annual O&M Cost Subtotal	***$775,388***
Grand Total	***$38,061,315***
Unit Water Cost ($/AF)	**$31,482**
Total Savings	**($4,619,466)**
Unit Water Savings ($/AF)	**$ (3,820.90)**
	$27,700
Net Unit Water Cost ($/AF)	**$27,661**

Discount Rate (%)	3.0%
Period (years)	30
Loan Rate (%)	2.5%
Years	30
Payments per Year	1
Loan Amount	$11,943,750

$31,500


$/AF Cost Comparison
$40,000.00
$35,000.00
$30,000.00
$27,700.00
$25,000.00
$20,000.00
$15,000.00
$10,000.00
$5,000.00
$-
$/AF of Recycled Water
$/AF Rates of Potable water from MWD at an assumed 8% year to year increase
$/AF City of LA fee to CVWD at an 8% historical year to year increase
2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060
CVWD Disposal Costs
MWD Water Costs
RW Cost

$/AF Sensitivity Analysis



The sensitivity analysis indicates the probable fee rate per Acre-foot of water and wastewater from a minimum of 3% to a maximum of 8% on a year-to-year basis. This analysis helps in understanding the potential financial impact and variability in costs over time.

ALTERNATIVE 2

Engineers Opinion of Probable Cost
CVWD - Recycled Water Feasibilty Study

Kennedy Jenks

Project: JRC - CVWD - 2024 RW Feasibility Study
Estimate: Conceptual

Prepared By: DK
Date Prepared: Dec-2024
K/J Proj. No. 2444512*00

Max Daily Flow: 1.07 mgd
Design Capacity: 743 Max Day Demand (gpm)
391 Max Annual Demand (MG/yr)

Item No.	Description	Qty	Units	Total Costs $/Unit	Total Capital Cost	Notes/Source
Capital Costs						
1.0	**MBR Facility**				**$ 15,725,000**	
1.1	Cloacina MEMPAC-M9 Package Treatment Plants	2	EA	$ 5,800,000	$ 11,600,000	
1.2	Cloacina Package Influent Lift Station	1	LS	$ 586,827	$ 587,000	32,000 Gal Tank
1.4	Cloacina Duplex Headworks Screens and Platform	1	LS	$ 733,722	$ 734,000	
1.5	COARSE Screen- Loose Shipped	1	LS	$ 250,000	$ 250,000	
1.6	Cloacina RAS Underflow Valves	2	LS	$ 50,373	$ 101,000	
1.7	Cloacina Effluent Disposal Pump Skid	1	LS	$ 187,681	$ 188,000	
1.8	Extended Warranties (10 year Membrane and 3-year Equipment)	1	LS	$ 175,000	$ 175,000	
1.9	Spare Parts (All unit processes)	1	LS	$ 250,000	$ 250,000	
1.1	UV Equipment Install (in re-purposed channels)	1	LS	$ 150,000	$ 150,000	
1.1	Cloacina Effluent UV Disinfection System	1	LS	$ 750,000	$ 750,000	
1.12	Installation of above	1	LS	$ 940,000	$ 940,000	
2.0	**Sewer Lift Station**				**$ 2,516,000**	Assuming $25k per hP
2.1	20 HP Pump Station	1	EA	$ 500,000	$ 500,000	Inlcudes wet well and connection to sewer
2.2	Connection to MBR (8")	4,200	LF	$ 480	$ 2,016,000	
3.0	**Connection back to sewer**				**$ 240,000**	
3.1	8" PVC Pipe	500	LF	$ 480	$ 240,000	
4.0	**AWPF**				**$ 31,030,000**	
4.1	Advance Water Purification Facility	1	LS	$ 31,030,000	$ 31,030,000	Assuming ~$29M per MGD
5.0	**Injection Well**				**$ 16,870,000**	
5.1	RW Injection Well	3	EA	$ 5,000,000	$ 15,000,000	
5.2	Pipeline connection (6")	4,500	LF	$ 360	$ 1,620,000	
5.3	RW Pump Station (10 HP)	1	EA	$ 250,000	$ 250,000	
6.0	**Site Civil**				**$ 1,020,000**	
6.1	Building Demolition	8,500	SF	$ 120	$ 1,020,000	
7.0	**Underground Construction**				**$ 31,030,000**	
7.1	Underground Construction	1	LS	$ 31,030,000	$ 31,030,000	Only AWPF is going under ground
				Subtotal Facility Capital Costs - Part 1	**$ 98,431,000**	
Additional Facility Capital Costs						
4.0	Site Development Costs	@	15%		9,921,000	% of Subtotal facility costs (Includes underground, grading, erosion control, cut/fill, etc.)
5.0	Electrical, I&C, and Remote (high-tech) Control	@	25%		12,318,000	% of Equipment
				Subtotal Facility Capital Costs - Part 2	**$ 22,239,000**	
				Total Capital Cost	**$ 120,670,000**	
	Taxes	@	10.25%		$ 6,184,000	Assumed 50% of cost is materials
	Mobilization/Demobilization/Permits	@	10%		$ 618,000	
	Contractor Overhead & Profit	@	15%		$ 928,000	
	Estimate Contingency	@	40%		$ 48,268,000	Assume 3 yrs
	Subtotal w/ Contractor Markups and Contingency				**$176,668,000**	
	Engineering		10%		$ 12,067,000	
	ROW/Land Acquisition		0%		$ -	No ROW/Land Acquisition
	Construction Management		10%		$ 12,067,000	
Total					**$200,802,000**	

O&M Costs

Annual Operations and Maintenance Costs

Item No.	Description	Qty	Units						
1.0	**Energy Costs**				**$ 582,686.57**				
1.1	Energy - MBR Treatment	1,300,000	kWh	$ 0.25	$ 325,000.00	MBR Treatment Operation =	24	hours per day	
1.2	Energy - Pump Station	130,746	kWh	$ 0.25	$ 32,686.57		8760	hours operated per year	
							3331	kWh/MG	from SV proposal
						Influent PS HP (TBD)	20	assume total motor HP required	
1.3	Energy - AWPF	900,000	kWh	$ 0.25	$ 225,000.00	AWPF Treatment Operation =	24	hours per day	
							8760	hours operated per year	
							3520	kWh/MG	from Santa Cruz RW
2.0	**Chemicals**								
2.1	**Clean in Place**				**$ 2,600.00**				
2.11	Sodium Hypochlorite	400	gal	$ 6.50	$ 2,600.00	100 gal hypo per clean quarterly per email from Kubota rep			
2.12	Citric Acid	0	gal	$ 24.00	$ -				
3.0	**Labor Costs**				**$ 700,000.00**				
3.1	Labor - MBR/AWPF	4	staff	$ 175,000.00	$ 700,000.00	full time staff at	$175,000	average salary + benefits per year	
4.0	**Dewatering Facility O&M**					TBD			
4.1	Polymer Dosing								
4.2	Solids Handling Fee			$ 60.00					
5.0	**Maintenance:**				**$ 1,476,465.00**				
5.1	Other (Replacement/Repair)	@	1.5%	$ 1,476,465.00	$ 1,476,465.00	% of facility direct costs			
					$ 1,235,204.14				
6.0	**Contingency**	@	25%	$ 1,235,204.14	$ 1,235,204.14	% of above O&M costs			
				Total O&M Costs	**3,996,955.71**				

Life Cycle Analysis
CVWD - Recycled Water Feasibility Study

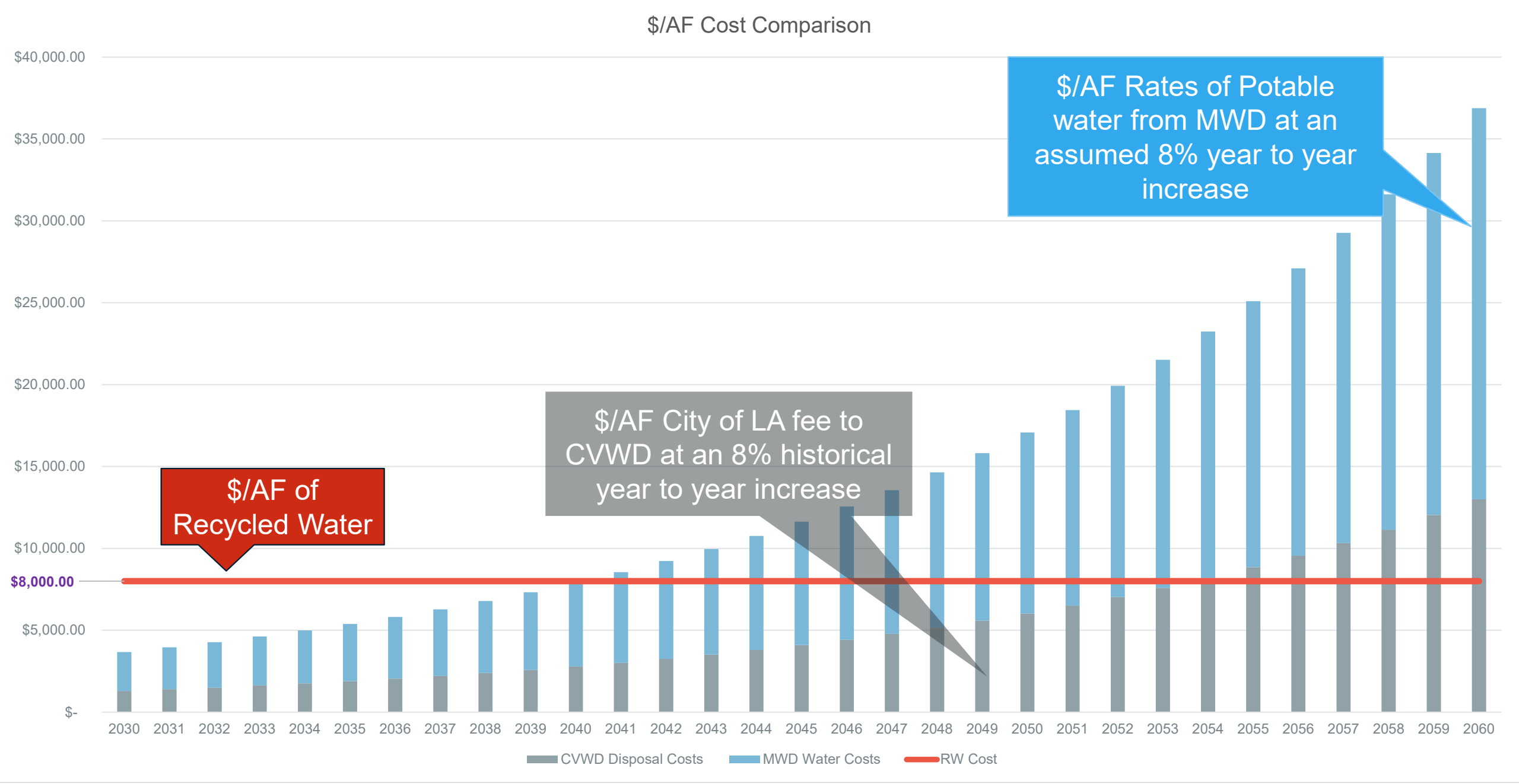
Kennedy Jenks

Project: CVWD - Recycled Water Feasibility Study

Prepared By: DK
Date Prepared: Feb-2024
K/J Proj. No.

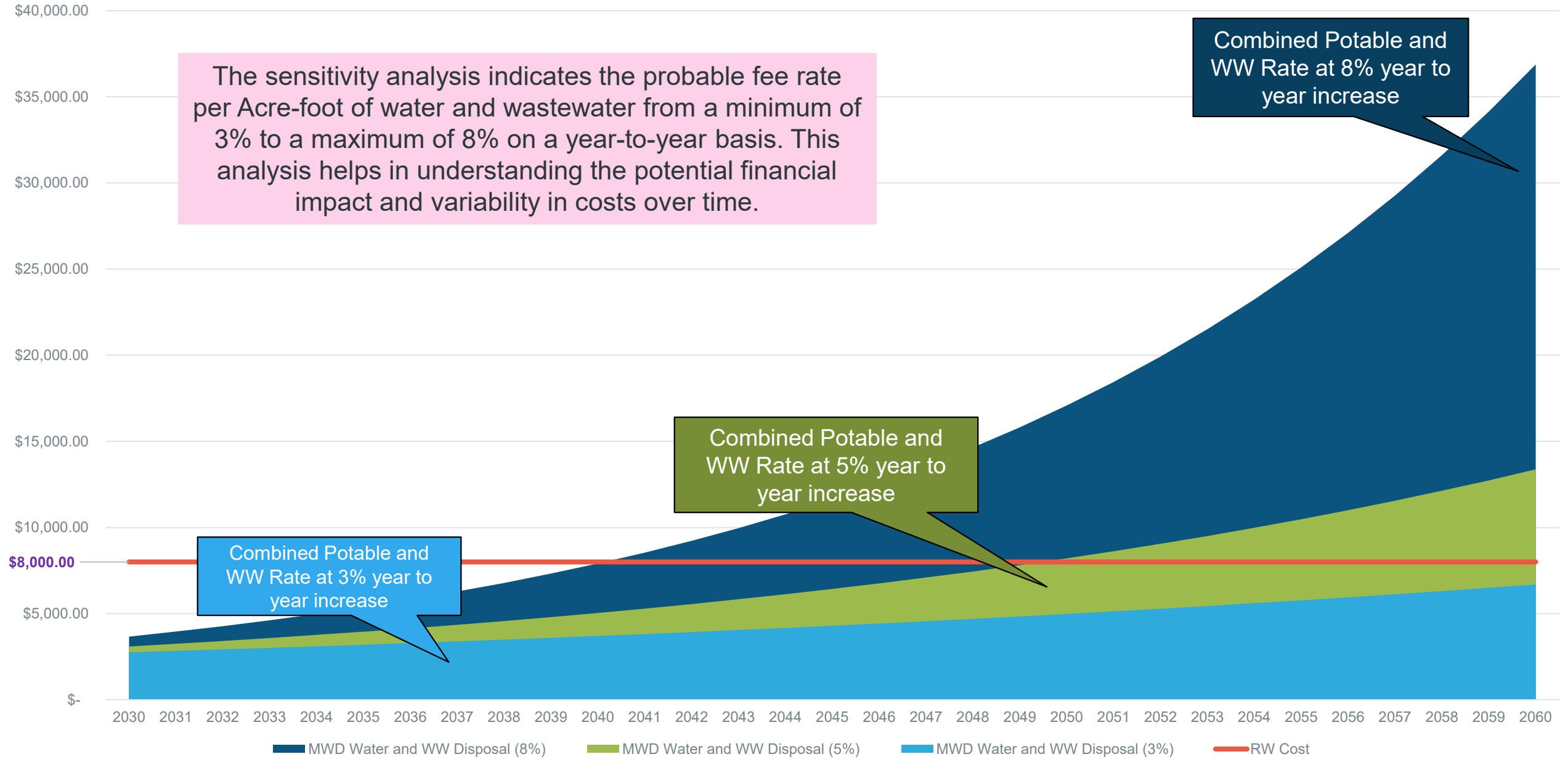
Date	Construction Cost ($)	Annual Power Consumption Cost ($)	Annaul Chemical Cost ($)	Annual Labor Cost ($)	Annual Maintenance Costs ($)	Annual Contingency ($)	Annual O&M Cost ($)	Recycled Water (AFY)	WW Disposal Cost Savings	FMWD Water Rates and Charges Savings
2030	$50,200,500	$582,687	$2,600	$700,000	$1,476,465	$1,235,204	$3,996,956	767	($1,046,369)	($1,536,641)
2031	$7,195,384	$600,167	$2,678	$721,000	$1,520,759	$1,272,260	$4,116,864	767	($1,098,688)	($1,613,473)
2032	$7,195,384	$618,172	$2,758	$742,630	$1,566,382	$1,310,428	$4,240,370	767	($1,153,622)	($1,694,146)
2033	$7,195,384	$636,717	$2,841	$764,909	$1,613,373	$1,349,741	$4,367,581	767	($1,211,303)	($1,778,854)
2034	$7,195,384	$655,819	$2,926	$787,856	$1,661,774	$1,390,233	$4,498,609	767	($1,271,869)	($1,867,796)
2035	$7,195,384	$675,493	$3,014	$811,492	$1,711,628	$1,431,940	$4,633,567	767	($1,335,462)	($1,961,186)
2036	$7,195,384	$695,758	$3,105	$835,837	$1,762,976	$1,474,898	$4,772,574	767	($1,402,235)	($2,059,246)
2037	$7,195,384	$716,631	$3,198	$860,912	$1,815,866	$1,519,145	$4,915,751	767	($1,472,347)	($2,162,208)
2038	$7,195,384	$738,130	$3,294	$886,739	$1,870,342	$1,564,720	$5,063,224	767	($1,545,964)	($2,270,318)
2039	$7,195,384	$760,274	$3,392	$913,341	$1,926,452	$1,611,661	$5,215,121	767	($1,623,262)	($2,383,834)
2040	$7,195,384	$783,082	$3,494	$940,741	$1,984,245	$1,660,011	$5,371,574	767	($1,704,426)	($2,503,026)
2041	$7,195,384	$806,574	$3,599	$968,964	$2,043,773	$1,709,811	$5,532,721	767	($1,789,647)	($2,628,177)
2042	$7,195,384	$830,772	$3,707	$998,033	$2,105,086	$1,761,106	$5,698,703	767	($1,879,129)	($2,759,586)
2043	$7,195,384	$855,695	$3,818	$1,027,974	$2,168,239	$1,813,939	$5,869,664	767	($1,973,086)	($2,897,565)
2044	$7,195,384	$881,366	$3,933	$1,058,813	$2,233,286	$1,868,357	$6,045,754	767	($2,071,740)	($3,042,444)
2045	$7,195,384	$907,807	$4,051	$1,090,577	$2,300,284	$1,924,408	$6,227,127	767	($2,175,327)	($3,194,566)
2046	$7,195,384	$935,041	$4,172	$1,123,295	$2,369,293	$1,982,140	$6,413,941	767	($2,284,093)	($3,354,294)
2047	$7,195,384	$963,092	$4,297	$1,156,993	$2,440,372	$2,041,604	$6,606,359	767	($2,398,298)	($3,522,009)
2048	$7,195,384	$991,985	$4,426	$1,191,703	$2,513,583	$2,102,852	$6,804,550	767	($2,518,213)	($3,698,109)
2049	$7,195,384	$1,021,744	$4,559	$1,227,454	$2,588,990	$2,165,938	$7,008,686	767	($2,644,123)	($3,883,015)
2050	$7,195,384	$1,052,397	$4,696	$1,264,278	$2,666,660	$2,230,916	$7,218,947	767	($2,776,330)	($4,077,165)
2051	$7,195,384	$1,083,969	$4,837	$1,302,206	$2,746,660	$2,297,844	$7,435,515	767	($2,915,146)	($4,281,024)
2052	$7,195,384	$1,116,488	$4,982	$1,341,272	$2,829,060	$2,366,779	$7,658,580	767	($3,060,903)	($4,495,075)
2053	$7,195,384	$1,149,982	$5,131	$1,381,511	$2,913,931	$2,437,782	$7,888,338	767	($3,213,949)	($4,719,829)
2054	$7,195,384	$1,184,482	$5,285	$1,422,956	$3,001,349	$2,510,916	$8,124,988	767	($3,374,646)	($4,955,820)
2055	$7,195,384	$1,220,016	$5,444	$1,465,645	$3,091,390	$2,586,243	$8,368,738	767	($3,543,378)	($5,203,611)
2056	$7,195,384	$1,256,617	$5,607	$1,509,614	$3,184,132	$2,663,830	$8,619,800	767	($3,720,547)	($5,463,792)
2057	$7,195,384	$1,294,315	$5,775	$1,554,902	$3,279,655	$2,743,745	$8,878,394	767	($3,906,575)	($5,736,981)
2058	$7,195,384	$1,333,145	$5,949	$1,601,549	$3,378,045	$2,826,058	$9,144,746	767	($4,101,903)	($6,023,830)
2059	$7,195,384	$1,373,139	$6,127	$1,649,596	$3,479,386	$2,910,839	$9,419,088	767	($4,306,999)	($6,325,022)
2060	$7,195,384	$1,414,333	$6,311	$1,699,084	$3,583,768	$2,998,165	$9,701,661	767	($4,522,348)	($6,641,273)
Total	**$176,365,542**	**$16,244,890**	**$72,486**	**$19,515,506**	**$41,162,802**	**$34,436,620**	**$111,432,305**	**23,777**	**($39,213,108)**	**($57,586,219)**

Line Item		Total Net Present Costs	
Total Project Probable Capital Cost		$176,370,000	
Construction Cost Subtotal		***$176,370,000***	
Annual Power Consumption Cost		$582,687	
Annual Chemical Cost		$2,600	
Annual Labor Cost		$700,000	
Annual Maintenance Cost		$1,476,465	
Annual Contingency		$1,235,204	
Annual O&M Cost Subtotal		***$3,996,956***	
Grand Total		***$287,797,847***	
Unit Water Cost ($/AF)		**$12,104**	**$12,100**
Total Savings		**($96,799,326)**	
Unit Water Savings ($/AF)	$	**(4,071.13)**	
		$8,000	
Net Unit Water Cost ($/AF)		**$8,033**	
Discount Rate (%)		3.5%	
Period (years)		30	
Loan Rate (%)		2.5%	
Years		30	
Payments per Year		1	
Loan Amount		$150,601,500	


$/AF Cost Comparison
$40,000.00
$35,000.00
$30,000.00
$25,000.00
$20,000.00
$15,000.00
$10,000.00
$8,000.00
$5,000.00
$-
$/AF Rates of Potable water from MWD at an assumed 8% year to year increase
$/AF City of LA fee to CVWD at an 8% historical year to year increase
$/AF of Recycled Water
2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060
CVWD Disposal Costs
MWD Water Costs
RW Cost

$/AF Sensitivity Analysis

The sensitivity analysis indicates the probable fee rate per Acre-foot of water and wastewater from a minimum of 3% to a maximum of 8% on a year-to-year basis. This analysis helps in understanding the potential financial impact and variability in costs over time.



ALTERNATIVE 3

Engineers Opinion of Probable Cost
CVWD - Recycled Water Feasibilty Study

Kennedy Jenks

Project: JRC - CVWD - 2024 RW Feasibility Study
Estimate: Conceptual

Prepared By: DK
Date Prepared: Dec-2024
K/J Proj. No. 2444512*00

Max Daily Flow: 0.32 mgd
Design Capacity: 222 Max Day Demand (gpm)
117 Max Annual Demand (MG/yr)

Item No.	Description	Qty	Units	Total Costs $/Unit	Total Capital Cost	Notes/Source
Capital Costs						
1.0	**MBR Facility**				**$ 9,493,000**	
1.1	Packaged MBR	1	LS	$ 5,589,648	$ 5,590,000	
1.2	Equalization Storage Tank	2	EA	$ 421,000	$ 842,000	32,000 Gal Tank
1.3	UV Disinfection System	1	LS	$ 800,000	$ 800,000	
1.4	Chemical Storage Tank and Containment Skid	2	EA	$ 5,000	10,000	
1.5	Installation of Above	1	LS	$ 1,810,500	1,811,000	install based on 25% of equipment supply / includes hoisting/ Cra
1.6	Interconnecting Piping for MBR Skid	@	-			Included in MBR Package System Costs
1.7	Interconnecting Conduit for MBR Skid	@	-			Included in MBR Package System Costs
1.8	Wet well	1	LS	$ 200,000	$ 200,000	
1.9	Connection to Sewer - 8" PVC	500	LF	$ 480	$ 240,000	
2.0	**Connection back to sewer**				**$ 240,000**	
2.1	8" PVC Pipe	500	LF	$ 480	$ 240,000	
3.0	**AWPF**				**$ 13,760,000**	
3.1	Advance Water Purification Facility	1	LS	$ 13,760,000	$ 13,760,000	Assuming ~$43M per MGD
4.0	**Injection Well**				**$ 5,054,000**	
4.1	RW Injection Well	1	EA	$ 5,000,000	$ 5,000,000	
4.2	Pipeline connection (6")	150	LF	$ 360	$ 54,000	
5.0	**Underground Construction**				**$ 23,253,000**	
5.1	Underground Construction	1	LS	$ 23,253,000	$ 23,253,000	
				Subtotal Facility Capital Costs - Part 1	**$ 51,800,000**	
Additional Facility Capital Costs						
4.0	Site Development Costs	@	15%		3,488,000	% of Subtotal facility costs (Includes grading, erosion control, cut,
5.0	Electrical, I&C, and Remote (high-tech) Control	@	25%		5,813,000	% of Equipment
				Subtotal Facility Capital Costs - Part 2	**$ 9,301,000**	
				Total Capital Cost	**$ 61,101,000**	
	Taxes	@	10.25%		$ 3,131,000	Assumed 50% of cost is materials
	Mobilization/Demobilization/Permits	@	10%		$ 306,000	
	Contractor Overhead & Profit	@	15%		$ 458,000	
	Estimate Contingency	@	40%		$ 24,440,000	
	Subtotal w/ Contractor Markups and Contingency				**$89,436,000**	
	Engineering		10%		$ 6,110,000	
	ROW/Land Acquisition		5%		$ 3,055,000	
	Construction Management		10%		$ 6,110,000	
Total					**$104,711,000**	

O&M Costs

Annual Operations and Maintenance Costs

Item No.	Description	Qty	Units					
1.0	**Energy Costs**				**$ 136,449.36**			
1.1	Energy - MBR Treatment	389,061	kWh	$ 0.25	$ 97,265.20	Treatmen	24	hours per day
1.2	Energy - Pump Station	130,746	kWh	$ 0.25	$ 32,686.57		8760	hours operated per year
1.3	Energy - Other	@	5%	$ 6,497.59	$ 6,497.59		3331	kWh/MG from SV pro
						Influent P	20	assume total motor HP required
2.0	**Chemicals**							
2.1	**Clean in Place**				**$ 2,600.00**			
#### ####	Sodium Hypochlorite	400	gal	$ 6.50	$ 2,600.00	100 gal hypo per clean quarterly per email from Kubota re		
#### ####	Citric Acid	0	gal	$ 24.00	$ -			
3.0	**Labor Costs**				**$ 175,000.00**			
3.1	Labor	1	staff	$ 175,000.00	$ 175,000.00	full time st	$175,000	average salary + benefits per year
4.0	**Dewatering Facility O&M**					TBD		
4.1	Polymer Dosing							
4.2	Solids Handling Fee			$ 60.00				
5.0	**Maintenance:**				**$ 2,590,000.00**			
5.1	Other (Replacement/Repair)	@	5%	$ 2,590,000.00	$ 2,590,000.00	% of facility direct costs		
					$ 1,417,912.34			
6.0	**Contingency**	@	25%	$ 1,417,912.34	$ 1,417,912.34	% of above O&M costs		
				Total O&M Costs	**4,321,961.69**			

Life Cycle Analysis
CVWD - Recycled Water Feasibility Study

Project: CVWD - Recycled Water Feasibility Study

Prepared By: DK
Date Prepared: Feb-2024
K/J Proj. No.

Date	Construction Cost ($)	Annual Power Consumption Cost ($)	Annaul Chemical Cost ($)	Annual Labor Cost ($)	Annual Maintenance Costs ($)	Annual Contingency ($)	Annual O&M Cost ($)	Recycled Water (AFY)
2025	$104,711,000							
2026	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2027	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2028	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2029	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2030	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2031	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2032	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2033	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2034	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2035	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2036	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2037	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2038	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2039	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2040	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2041	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2042	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2043	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2044	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2045	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2046	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2047	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2048	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2049	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2050	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2051	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2052	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2053	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
2054	$0	$136,449	$2,600	$175,000	$2,590,000	$1,417,912	$4,321,962	300
Total	**$104,711,000**	**$2,460,969**	**$46,893**	**$3,156,259**	**$46,712,637**	**$25,573,137**	**$77,949,894**	**8,700**

Line Item	Total Net Present Costs
Total Project Probable Capital Cost	$104,710,000
Construction Cost Subtotal	***$104,710,000***
Annual Power Consumption Cost	$136,449
Annual Chemical Cost	$2,600
Annual Labor Cost	$175,000
Annual Maintenance Cost	$2,590,000
Annual Contingency	$1,417,912
Annual O&M Cost Subtotal	***$4,321,962***
Grand Total	***$157,087,758***
Unit Water Cost ($/AF)	**$18,056**
	$18,100
Discount Rate (%)	3.5%
Period (years)	30

ALTERNATIVE 4

Engineers Opinion of Probable Cost
CVWD - Recycled Water Feasibilty Study

Kennedy Jenks

Project: JRC - CVWD - 2024 RW Feasibility Study
Estimate: Conceptual

Prepared By: DK
Date Prepared: Dec-2024
K/J Proj. No. 2444512*00

Max Daily Flow: 1.00 mgd
Design Capacity: 694 Max Day Demand (gpm)
365 Max Annual Demand (MG/yr)

Item No.	Description	Qty	Units	Total Costs $/Unit	Total Capital Cost	Notes/Source
Capital Costs						
1.0	**MBR Facility**				**$ 27,364,760**	
1.1	Packaged MBR	1	LS	$ 20,039,760	$ 20,039,760	
1.2	Equalization Storage Tank	2	EA	$ 421,000	$ 842,000	32,000 Gal Tank
1.3	UV Disinfection System	1	LS	$ 1,000,000	$ 1,000,000	
1.4	Chemical Storage Tank and Containment Skid	2	EA	$ 5,000	10,000	
1.5	Installation of Above	1	LS	$ 5,472,940	5,473,000	install based on 25% of equipment supply / includes hoisting/ Cra
1.6	Interconnecting Piping for MBR Skid	@	-			Included in MBR Package System Costs
1.7	Interconnecting Conduit for MBR Skid	@	-			Included in MBR Package System Costs
2.0	**Sewer Lift Station**				**$ 3,750,000**	Assuming $25k per hP
2.1	150 HP Pump Station	1	EA	$ 3,750,000	$ 3,750,000	Inlcudes wet well and connection to sewer
3.0	**Connection back to sewer**				**$ 1,200,000**	
3.1	8" PVC Pipe	2,500	LF	$ 480	$ 1,200,000	
4.0	**AWPF**				**$ 29,000,000**	
4.1	Advance Water Purification Facility	1	LS	$ 29,000,000	$ 29,000,000	Assuming ~$29M per MGD
5.0	**Injection Well**				**$ 21,440,000**	No PS needed, ~250 ft elevation difference from RW storage
5.1	RW Injection Well	4	EA	$ 5,000,000	$ 20,000,000	
5.2	Pipeline connection (6")	4,000	LF	$ 360	$ 1,440,000	
6.0	**Underground Construction**				**$ 56,364,760**	
6.1	Underground Construction	1	LS	$ 56,364,760	$ 56,364,760	
	Subtotal Facility Capital Costs - Part 1				**$ 139,119,520**	
Additional Facility Capital Costs						
4.0	Site Development Costs	@	15%		9,017,000	% of Subtotal facility costs (Includes grading, erosion control, cut,
5.0	Electrical, I&C, and Remote (high-tech) Control	@	25%		15,029,000	% of Equipment
	Subtotal Facility Capital Costs - Part 2				**$ 24,046,000**	
	Total Capital Cost				**$ 163,165,520**	
	Taxes	@	10.25%		$ 8,362,000	Assumed 50% of cost is materials
	Mobilization/Demobilization/Permits	@	10%		$ 16,317,000	
	Contractor Overhead & Profit	@	15%		$ 24,475,000	
	Estimate Contingency	@	40%		$ 65,266,000	
	Subtotal w/ Contractor Markups and Contingency				**$277,585,600**	
	Engineering		10%		$ 16,317,000	
	ROW/Land Acquisition		5%		$ 8,158,000	
	Construction Management		10%		$ 16,317,000	
Total					**$318,378,000**	

O&M Costs

Annual Operations and Maintenance Costs

Item No.	Description	Qty	Units						
1.0	**Energy Costs**				**$ 353,472.33**				
1.1	Energy - MBR Treatment	1,215,815	kWh	$ 0.25	$ 303,953.75	Treatmen	24	hours per day	
1.2	Energy - Pump Station	130,746	kWh	$ 0.25	$ 32,686.57		8760	hours operated per year	
1.3	Energy - Other	@	5%	$ 16,832.02	$ 16,832.02		3331	kWh/MG	from SV pro
						Influent P	20	assume total motor HP required	
2.0	**Chemicals**								
2.1	**Clean in Place**				**$ 2,600.00**				
#### ####	Sodium Hypochlorite	400	gal	$ 6.50	$ 2,600.00	100 gal hypo per clean quarterly per email from Kubota re			
#### ####	Citric Acid	0	gal	$ 24.00	$ -				
3.0	**Labor Costs**				**$ 175,000.00**				
3.1	Labor	1	staff	$ 175,000.00	$ 175,000.00	full time st	$175,000	average salary + benefits per year	
4.0	**Dewatering Facility O&M**					TBD			
4.1	Polymer Dosing								
4.2	Solids Handling Fee			$ 60.00					
5.0	**Maintenance:**				**$ 6,955,975.99**				
5.1	Other (Replacement/Repair)	@	5%	$6,955,975.99	$ 6,955,975.99	% of facility direct costs			
					$ 3,655,156.08				
6.0	**Contingency**	@	25%	$3,655,156.08	$ 3,655,156.08	% of above O&M costs			
				Total O&M Costs	**11,142,204.41**				

Life Cycle Analysis
CVWD - Recycled Water Feasibility Study

Project: CVWD - Recycled Water Feasibility Study

Prepared By: DK
Date Prepared: Feb-2024
K/J Proj. No.

Date	Construction Cost ($)	Annual Power Consumption Cost ($)	Annaul Chemical Cost ($)	Annual Labor Cost ($)	Annual Maintenance Costs ($)	Annual Contingency ($)	Annual O&M Cost ($)	Recycled Water (AFY)
2025	$318,378,000							
2026	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2027	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2028	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2029	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2030	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2031	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2032	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2033	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2034	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2035	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2036	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2037	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2038	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2039	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2040	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2041	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2042	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2043	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2044	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2045	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2046	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2047	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2048	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2049	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2050	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2051	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2052	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2053	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
2054	$0	$353,472	$2,600	$175,000	$6,955,976	$3,655,156	$11,142,204	1,105
Total	**$318,378,000**	**$6,375,145**	**$46,893**	**$3,156,259**	**$125,456,362**	**$65,923,543**	**$200,958,203**	**32,045**

Line Item	Total Net Present Costs
Total Project Probable Capital Cost	$318,380,000
Construction Cost Subtotal	***$318,380,000***
Annual Power Consumption Cost	$353,472
Annual Chemical Cost	$2,600
Annual Labor Cost	$175,000
Annual Maintenance Cost	$6,955,976
Annual Contingency	$3,655,156
Annual O&M Cost Subtotal	***$11,142,204***
Grand Total	***$453,412,659***
Unit Water Cost ($/AF)	**$14,149**
	$14,100
Discount Rate (%)	3.5%
Period (years)	30

ALTERNATIVE 5

Engineers Opinion of Probable Cost
CVWD - Recycled Water Feasibilty Study

Kennedy Jenks

Project: JRC - CVWD - 2024 RW Feasibility Study
Estimate: Conceptual

Prepared By: DK
Date Prepared: Dec-2024
K/J Proj. No. 2444512*00

Max Daily Flow: 2.00 mgd
Design Capacity: 1,389 Max Day Demand (gpm)
730 Max Annual Demand (MG/yr)

Item No.	Description	Qty	Units	Total Costs $/Unit	Total Capital Cost	Notes/Source
Capital Costs						
1.0	**MBR Facility**				**$ 27,364,760**	
1.1	Packaged MBR	1	LS	$ 20,039,760	$ 20,039,760	
1.2	Equalization Storage Tank	2	EA	$ 421,000	$ 842,000	32,000 Gal Tank
1.3	UV Disinfection System	1	LS	$ 1,000,000	$ 1,000,000	
1.4	Chemical Storage Tank and Containment Skid	2	EA	$ 5,000	10,000	
1.5	Installation of Above	1	LS	$ 5,472,940	5,473,000	install based on 25% of equipment supply / includes hoisting/ Cr
1.6	Interconnecting Piping for MBR Skid	@	-			Included in MBR Package System Costs
1.7	Interconnecting Conduit for MBR Skid	@	-			Included in MBR Package System Costs
2.0	**Sewer Lift Station**				**$ 3,750,000**	Assuming $25k per hP
2.1	150 HP Pump Station	1	EA	$ 3,750,000	$ 3,750,000	
3.0	**Connection back to sewer**				**$ 1,200,000**	
3.1	8" PVC Pipe	2,500	LF	$ 480	$ 1,200,000	
4.0	**AWPF**				**$ 43,500,000**	
4.1	Advance Water Purification Facility	1	LS	$ 43,500,000	$ 43,500,000	Assuming ~$29M per MGD
5.0	**Injection Well**				**$ 37,880,000**	No PS needed, ~250 ft elevation difference from RW storage
5.1	RW Injection Well	7	EA	$ 5,000,000	$ 35,000,000	
5.2	Pipeline connection (6")	8,000	LF	$ 360	$ 2,880,000	
6.0	**Underground Construction**				**$ 70,864,760**	
6.1	Underground Construction	1	LS	$ 70,864,760	$ 70,864,760	
			Subtotal Facility Capital Costs - Part 1		**$ 184,559,520**	
Additional Facility Capital Costs						
4.0	Site Development Costs	@	15%		11,192,000	% of Subtotal facility costs (Includes grading, erosion control, cut
5.0	Electrical, I&C, and Remote (high-tech) Control	@	25%		18,654,000	% of Equipment
			Subtotal Facility Capital Costs - Part 2		**$ 29,846,000**	
			Total Capital Cost		**$ 214,405,520**	
	Taxes	@	10.25%		$ 10,988,000	Assumed 50% of cost is materials
	Mobilization/Demobilization/Permits	@	10%		$ 21,441,000	
	Contractor Overhead & Profit	@	15%		$ 32,161,000	
	Estimate Contingency	@	40%		$ 85,762,000	
	Subtotal w/ Contractor Markups and Contingency				**$364,757,600**	
	Engineering		10%		$ 21,441,000	
	ROW/Land Acquisition		5%		$ 10,720,000	
	Construction Management		10%		$ 21,441,000	
Total					**$418,360,000**	

O&M Costs

Annual Operations and Maintenance Costs

Item No.	Description	Qty	Units						
1.0	**Energy Costs**				**$ 672,623.77**				
1.1	Energy - MBR Treatment	2,431,630	kWh	$ 0.25	$ 607,907.50	Treatmer	24	hours per day	
1.2	Energy - Pump Station	130,746	kWh	$ 0.25	$ 32,686.57		8760	hours operated per year	
1.3	Energy - Other	@	5%	$ 32,029.70	$ 32,029.70		3331	kWh/MG	from SV pro
						Influent F	20	assume total motor HP required	
2.0	**Chemicals**								
2.1	**Clean in Place**				**$ 2,600.00**				
#### ####	Sodium Hypochlorite	400	gal	$ 6.50	$ 2,600.00	100 gal hypo per clean quarterly per email from Kubota re			
#### ####	Citric Acid	0	gal	$ 24.00	$ -				
3.0	**Labor Costs**				**$ 175,000.00**				
3.1	Labor	1	staff	$ 175,000.00	$ 175,000.00	full time s	$175,000	average salary + benefits per year	
4.0	**Dewatering Facility O&M**					TBD			
4.1	Polymer Dosing								
4.2	Solids Handling Fee			$ 60.00					
5.0	**Maintenance:**				**$ 9,227,975.99**				
5.1	Other (Replacement/Repair)	@	5%	$9,227,975.99	$ 9,227,975.99	% of facility direct costs			
					$ 4,870,943.94				
6.0	**Contingency**	@	25%	$4,870,943.94	$ 4,870,943.94	% of above O&M costs			
				Total O&M Costs	**14,949,143.71**				

Life Cycle Analysis
CVWD - Recycled Water Feasibility Study

Project: CVWD - Recycled Water Feasibility Study

Prepared By: DK
Date Prepared: Feb-2024
K/J Proj. No.

Date	Construction Cost ($)	Annual Power Consumption Cost ($)	Annaul Chemical Cost ($)	Annual Labor Cost ($)	Annual Maintenance Costs ($)	Annual Contingency ($)	Annual O&M Cost ($)	Recycled Water (AFY)
2025	$418,360,000							
2026	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2027	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2028	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2029	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2030	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2031	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2032	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2033	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2034	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2035	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2036	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2037	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2038	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2039	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2040	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2041	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2042	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2043	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2044	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2045	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2046	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2047	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2048	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2049	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2050	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2051	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2052	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2053	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
2054	$0	$672,624	$2,600	$175,000	$9,227,976	$4,870,944	$14,949,144	2,000
Total	**$418,360,000**	**$12,131,286**	**$46,893**	**$3,156,259**	**$166,433,625**	**$87,851,210**	**$269,619,273**	**58,000**

Line Item	Total Net Present Costs
Total Project Probable Capital Cost	$418,360,000
Construction Cost Subtotal	***$418,360,000***
Annual Power Consumption Cost	$672,624
Annual Chemical Cost	$2,600
Annual Labor Cost	$175,000
Annual Maintenance Cost	$9,227,976
Annual Contingency	$4,870,944
Annual O&M Cost Subtotal	***$14,949,144***
Grand Total	***$600,128,063***
Unit Water Cost ($/AF)	**$10,347**
	$10,300
Discount Rate (%)	3.5%
Period (years)	30

ALTERNATIVE 6

Engineers Opinion of Probable Cost
CVWD - Recycled Water Feasibilty Study

Kennedy Jenks

Project: JRC - CVWD - 2024 RW Feasibility Study
Estimate: Conceptual

Prepared By: DK
Date Prepared: Dec-2024
K/J Proj. No. 2444512*00

Max Daily Flow MBR: 1.54 mgd
Max Daily Flow AWPF: 1.23 mgd
Design Capacity: 1,069 Max Day Demand (gpm)
562 Max Annual Demand (MG/yr)

Item No.	Description	Qty	Units	Total Costs $/Unit	Total Capital Cost	Notes/Source
Capital Costs						
1.0	**MBR Facility**				**$ 31,005,000**	
1.1	Cloacina MEMPAC-M12 Package Treatment Plants	3	EA	$ 7,500,000	$ 22,500,000	
1.2	Cloacina Package Influent Lift Station	1	LS	$ 586,827	$ 587,000	
1.3	Cloacina Duplex Headworks Screens and Platform	2	LS	$ 733,722	$ 1,467,000	
1.4	COARSE Screen- Loose Shipped	2	LS	$ 250,000	$ 500,000	
1.5	Cloacina RAS Underflow Valves	3	LS	$ 50,373	$ 151,000	
1.6	Cloacina Effluent Disposal Pump Skid	2	LS	$ 300,000	$ 600,000	
1.7	UV Equipment Install (in re-purposed channels)	2	LS	$ 150,000	$ 300,000	
1.8	Cloacina Effluent UV Disinfection System	2	LS	$ 1,000,000	$ 2,000,000	
1.9	Factory TIER 2 Installation of Treatment Plant Equipment and Components	1	LS	$ 2,580,000	$ 2,580,000	
1.11	Wet well	1	LS	$ 200,000	$ 200,000	
1.12	Connection to Sewer - 8" PVC	250	LF	$ 480	$ 120,000	
3.0	**Connection back to sewer**				**$ 144,000**	
3.1	8" PVC Pipe	300	LF	$ 480	$ 144,000	
4.0	**AWPF**				**$ 35,728,000**	
4.1	Advance Water Purification Facility	1	LS	$ 35,728,000	$ 35,728,000	Assuming ~$29M per MGD
5.0	**Injection Well**				**$ 22,582,000**	
5.1	RW Injection Well	4	EA	$ 5,000,000	$ 20,000,000	
5.2	Pipeline connection (6")	3,700	LF	$ 360	$ 1,332,000	
5.3	Pump Station (50 HP)	1	EA	$ 1,250,000	$ 1,250,000	
6.0	**Underground Construction**				**$ 66,733,000**	
6.1	Underground Construction	1	LS	$ 66,733,000	$ 66,733,000	
				Subtotal Facility Capital Costs - Part 1	**$ 156,192,000**	
Additional Facility Capital Costs						
4.0	Site Development Costs	@	15%		10,010,000	% of Subtotal facility costs (Includes grading, erosion control, c
5.0	Electrical, I&C, and Remote (high-tech) Control	@	25%		16,683,000	% of Equipment
				Subtotal Facility Capital Costs - Part 2	**$ 26,693,000**	
			Total Capital Cost		**$ 182,885,000**	
	Taxes	@	10.25%		$ 9,373,000	Assumed 50% of cost is materials
	Mobilization/Demobilization/Permits	@	10%		$ 18,289,000	
	Contractor Overhead & Profit	@	15%		$ 27,433,000	
	Estimate Contingency	@	40%		$ 73,154,000	
	Subtotal w/ Contractor Markups and Contingency				**$ 311,134,000**	
	Engineering		10%		$ 18,289,000	
	ROW/Land Acquisition		5%		$ 9,144,000	
	Construction Management		10%		$ 18,289,000	
Total					**$ 356,856,000**	

O&M Costs

Annual Operations and Maintenance Costs

Item No.	Description	Qty	Units					
1.0	**Energy Costs**				**$ 507,686.57**			
1.1	Energy - MBR Treatment	1,900,000	kWh	$ 0.25	$ 475,000.00	MBR Tre	24	hours per day
1.2	Energy - Pump Station	130,746	kWh	$ 0.25	$ 32,686.57		8760	hours operated per year
							3331	kWh/MG from SV pro
						Influent	20	assume total motor HP required
1.3	Energy - AWPF	1,000,000	kWh	$ 0.25	$ 250,000.00	AWPF Tr	24	hours per day
							8760	hours operated per year
							3520	kWh/MG from Santa C

2.0	**Chemicals**					
2.1	**Clean in Place**				**$ 2,600.00**	
#### ####	Sodium Hypochlorite	400	gal	$ 6.50	$ 2,600.00	100 gal hypo per clean quarterly per email from Kubota re
#### ####	Citric Acid	0	gal	$ 24.00	$ -	
3.0	**Labor Costs**				**$ 1,225,000.00**	
3.1	Labor - MBR/AWPF	7	staff	$ 175,000.00	$ 1,225,000.00	full time s $175,000 average salary + benefits per year
4.0	**Dewatering Facility O&M**					TBD
4.1	Polymer Dosing					
4.2	Solids Handling Fee			$ 60.00		
5.0	**Maintenance:**				**$ 2,342,880.00**	
5.1	Other (Replacement/Repair)	@	2%	$ 2,342,880.00	$ 2,342,880.00	% of facility direct costs
					$ 1,974,661.64	
6.0	**Contingency**	@	25%	$ 1,974,661.64	$ 1,974,661.64	% of above O&M costs
				Total O&M Costs	**6,052,828.21**	

Life Cycle Analysis
CVWD - Recycled Water Feasibility Study

Kennedy Jenks

Project: CVWD - Recycled Water Feasibility Study

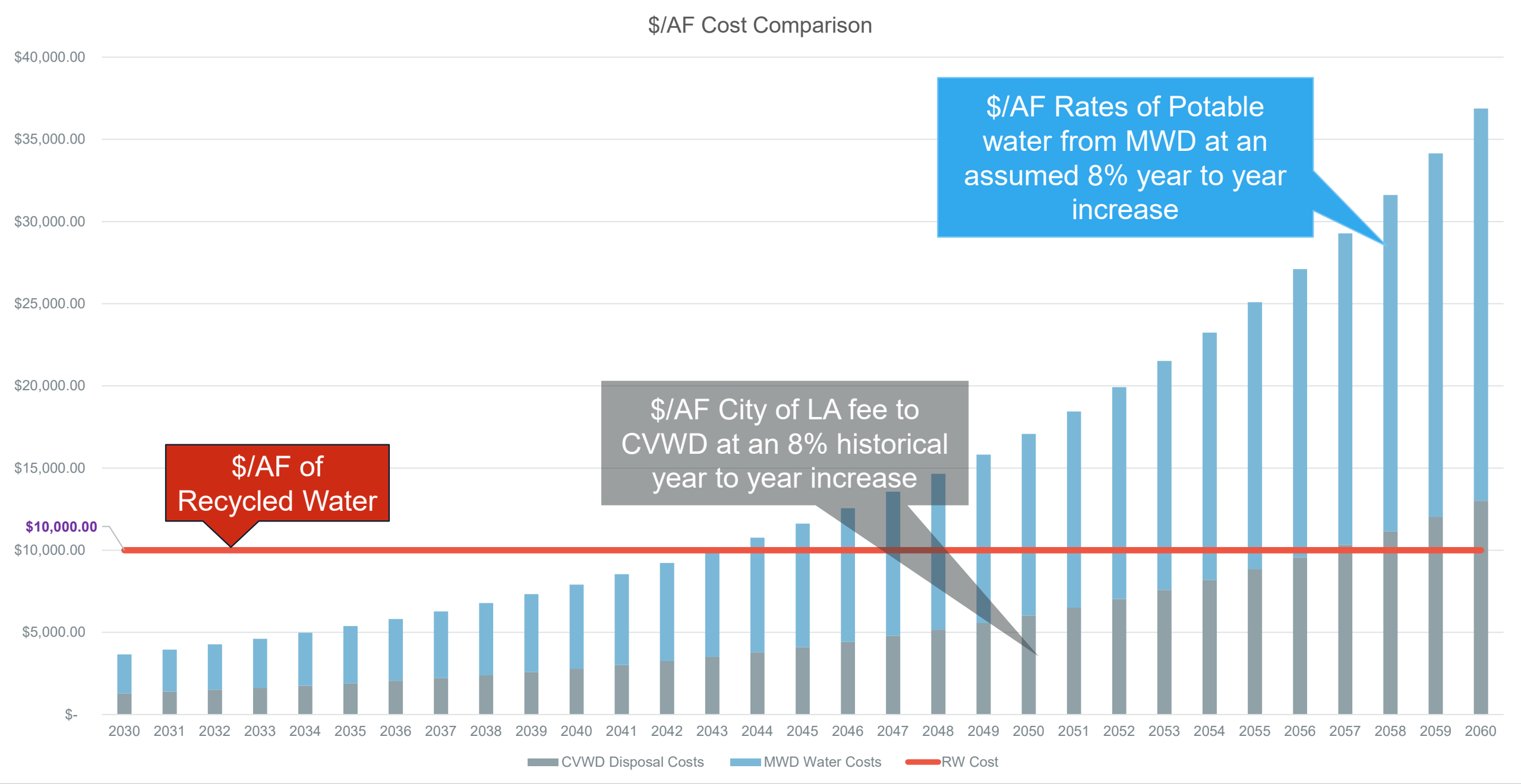
Prepared By: DK
Date Prepared: Feb-2024
K/J Proj. No.

Date	Construction Cost ($)	Annual Power Consumption Cost ($)	Annaul Chemical Cost ($)	Annual Labor Cost ($)	Annual Maintenance Costs ($)	Annual Contingency ($)	Annual O&M Cost ($)	Recycled Water (AFY)	WW Disposal Cost Savings	FMWD Water Rates and Charges Savings
2030	$89,214,000	$507,687	$2,600	$1,225,000	$2,342,880	$1,974,662	$6,052,828	1,105	($1,505,990)	($2,213,804)
2031	$12,787,303	$522,917	$2,678	$1,261,750	$2,413,166	$2,033,901	$6,234,413	1,105	($1,581,289)	($2,324,495)
2032	$12,787,303	$538,605	$2,758	$1,299,603	$2,485,561	$2,094,919	$6,421,445	1,105	($1,660,354)	($2,440,719)
2033	$12,787,303	$554,763	$2,841	$1,338,591	$2,560,128	$2,157,766	$6,614,089	1,105	($1,743,371)	($2,562,755)
2034	$12,787,303	$571,406	$2,926	$1,378,748	$2,636,932	$2,222,499	$6,812,511	1,105	($1,830,540)	($2,690,893)
2035	$12,787,303	$588,548	$3,014	$1,420,111	$2,716,040	$2,289,174	$7,016,887	1,105	($1,922,067)	($2,825,438)
2036	$12,787,303	$606,204	$3,105	$1,462,714	$2,797,521	$2,357,849	$7,227,393	1,105	($2,018,170)	($2,966,710)
2037	$12,787,303	$624,390	$3,198	$1,506,595	$2,881,447	$2,428,585	$7,444,215	1,105	($2,119,079)	($3,115,045)
2038	$12,787,303	$643,122	$3,294	$1,551,793	$2,967,890	$2,501,442	$7,667,542	1,105	($2,225,033)	($3,270,798)
2039	$12,787,303	$662,416	$3,392	$1,598,347	$3,056,927	$2,576,486	$7,897,568	1,105	($2,336,284)	($3,434,337)
2040	$12,787,303	$682,288	$3,494	$1,646,298	$3,148,635	$2,653,780	$8,134,495	1,105	($2,453,098)	($3,606,054)
2041	$12,787,303	$702,757	$3,599	$1,695,686	$3,243,094	$2,733,394	$8,378,530	1,105	($2,575,753)	($3,786,357)
2042	$12,787,303	$723,840	$3,707	$1,746,557	$3,340,387	$2,815,395	$8,629,886	1,105	($2,704,541)	($3,975,675)
2043	$12,787,303	$745,555	$3,818	$1,798,954	$3,440,598	$2,899,857	$8,888,782	1,105	($2,839,768)	($4,174,459)
2044	$12,787,303	$767,921	$3,933	$1,852,922	$3,543,816	$2,986,853	$9,155,446	1,105	($2,981,757)	($4,383,181)
2045	$12,787,303	$790,959	$4,051	$1,908,510	$3,650,131	$3,076,458	$9,430,109	1,105	($3,130,844)	($4,602,341)
2046	$12,787,303	$814,688	$4,172	$1,965,765	$3,759,635	$3,168,752	$9,713,012	1,105	($3,287,387)	($4,832,458)
2047	$12,787,303	$839,129	$4,297	$2,024,738	$3,872,424	$3,263,815	$10,004,403	1,105	($3,451,756)	($5,074,080)
2048	$12,787,303	$864,302	$4,426	$2,085,481	$3,988,596	$3,361,729	$10,304,535	1,105	($3,624,344)	($5,327,784)
2049	$12,787,303	$890,231	$4,559	$2,148,045	$4,108,254	$3,462,581	$10,613,671	1,105	($3,805,561)	($5,594,174)
2050	$12,787,303	$916,938	$4,696	$2,212,486	$4,231,502	$3,566,459	$10,932,081	1,105	($3,995,839)	($5,873,882)
2051	$12,787,303	$944,447	$4,837	$2,278,861	$4,358,447	$3,673,452	$11,260,043	1,105	($4,195,631)	($6,167,577)
2052	$12,787,303	$972,780	$4,982	$2,347,227	$4,489,200	$3,783,656	$11,597,845	1,105	($4,405,412)	($6,475,955)
2053	$12,787,303	$1,001,963	$5,131	$2,417,643	$4,623,876	$3,897,166	$11,945,780	1,105	($4,625,683)	($6,799,753)
2054	$12,787,303	$1,032,022	$5,285	$2,490,173	$4,762,593	$4,014,081	$12,304,154	1,105	($4,856,967)	($7,139,741)
2055	$12,787,303	$1,062,983	$5,444	$2,564,878	$4,905,470	$4,134,503	$12,673,278	1,105	($5,099,816)	($7,496,728)
2056	$12,787,303	$1,094,872	$5,607	$2,641,824	$5,052,635	$4,258,538	$13,053,476	1,105	($5,354,806)	($7,871,564)
2057	$12,787,303	$1,127,719	$5,775	$2,721,079	$5,204,214	$4,386,294	$13,445,081	1,105	($5,622,547)	($8,265,142)
2058	$12,787,303	$1,161,550	$5,949	$2,802,711	$5,360,340	$4,517,883	$13,848,433	1,105	($5,903,674)	($8,678,400)
2059	$12,787,303	$1,196,397	$6,127	$2,886,793	$5,521,150	$4,653,420	$14,263,886	1,105	($6,198,858)	($9,112,319)
2060	$12,787,303	$1,232,289	$6,311	$2,973,397	$5,686,785	$4,793,022	$14,691,803	1,105	($6,508,801)	($9,567,935)
Total	**$313,428,660**	**$14,153,943**	**$72,486**	**$34,152,136**	**$65,317,841**	**$55,052,173**	**$168,748,579**	**34,255**	**($56,437,557)**	**($82,963,197)**

Line Item	Total Net Present Costs
Total Project Probable Capital Cost	$313,430,000
Construction Cost Subtotal	***$313,430,000***
Annual Power Consumption Cost	$507,687
Annual Chemical Cost	$2,600
Annual Labor Cost	$1,225,000
Annual Maintenance Cost	$2,342,880
Annual Contingency	$1,974,662
Annual O&M Cost Subtotal	***$6,052,828***
Grand Total	***$482,177,239***
Unit Water Cost ($/AF)	**$14,076**
Total Savings	**($139,400,753)**
Unit Water Savings ($/AF)	**$ (4,069.50)**
	$10,000
Net Unit Water Cost ($/AF)	**$10,007**

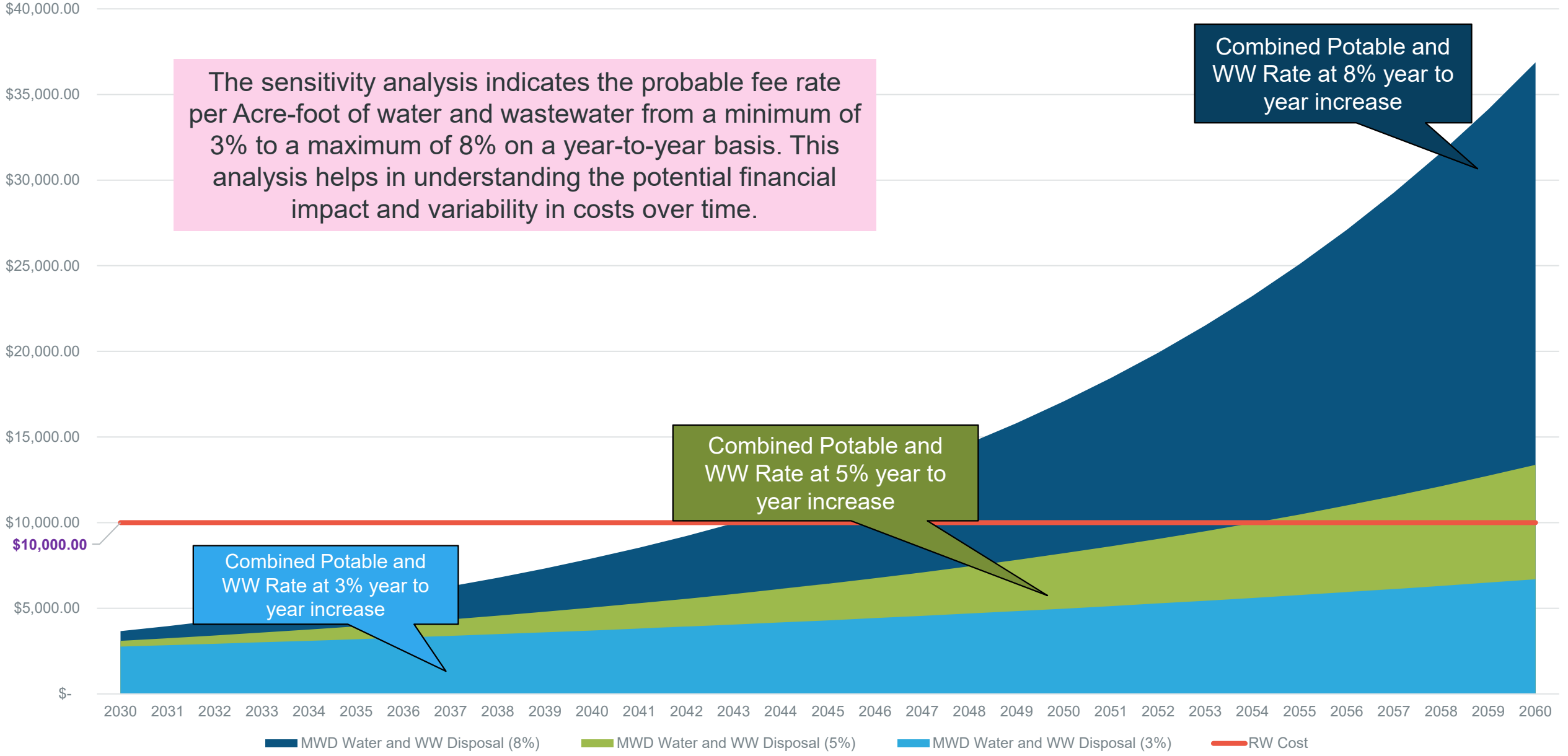
Discount Rate (%)	3.5%
Period (years)	30
Loan Rate (%)	2.5%
Years	30
Payments per Year	1
Loan Amount	$267,642,000

$14,100


$/AF Cost Comparison
$40,000.00
$35,000.00
$30,000.00
$25,000.00
$20,000.00
$15,000.00
$10,000.00
$10,000.00
$5,000.00
$-
$/AF Rates of Potable water from MWD at an assumed 8% year to year increase
$/AF City of LA fee to CVWD at an 8% historical year to year increase
$/AF of Recycled Water
2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060
CVWD Disposal Costs
MWD Water Costs
RW Cost

$/AF Sensitivity Analysis

The sensitivity analysis indicates the probable fee rate per Acre-foot of water and wastewater from a minimum of 3% to a maximum of 8% on a year-to-year basis. This analysis helps in understanding the potential financial impact and variability in costs over time.



Appendix N: CVWD Water Conservation Program

Crescenta Valley Water District 2025 Urban Water Management Plan

APPENDIX G

CRESCENTA VALLEY WATER DISTRICT

WATER CONSERVATION PROGRAM

CRESCENTA VALLEY WATER DISTRICT

APPENDIX G

WATER CONSERVATION PROGRAM

GENERAL STATEMENT

1. Due to the water supply conditions prevailing in the Crescenta Valley Water District (CVWD) and/or in the area from which CVWD obtains a portion of its water supply, the general welfare requires that:

   - The water resources available to the CVWD be put to the maximum beneficial use;
   - The waste or unreasonable use, or unreasonable method of use of water be prevented;
   - The conservation of such water be practiced with a view to the reasonable and beneficial use thereof in the interest of the customers of CVWD and for the public health and safety.

2. The purpose of this program is to provide water conservation regulations, in a phased approach, to minimize the effect of a shortage of water supplies on the customers of CVWD during various critical stages of a water shortage.

PHASE I –NORMAL WATER CONSERVATION

Phase I standard water conservation practices will be in effect at all times. The CVWD Board of Directors has adopted the following measures to reduce consumption and prohibit water waste for existing and new water users within CVWD in order to sustain water supply reliability.

Prohibited Use Applicable to Existing and New Customers

1. **Water hose usage:** Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.
2. **Overspray and runoff:** Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, streets, adjacent lands or into gutters shall not be permitted.
3. **Fountains, similar structures and swimming pools:** Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.
4. **Leaks:** Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.
5. **Irrigating times:** No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, but not limited to, golf courses, parks, cemeteries and school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings.

6. **Hand Watering:** Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.

7. **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.

8. **Vehicle washing:** The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.

9. **Swimming pools:** Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.

10. **Construction water restrictions:** Water for construction purposes including but not limited to de-brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.

11. **Fire hydrants:** The use of potable water from fire hydrants shall be limited to firefighting related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.

12. **Drinking water upon request:** No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.

13. **Hotels/Motels:** Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about the city's water conservation policy and urging guests to conserve water. Water conservation notices will be provided by CVWD.

14. **Hotels/Motels:** Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.

15. **Reporting waste of water:** The District shall maintain a program for residents to report waste of water throughout the District boundaries. This will include an online submittal form, a dedicated phone number, and follow-up by District staff on all waste of water reports. Residents are requested to report any observed waste of water from surrounding properties or in the community and report to the District for follow-up.

16. **Pre-rinse spray valve**: Where applicable, restaurants must utilize water conserving nozzles.

17. **New Development (**new commercial and multi-family accounts):

    1) All new commercial and multi-family accounts are prohibited from water waste such as, but not limited to: single-pass cooling systems; conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water; non-recirculating decorative water fountains.

    2) All landscape must be in accordance with the permitting agency's landscape ordinance. If the permitting agency does not have a landscape ordinance, the Department of Water Resources Model Landscape Ordinance will apply.

BE IT FURTHER RESOLVED, Crescenta Valley Water District urges the following water usage to all of its customers:

1. To reduce the amount of turf and install new drought tolerant landscaping, low-water using trees and plants, and efficient irrigation systems including but not limited to ET controllers, drip irrigation, and "high efficiency sprinkler heads".
2. To wash only full loads of dishes or clothes in automatic washers, and do not allow indoor faucets to run continuously.
3. To turn water system off when leaving property unoccupied for an extended period of time.
4. To use covers to minimize the evaporation of water from outdoor swimming pools, wading pools or spas when they are not in use.

WATER CONSERVATION ALERT SYSTEM

When a water conservation alert system is implemented by direction of the General Manager, the following measures to reduce water consumption will be required for all water users within CVWD.

a. Color Code **"Blue"** is defined as the Normal Water Conservation Alert, Foothill Municipal Water District can meet all Member Agency demands. Standard water conservation applies as defined in Appendix G of the Rules and Regulations.

b. Color Code **"Green"** is defined as an Increased Voluntary Conservation Alert, some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.

c. Color Code "Yellow" is defined as an Extraordinary Conservation Alert, when Metropolitan Water District of Southern California is pulling water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three (3) days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday.

d. Color Code **"Orange"** is defined as a Rationing Conservation Alert, when Metropolitan Water District of Southern California has implemented its allocation plan to its member agencies. Customers are requested to minimize indoor water use and severely limit outdoor water use as follows:

    1. Residential and commercial landscape irrigation is limited to no more than two (2) days per week on Tuesday and Saturday.
    2. Exemption: Public use areas owned and/or operated by School Districts are exempt from watering days, and public use areas greater than 4,000 square feet are exempt from watering days so long as best management practices are applied by all.
    3. The filling, refilling or adding of water to indoor and outdoor pools, wading pools, or spas is prohibited. Exemptions: Commercial Repairs mandated by the Federal Virginia Graeme Baker Act, or adding water for the prevention of equipment failure is permissible, however, the District strongly urges that a cover be used to prevent evaporation and thereby reducing the frequency of refilling..
    4. The use of water to clean, maintain, fill, or refill decorative fountains or similar structures is prohibited. Exemptions: Adding water for the prevention of equipment failure is permissible.

5. Vehicle washing is restricted to the use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle.

6. Fix leaks within 48 hours.

e. Color Code **"Red"** is defined as a Critical Water Conservation Alert, when water supplies are only available for health and safety needs. Customers are required to minimize indoor water use and curtail all outdoor water use. Fix any leaks within 24 hours.

Notification of the Water Conservation Alert System status on any given day shall be visibly posted at the exterior of the District's Administration Office (2700 Foothill Blvd., La Crescenta) and other accessible locations throughout the District service area where allowed. At least one direct mailing shall be made to all water customer accounts, with notification and explanation of the alert system. Newspaper coverage will also be used to disseminate alert system status and water conservation updates.

APPENDIX G

Date	Revisions	Approved by Board	Initials
04/28/2010	Residential and commercial landscape irrigation has been increased from two (2) days per week to no more than three (3) days per week on Tuesday, Thursday and Saturday. Watering limits have been reduced to seven (7) minutes per watering station from (10) minutes per station.	04/27/2010	
07/11/12	1. Revise "Prohibited Use Applicable to **all** Customers" was revised to "Prohibited Use Applicable to **Existing and New** Customers" 2. Add the following: **17. New Development (**new commercial and multi-family accounts) 1) All new commercial and multi-family accounts are prohibited from water waste such as, but not limited to: single-pass cooling systems; conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water; non-recirculating decorative water fountains. 2) All landscape must be in accordance with the permitting agency's landscape ordinance. If the permitting agency does not have a landscape ordinance, the Department of Water Resources Model Landscape Ordinance will apply.	07/10/12	
7/23/14	1. Revised Orange Alert from three (3) days per week to two (2) days per week, Tuesdays and Saturdays	7/23/2014	
4/7/15	1. Revise Appendix "G": **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray, and on days when it is raining. 2. Add the following: **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.		

RESOLUTION NO. 681

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESCENTA VALLEY WATER DISTRICT ADOPTING A WATER CONSERVATION ALERT SYSTEM

WHEREAS, the Crescenta Valley Water District was established for the purpose of providing adequate and reliable potable water to its inhabitants at a reasonable cost; and

WHEREAS, the groundwater supply in the Verdugo Basin is utilized as the primary source of water for District customers; and

WHEREAS, consecutive years of below normal precipitation in the watersheds of the Verdugo Basin have severely reduced the groundwater production capacity and individual well reliability in the Verdugo Basin and hence the water supply available to the District; and

WHEREAS, the District's imported water supply connections with the Foothill Municipal Water District and the emergency water supply interconnection with the City of Glendale, both which provide a supplemental source of water for District customers, are limited in size and capacity, may be subjected to random mechanical failures, and are being subjected to increased demands; and

WHEREAS, the District's imported water supply may be subject to a reduced water allotment from the Foothill Municipal Water District should the Metropolitan Water District of Southern California put into effect their approved allocation plan; and

WHEREAS, the above limitations have created the possibility that the District may be unable to meet customer demand during periods of high water use such as hot weather; and

WHEREAS, the District's Phase I Voluntary Water Conservation Program has been only minimally successful in reducing water demand; and

WHEREAS, conservation of water by District customers will help the District supply water for customers and keep water in storage for fire protection during peak periods; and

WHEREAS, peak summer water demands are generally considered to be caused by outdoor water use and the District should place special emphasis on outdoor water conservation; and

WHEREAS, the District, through its public information program, should advise and alert its customers to the serious nature of the situation and the need for a reduction in demand by customers through the use of a conservation alert system; and

WHEREAS, the District has the power and authority, under Section 375 of the California Water Code, to adopt water conservation measures for activities within its service area; and

WHEREAS, given the current conditions, the District finds it necessary and beneficial to undertake the second phase of its water conservation program; and

NOW, THEREFORE, BE IT RESOLVED, that the General Manager is authorized to implement a color-coded water conservation alert system, as Phase II of the goal to reduce the risk and severity of water shortage; and

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District requires its customers to follow the alert system described below:

a. Color Code "Blue" is defined as the Normal Water Conservation Alert, Foothill Municipal Water District can meet all Member Agency demands. Standard water conservation applies as defined in Appendix G of the Rules and Regulations.

b. Color Code "Green" is defined as an Increased Voluntary Conservation Alert, some supplies have been impacted and customers should increase efforts to conserve by following strict water conservation practices indoors and limiting outdoor water use to odd or even days, based on ending number of customer address.

c. Color Code "Yellow" is defined as an Extraordinary Conservation Alert, when Metropolitan Water District of Southern California is pulling water from most of its storage programs to meet demands. Extraordinary conservation is called for from customers. Customers are requested to minimize indoor water use and water outdoors no more than three (3) days per week. Outdoor irrigation will be permitted only on Tuesday, Thursday, and Saturday.

d. Color Code "Orange" is defined as a Rationing Conservation Alert, when Metropolitan Water District of Southern California has implemented its allocation plan to its member agencies. Customers are requested to minimize indoor water use and severely limit outdoor water use as further detailed in Appendix G of the District Rules and Regulations.

e. Color Code "Red" is defined as a Critical Water Conservation Alert, when water supplies are only available for health and safety needs. Customers are requested to minimize indoor water use and curtail all outdoor water use as further detailed in Appendix G of the District's Rules and Regulations.

BE IT FURTHER RESOLVED, that the Board of Directors of the Crescenta Valley Water District authorize that Appendix G of the District's Rules and Regulations is amended to read as attached; and

BE IT FURTHER RESOLVED, that if critical water shortages continue to exist and if a water conservation alert system proves insufficient to accomplish the necessary conservation, the Crescenta Valley Water District will consider additional and more restrictive phases of water conservation to curtail water use. Likewise, should water supply conditions return to normal, the Crescenta Valley Water District will also consider ending this program at such time.

PASSED, APPROVED, AND ADOPTED at a Regular Meeting of the Board of Directors of Crescenta Valley Water District held on January 7, 2009, Resolution No. 681 was adopted by the following vote:

AYES: Directors

NOES: Directors None

ABSTAIN: Directors None

_____

ATTEST: President, Board of Directors
Crescenta Valley Water District

_____

Secretary of the Board of Directors

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I, RON MITCHELL, Secretary of the Crescenta Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 681 of the Board of Directors of Crescenta Valley Water District adopted at a Regular Meeting held on January 7, 2009, and that the same has not been amended or repealed.

_____

Secretary of the Board of Directors of
Crescenta Valley Water District

DATED: March 27, 2009 (S E A L)

RESOLUTION NO. 682

RESOLUTION OF THE BOARD OF DIRECTORS OF CRESCENTA VALLEY WATER DISTRICT ADOPTING A WATER CONSERVATION PROGRAM (PHASE I)

WHEREAS, the Crescenta Valley Water District was established for the purpose of providing adequate and reliable potable water to its inhabitants at a reasonable cost; and

WHEREAS, the groundwater supply in the Verdugo Basin is utilized as the primary source of water for District customers; and

WHEREAS, consecutive years of below normal precipitation in the watersheds of the Verdugo Basin have severely reduced the groundwater production capacity in the Verdugo Basin and hence the water supply available to the District; and

WHEREAS, the District's imported water supply connections with the Foothill Municipal Water District, which provide a supplemental source of water for District customers, are limited in size and capacity and are being subjected to increased demands; and

WHEREAS, the District's imported water supply may be subject to a reduced water allotment from the Foothill Municipal Water District should the Metropolitan Water District of Southern California put into effect their approved allocation plan; and

WHEREAS, California has experienced an energy crisis which has resulted in extremely high energy costs; and

WHEREAS, the District is a user of significant quantities of energy to meet its system demands for the production, transmission, and distribution of water; and

WHEREAS, conservation of water by District customers will help relieve the problems caused by the shortage in supply and the increase in energy costs; and

WHEREAS, the District, through its public information program, should advise and alert its customers to the serious nature of the situation and the need for a reduction in demand by customers; and

WHEREAS, the District has the power and authority, under Section 375 of the California Water Code, to adopt water conservation measures for activities within its service area; and

WHEREAS, given the current conditions, the District finds it necessary and beneficial to undertake a phased water conservation program; and

NOW, THEREFORE, BE IT RESOLVED, that the General Manager is authorized to implement a water conservation program, as Phase I of the goal to reduce water use below pre-drought water usage, to reduce the risk and severity of water shortage; and

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District prohibits the following water usage to all of its customers:

Prohibited Use Applicable to ALL Customers

1. **Water hose usage:** Hose washing of sidewalks, walkways, driveways, or parking areas, tennis courts, patios, porches or other paved areas shall not be permitted. Exception: Flammable or other dangerous substances may be disposed of by direct hose flushing by public safety officers for the benefit of public health and safety. Businesses or schools required to hose down public eating areas will be provided with access to a water broom.

2. **Overspray and runoff:** Use of water for any purpose which results in overspray, excessive runoff onto hardscapes, driveways, street, adjacent lands or into gutters shall not be permitted.

3. **Fountains, similar structures:** Water used to clean, fill or maintain levels in decorative fountains or similar structures must be part of a recirculation system.

4. **Leaks:** Leaks from any facility both inside and outside of a customer's premises must be repaired within seventy-two hours after the customer is notified of, or discovers the leak. Failure to affect the repair of any leak shall subject said customer to all penalties provided herein for waste of water.

5. **Irrigating times: Irrigating times:** No watering, sprinkling or irrigating shall take place between the hours of nine a.m. (9:00AM) and five p.m. (5:00PM) in any landscaped or vegetated areas, including, including, but not limited to, golf courses, parks, cemeteries and school areas landscaped with, but not limited to, grass, lawn, groundcover, shrubbery, annual and perennial plants, crops, trees, and California-friendly plantings. With the exception of drip irrigation systems or weather based irrigation controllers, residential timers shall not run for more than a 10 minutes per station.

6. **Hand Watering:** Hand watering of non-turf areas is allowed using a hose with a positive shut-off nozzle or watering can within the allowable times as specified above.

7. **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.

8. **Vehicle washing:** The washing of commercial and non-commercial privately owned automobiles, trucks, trailers, motor-homes, boats, buses, airplanes and other types of vehicles is restricted to use of a hand-held bucket and quick rinses using a hose with a positive shut-off nozzle. Exceptions: the use of wash water which is on the immediate premises of a commercial car wash or commercial service station; where health, safety and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles which transport food and perishables.

9. **Swimming pools:** Owners of outdoor swimming pools, wading pools or spas, when these are not in use, are requested to use covers to minimize the evaporation of water.

10. **Construction water restrictions:** Water for construction purposes including but not limited to de-brushing of vacant land, compaction of fills and pads, trench backfill and other construction uses, shall be used in an efficient manner which will not result in runoff.

11. **Fire hydrants:** The use of potable water from fire hydrants shall be limited to firefighting, related activities or other activities immediately necessary to maintain the health, safety, and welfare of the residents of the city.

12. **Drinking water upon request:** No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested by a customer.

13. **Hotels/Motels:** Hotels, motels, and other commercial lodging establishments are requested to post notices informing their guests about the city's water conservation policy and urging guests to conserve water. Water conservation notices will be provided by CVWD.

14. **Hotels/Motels:** Hotels, motels and other commercial lodgings are requested to post notices giving their guests the option of not laundering towels and linens daily.

15. **Reporting waste of water:** The District shall maintain a program for residents to report waste of water throughout the District boundaries. This will include an online submittal form, a dedicated phone number, and follow-up by District staff on all waste of water reports. Residents are requested to report any observed waste of water from surrounding properties or in the community and report to the District for follow-up.

16. **Pre-rinse spray valve**: Where applicable, restaurants must utilize water conserving nozzles.

17. **New Development**. 1). Prohibit water waste such as, but not limited to: single-pass cooling systems; conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water; non-re-circulating decorative water fountains, and address irrigation, landscape, and industrial, commercial, and other design deficiencies. 2). Enacts and enforces ordinances or establishes terms of service for water efficient design in new development, and supports local ordinances that establish permits for water efficient design in new development.

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District urges the following water conservation practices to all of its customers:

1. Reduce the amount of turf and install new drought tolerant landscaping, low-water using trees and plants, and efficient irrigation systems including but not limited to evapotranspiration (ET) controllers, drip irrigation, and “high efficiency sprinkler heads”.

2. Wash only full loads of dishes or clothes in automatic washers, and do not allow indoor faucets to run continuously.

3. Turn off water system when leaving property unoccupied for an extended period of time.

VIOLATIONS

For any customer of the District in violation of the provisions listed in the Waste of Water Ordinance:

First Violation: The District shall issue a written notice of the fact of such violation to the customer.

Second Violation: The District shall issue a written warning to the customer of the fact of such second violation with a statement of the possible penalties for the present violation for which the notice was written, the possible penalties for each subsequent violation should they occur, and a written copy of this resolution.

Third Violation: The District shall install a flow-restricting device of one gallon per minute (1gpm) capacity for services up to one and one-half inch size, and comparatively sized restrictors for larger service, on the service of the customer at the premises at which the violation occurred for a period of not less than forty-eight hours.

The charge for installing a flow-restricting device shall be based upon the size of the meter and shall not exceed $150.00.

The charge for removal of the flow-restricting device and restoration of normal service shall not exceed $100.00. Restoration of normal service will be performed during regular working hours on regular working days.

For any subsequent violation or any willful violation: The District shall either install a flow-restricting device, for a period of time not less than one week or discontinue water service to that customer at the premises at which the violation occurred.

The charge for installing a flow-restricting device shall be based upon the size of the meter and shall not exceed $200.00.

The charge for removal of the flow-restricting device and restoration of normal service shall not exceed $150.00. Restoration of normal service will be performed during regular working hours on regular working days.

Notice: The District shall give notice of each violation to the customer committing such violation as follows:

For the first violation: The District shall give written notice of the fact of such violation to the customer personally or by United States regular mail.

For the second violation: The District shall give written notice of the fact of such violation to the customer by United States certified mail, return receipt requested.

For any subsequent violations: If the penalty assessed is, or includes the installation of a flow-restrictor or the discontinuance of water service to the customer for any period of time whatsoever, notice of the fact of the violation shall be delivered fifteen (15) working days before the penalty is to be enacted, in the following manner:

- Personal delivery of written notice to the customer at their residence or place of business and obtain their signature of delivery.

- Return receipt delivery to customer at their residence or place of business.

All notices shall contain, in addition to the facts of the violation, a statement of the possible penalties for the present violation for which the notice was written and each subsequent violation, a statement of the anticipated date of the penalty, if any, will be enacted for the present violation, and a statement informing the customer of the customer's right to a hearing on the violation.

Hearing: Any customer against whom a restriction or limitation is levied has the right to a hearing and a right to appeal to the Board of Directors. Written request from customer to the District must be received within fifteen (15) working days of the date of notification of the violation. Before the hearing can be scheduled all existing plumbing fixtures in the structure must be retrofitted exclusively with water-conserving plumbing fixtures including low flush or high efficiency toilets, low flow showerheads, and aerators. A water audit will be used to verify installation.

Enactments of the appropriate penalty shall be deferred until the appeal is resolved.

If the appeal decision is NOT in favor of the customer, the determined penalty shall be enacted within ten (10) days after the customer is advised of the decision in writing through certified mail, return receipt requested.

Reservation of Rights: The rights of the District hereunder shall be cumulative to any other right of the District to discontinue service. All monies collected by the District pursuant to any of the penalty provisions of the chapter shall be deposited in the water revenue fund as reimbursement for the District's costs and expenses of administering and enforcing this ordinance.

BE IT FURTHER RESOLVED, that the Crescenta Valley Water District finds that a program of voluntary measures to reduce consumption will assist in achieving the goal of conserving the water supply without causing unnecessary adverse economic consequences; and

BE IT FURTHER RESOLVED, that the Board of Directors of the Crescenta Valley Water District authorize that Section 8.07(c) and Appendix G of the District's Rules and Regulations are amended to read as attached; and

BE IT FURTHER RESOLVED, that if critical water shortages continue to exist and if current measures prove insufficient to accomplish the necessary conservation, the Crescenta Valley Water District will consider additional and more restrictive phases of water conservation to curtail water use. Likewise, should water supply conditions return to normal, the Crescenta Valley Water District will also consider ending this program.

PASSED, APPROVED, AND ADOPTED at a Regular Meeting of the Board of Directors of Crescenta Valley Water District held on April 7, 2015, amendments to Resolution No. 682 were adopted by the following vote:

AYES:

NOES: **None**

ABSENT: **None**

ATTEST:

President, Board of Directors
Crescenta Valley Water District

Secretary of the Board of Directors

STATE OF CALIFORNIA)
) **ss.**
COUNTY OF LOS ANGELES)

I, RON MITCHELL, Secretary of the Crescenta Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of the amendments to Resolution No. 682 of the Board of Directors of Crescenta Valley Water District adopted at a Regular Meeting held on April 7, 2015 and that the same has not been amended or repealed.

Secretary of the Board of Directors of
Crescenta Valley Water District

DATED: April 7, 2015 **(S E A L)**

Date	Revisions	Approved by Board	Initials
04/07/2015	1. Revise Resolution 682: **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray, and on days when it is raining. 2. Add the following: **Windy and rainy days:** No watering, sprinkling or irrigating shall take place in any landscaped or vegetated areas on days when the wind is blowing causing overspray. No irrigation or watering of turf or ornamental-landscapes during and 48 hours following measurable precipitation.		

WEST&ASSOCIATES
ENGINEERING, INC.