MesaWater
DISTRICT

2025 Urban Water Management Plan

FINAL DRAFT / May 2026

carollo® in collaboration with CDM Smith and Maddaus Water Management Inc.

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DISTRICT©

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May 2026 / FINAL DRAFT

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In collaboration with:

CDM Smith
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Abbreviations

AB	Assembly Bill (California)
ACS	American Community Survey
Act	Urban Water Management Plan Act of 1983
ADU	Accessory Dwelling Unit
AF	Acre-Feet
AFY	Acre-Feet per Year
AMR	Automatic Meter Reading
AVEK	Antelope Valley–East Kern Water Agency
AWWA	American Water Works Association
BEA	Basin Equity Assessment
BiOps	Biological Opinions
BMP	Best Management Practices
BPP	Basin Production Percentage
BSA	Boy Scouts of America
CAMP4W	Climate Adaptation Master Plan for Water
CDR	Center for Demographic Research at California State University, Fullerton
CEE	Consortium for Energy Efficiency
CFS	Cubic Feet per Second
CII	Commercial, Industrial, Institutional
CMMS	Computerized Maintenance Management System
CMSD	Costa Mesa Sanitary District
Conservation Framework	"Making California a Conservation Way of Life" Framework
COVID-19	Coronavirus Disease 2019
CPTP	Coastal Pumping Transfer Program
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CWC	California Water Code
DCP	Drought Contingency Plan
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin Delta
DIM	Dedicated Irrigation Meter
District	Mesa Water District
DOF	Department of Finance
DRA	Drought Risk Assessment

DVL	Diamond Valley Lake
DWR	Department of Water Resources
EIR	Environmental Impact Report
EOC	Emergency Operation Center
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIRO	Forecast-Informed Reservoir Operations
ft	foot (feet)
FY	Fiscal Year
GAP	Green Acres Project
GDP	Gross Domestic Product
GHG	greenhouse gas
GIS	Geographic Information System
GPCD	Gallons Per Capita Per Day
gpf	gallons per flush
GRP	Greenhouse Reliability Plan
GRP	Groundwater Resilience Plan
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWRS	Groundwater Replenishment System
HDI	Hot-Dry Index
HECW	High-Efficiency Clothes Washer
HET	High-Efficiency Toilet
HRL	Healthy Rivers and Landscapes
ICS	Intentionally Created Surplus
IPR	Indirect Potable Reuse
IRP	Integrated Resources Plan
IRWD	Irvine Ranch Water District
IWCM	Interim Water Control Manual
JADU	Junior Accessory Dwelling Unit
KWh	Kilowatt-hours
LAM	Landscape Area Measurement
LRP	Local Resources Program
LVL	Leo J. Vander Lans Advanced Water Treatment Facility
M&I	Municipal & Industrial
MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
Mesa Water	Mesa Water District
MET	Metropolitan Water District of Southern California

MG	Million Gallons
MG/L	Milligrams per Liter
MGD	Million Gallons per Day
MRWF	Mesa Water Reliability Facility
MUM	Mixed-Use CII Meter
MWDOC	Municipal Water District of Orange County
ND	non detect
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OC Basin	Orange County Groundwater Basin
OC San	Orange County Sanitation District
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
ppt	parts per trillion
PRISM	Parameter-elevation Regressions on Independent Slopes Model
QSA	Quantification Settlement Agreement
QWEL	Qualified Water Efficient Landscaper
R&I	retail and municipal
RA	Replenishment Assessment
R-GPCD	Residential Gallons Per Capita Per Day
RHNA	Regional Housing Needs Assessment
RUWMP	Regional Urban Water Management Plan
SARCCUP	Santa Ana River Conservation and Conjunctive Use Program
SB	Senate Bill
SCAB	South Coast Air Basin
SCADA	supervisory control and data acquisition
SCAG	Southern California Association of Governments
SDCWA	San Diego County Water Authority
SFR	single family residential
SGMA	Sustainable Groundwater Management Act
SNWA	Southern Nevada Water Authority
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAP	Technical Assistance Program
TAZ	Traffic Analysis Zone

TDS	Total Dissolved Solids
TM	Technical Memorandum
USACE	U.S. Army Corps of Engineers
USGS	United State Geological Survey
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act of 1983
UWUO	Urban Water Use Objective
Valley	San Bernardino Valley Municipal Water District
Water Code	California Water Code
WCM	Water Control Manual
WEEA	Water Energy Education Alliance
WRD	Water Replenishment District of Southern California
WSAP	Water Savings Action Plan
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WUE	Water Use Efficiency

EXECUTIVE SUMMARY

ES.1 Introduction and UWMP Overview

Mesa Water District (Mesa Water) prepared this 2025 Urban Water Management Plan (UWMP) to submit to the California Department of Water Resources (DWR) to satisfy the UWMP Act of 1983 (UWMP Act or Act) and subsequent California Water Code (Water Code) requirements. UWMPs are comprehensive documents that present an evaluation of a water supplier's reliability over a long-term (20-25 year) horizon. This 2025 UWMP provides an assessment of the present and future water supply sources and demands within Mesa Water's service area. It presents an update to the 2020 UWMP on Mesa Water's water resource needs, water use efficiency programs, water reliability assessment, and strategies to mitigate water shortage conditions. It also presents Mesa Water's updated 2025 Water Shortage Contingency Plan (WSCP), designed to prepare for and respond to water shortages. This 2025 UWMP contains all elements required by the UWMP Act.

ES.2 UWMP Preparation

Mesa Water coordinated the preparation of this 2025 UWMP with other key entities, the Municipal Water District of Orange County (MWDOC), the regional wholesaler of imported water for Orange County, and the Orange County Water District (OCWD), Orange County Groundwater Basin (OC Basin) manager and provider of recycled water in north Orange County. Mesa Water also coordinated with other entities that provided valuable, regionally consistent data for the analyses prepared in this UWMP, including population projections from the Center for Demographic Research (CDR) at California State University, Fullerton, and the Orange County Water Demand Projection Model Technical Memorandum (TM).

ES.3 System Description

Mesa Water is governed by a five-member Board of Directors and is located in a community that originated in about 1906. After the Costa Mesa District Merger Law was signed on June 30, 1959, Mesa Water (formerly known as the Costa Mesa County Water District) commenced operations on January 1, 1960, by acquiring the assets and obligations and assumed the responsibility of consolidating the City of Costa Mesa's Water Department, Fairview County Water District, Newport Mesa Irrigation District, and Newport Mesa County Water District.

Mesa Water's water service area covers approximately 18 square miles, along the coast of Southern California within the County of Orange and includes most of the City of Costa Mesa, portions of the City of Newport Beach and a small portion of unincorporated Orange County. Mesa Water operates nine wells, including seven clear water wells and two amber wells, two reservoirs with a total storage of 29 million gallons (MG), four metered imported water connections, and 15 emergency interconnections. Mesa Water's potable water distribution system consists of one pressure zone with approximately 317-miles of water mains system with approximately 24,425 service connections.

ES.4 Water Use Characterization

ES.4.1 Water Use in the Last Five Years

Total water use within Mesa Water's service area has fluctuated over the past five years (fiscal year [FY] 2021-25), with an annual average of approximately 16,557 AF. FY 2020-21 through FY 2021-22 saw the highest water use over the last five years due to region-wide drought conditions. FY 2022-23 proved to be one of the wettest years on record in the State and Mesa Water saw a general decrease in water demand following this wet year, as precipitation offsets landscape irrigation demands. These year-to-year fluctuations in precipitation will continue to influence Mesa Water's annual demands. In general, Mesa Water saw a decrease in demand of 6.7 percent over the 5-year reporting period.

ES.4.2 Projected Water Use

Mesa Water recently completed its 10-year water capital improvement plan, which included water use projections through 2035. Water use projections from 2035 through 2050 are based on the 2025 Orange County Water Demand Projection Model Technical Memorandum (TM).

Over the next 25 years, Mesa Water's total water demands are projected to increase by 7.6 percent from 16,515 acre-feet (AF) in 2025 to approximately 17,767 AF by 2050. The Orange County Groundwater Basin is expected to continue meeting a notable share of total water demand between 2025 and 2050.

ES.5 Conservation Target Compliance

Mesa Water participated in the Orange County 20x2020 Regional Alliance along with all other Orange County water agencies. The alliance was created by MWDOC in collaboration with all its retail member agencies as well as the Cities of Anaheim, Fullerton, and Santa Ana, to assist Orange County retail agencies in complying with the requirements of the Water Conservation Act of 2009, also known as SBx7-7 (Senate Bill 7 as part of the Seventh Extraordinary Session). Signed into law on February 3, 2010, it required the State of California to reduce urban water use by 20 percent by 2020.

Retail water suppliers are required to comply with SBx7-7 individually or as a region in collaboration with other retail water suppliers, to be eligible for water-related state grants and loans. Orange County, as a region, achieved its 2020 target water use of 159 gallons per capita per day (GPCD) prior to 2020, indicative of the collective efforts in reducing water use in the region. All Orange County water retailers, achieved individual compliance prior to 2020. By 2020, Mesa Water achieved a per capita per day water use of 85 GPCD (compared to its 143 GPCD target) and continues to implement water use efficiency measures.

ES.6 Water Supply Characterization

Mesa Water's main source of water supply is groundwater from the OC Basin. Recycled water makes up the rest of Mesa Water's water supply portfolio. In FY 2024-25, Mesa Water used 100 percent local water supplies, relying on 94 percent groundwater and 6 percent recycled water. Imported water is available as an emergency backup or supplemental supply, but Mesa Water has met all potable water demands with local groundwater in recent years. Imported water supply has not been a significant supply source for

Mesa Water since 2013. This supply portfolio is projected to remain stable for the next 25 years through 2050.

ES.7 Water Service Reliability and Drought Risk Assessment

Every urban water supplier is required to assess the reliability of their water service to its customers under a normal year, a single dry year, and multiple dry years. The water service reliability assessment compares projected supply to projected demand for three long-term hydrological conditions. Mesa Water's water sources are local groundwater from the OC Basin and imported water purchased from MWDOC/MET.

The OC Basin manager, OCWD, has developed programs and projects to improve groundwater recharge and augment groundwater through recycled water, conjunctive use, and water transfers. OCWD assesses groundwater conditions and sets its BPP, which determines how much water will be pumped from the basin year, and the Basin Equity Assessment (BEA), which is a surcharge for exceeding the BPP. The BPP is set at 85 percent and is forecasted to remain so through 2050. Mesa Water also has two wells that pump amber-colored groundwater from a deeper aquifer and are treated at the Mesa Water Reliability Facility.

MET, the Southern California regional wholesaler of imported water, has also invested in numerous programs and projects to augment its direct deliveries of imported water, such as water transfers, groundwater banking, and use of its reservoir storage. MET's 2025 UWMP demonstrates that MET will be able to meet its projected water demands for its entire service area for the next 25 years under normal, dry, and five consecutive dry year conditions.

Overall, Mesa Water's service area is projected to meet full-service demands from 2026 through 2050 under normal years, single dry year, and five consecutive dry year conditions.

ES.8 Water Shortage Contingency Planning

The Water Shortage Contingency Plan (WSCP) is a standalone document adopted by Mesa Water serving as the guidance document used to prepare for and respond to water shortages and service disruptions of Mesa Water's water supplies through proactive mitigation measures. A water shortage, when water supply available is insufficient to meet the normally expected customer water use at a given point in time, may occur due to a number of reasons, such as water supply quality changes, climate change, drought, and catastrophic events (e.g., earthquake). Mesa Water's WSCP provides a water supply availability assessment and structured steps designed to respond to actual conditions. This level of detailed planning and preparation will help maintain reliable supplies and reduce the impacts of supply interruptions.

The WSCP contains the processes and procedures that will be deployed when shortage conditions arise so that Mesa Water's governing body and its staff can easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate to the degree of water shortfall anticipated.

ES.9 Demand Management Measures

Mesa Water has demonstrated its commitment to water use efficiency through multi-faceted and holistic water use efficiency programs. Mesa Water's water use efficiency implementation can be described broadly under five categories: *Operations Practices* (e.g., conservation pricing, water waste prevention, water loss control, and metering with commodity rates), *Education and Outreach* (e.g., public outreach programs, K-12 school programs, Water Awareness Poster Contest, Qualified Water Efficiency Landscaper Training Program), *Residential Indoor Program* (e.g. various rebates), *Commercial, Industrial, and Institutional Program* (e.g., rebates, Water Savings Incentive Program, On-site Retrofit Program), and Landscape Programs (e.g., turf replacement, spray-to-drip irrigation rebate, residential landscape design assistance).

ES.10 Plan Adoption, Submittal, and Implementation

The Water Code requires both the UWMP and the WSCP to be adopted by the Supplier's governing body. Before the adoption of the UWMP, Mesa Water notified the public and the cities and counties within its service area that MWDOC was in the process of preparing an UWMP and WSCP per the Water Code. Mesa Water circulated the final draft of the UWMP and WSCP to facilitate public review and held a public hearing to receive input from the public on the UWMP and WSCP. Upon completion of the public hearing, Mesa Water moved to adopt both the UWMP and WSCP. Post adoption, Mesa Water submitted the UWMP to DWR and other key agencies and made the document available for public review within 30 days after filing with DWR.

The UWMP serves as a legal and technical water management foundation for Mesa Water and can be referenced as needed, until its next required update cycle in 2030. With approval from DWR, Mesa Water shall implement this plan into its public resources, providing Mesa Water staff, the public, and elected officials with an understanding of past, current, and future water conditions and management. Furthermore, the WSCP serves as a strategic planning document designed to prepare for and respond to water shortages and service disruptions of Mesa Water's water supplies.

CHAPTER 1 INTRODUCTION AND UWMP OVERVIEW

Mesa Water District (Mesa Water) prepared this 2025 Urban Water Management Plan (UWMP) to submit to the California Department of Water Resources (DWR) to satisfy the UWMP Act of 1983 (UWMP Act or Act) and subsequent California Water Code (Water Code) requirements.

Mesa Water is a retail water supplier that provides water to its residents and other customers sourced from the Orange County Groundwater Basin (OC Basin), which is managed by the Orange County Water District (OCWD), and recycled wastewater from OCWD's Green Acres Project (GAP). Mesa Water, as one of MWDOC's 27 member agencies, prepared this 2025 UWMP in collaboration with MWDOC, Metropolitan Water District of Southern California (MET), OCWD, and other key agencies.

UWMPs are comprehensive documents that present an evaluation of a water supplier's reliability over a long-term (20-25 year) horizon. In response to the changing climatic conditions since the 2020 UWMP, MWDOC has been assisting its member agencies and surrounding communities to manage both their water supplies and demands. The water loss audit program, water conservation measures, public outreach and education on conservation and efforts for increased self-reliance to reduce dependency on imported water from the Sacramento-San Joaquin Delta (the "Delta") are some of the water management actions that Mesa Water has taken to maintain the reliability of water supply for its service area. In addition, Mesa Water has been proactive in managing local water supplies through the addition of two new water supply wells. Lastly, Mesa Water has worked towards increasing supply resilience through the evaluation of a brackish groundwater desalination project with neighboring agencies.

This UWMP provides an assessment of the present and future water supply sources and demands within Mesa Water's service area. It presents an update to the 2020 UWMP on Mesa Water's water resource needs, water use efficiency programs, water reliability assessment and strategies to mitigate water shortage conditions. It also includes Mesa Water's updated 2025 Water Shortage Contingency Plan (WSCP) designed to prepare for and respond to water shortages. This 2025 UWMP contains all elements required by the Act.

1.1 Overview of Urban Water Management Plan Requirements

The UWMP Act enacted by California legislature requires every urban water supplier (Supplier) providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to prepare, adopt, and file an UWMP with the DWR every five years in the years ending in six and one.

For this 2025 UWMP cycle, DWR continues to place emphasis on achieving improvements for long term reliability and resilience to drought and climate change in California. Despite there being no new statutory requirements, Suppliers must now report progress on meeting their 2028 Water Loss Standards and continue to state their compliance with Senate Bill (SB) X7-7 2020 Targets. Additional guidance on stored water accounting and recommendations on identifying the need for future or proposed water supply projects are provided by DWR as well.

1.2 UWMP Organization

This UWMP is organized into 10 chapters aligned with the DWR Guidebook recommendations. The sections within each chapter are customized to include Mesa Water's water supply reliability and future projections as well as plans to overcome any water shortages over a planning horizon of the next 25 years. The Chapters for this UWMP are listed below:

Chapter 1 Introduction and UWMP Overview gives an overview of the UWMP fundamentals and requirements for the 2025 UWMP.

Chapter 2 UWMP Preparation identifies this UWMP as an individual planning effort of Mesa Water, lists the type of year and units of measure used and introduces the coordination and outreach activities conducted by Mesa Water to develop this UWMP.

Chapter 3 System Description gives a background on Mesa Water's water system and its climate characteristics, population projections, demographics, socioeconomics, and predominant current and projected land uses of its service area.

Chapter 4 Water Use Characterization provides historical, current, and projected water use by customer category for the next 25 years for Mesa Water and the projection methodology used by Mesa Water to develop the 25-year projections.

Chapter 5 Conservation Target Compliance restates that Mesa Water's 2020 per capita water use in gallons per capita per day (gpcd) met the compliance target defined by SB X7-7.

Chapter 6 Water Supply Characterization describes the current water supply portfolio of Mesa Water as well as the planned and potential water supply projects and water exchange and transfer opportunities.

Chapter 7 Water Service Reliability and Drought Risk Assessment describes the assessment of the reliability of Mesa Water's water supply service to its customers for a normal year, single dry year and five consecutive dry years scenarios. This section also includes a Drought Risk Assessment (DRA) of all the supply sources for a consecutive five-year drought period beginning 2026.

Chapter 8 Water Shortage Contingency Planning is a brief summary of the standalone WSCP document which provides a structured guide for Mesa Water to deal with water shortages, incorporating prescriptive information and standardized action levels, lists the appropriate actions and water use efficiency measures to be taken to ensure water supply reliability in times of water shortage conditions, along with implementation actions in the event of a catastrophic supply interruption.

Chapter 9 Demand Management Measures provides a description of Mesa Water's current and planned measures and programs to help the retail customers in its service area be water efficient and comply with its urban water use reduction targets.

Chapter 10 Plan Adoption, Submittal, and Implementation provides a record of the process Mesa Water followed to adopt and implement its UWMP.

CHAPTER 2 UWMP PREPARATION

Mesa Water District's (Mesa Water) 2025 Urban Water Management Plan (UWMP) is prepared to meet the California Water Code (Water Code) compliance as a retail water supplier to its customers. The development of this UWMP involved close coordination with its wholesale supplier, the Municipal Water District of Orange County (MWDOC), along with other key entities within the region.

2.1 Individual Planning and Compliance

As described in Chapter 1, every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually must prepare, adopt, and file an UWMP with the California Department of Water Resources (DWR) every five years to meet the compliance requirements of the UWMP Act. As shown in Table 2.1. Mesa Water meets this requirement as it has 24,425 municipal connections and supplied 16,375 AF in Fiscal Year 2025.

Table 2.1 Submittal Table 2-1 Retail: Public Water Systems

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)
CA3010004	Mesa Water District	24,425	16,515
	Total	24,425	16,515
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 Table 2-3.			
NOTES:			

Mesa Water opted to prepare its own UWMP (Table 2.2) and comply with the Water Code individually, while closely coordinating with MWDOC and various key entities as discussed in Chapter 2.2 to streamline regional integration. The UWMP Checklist was completed to confirm the compliance of this UWMP with the Water Code (Appendix A). All DWR standardized tables are provided in Appendix B. Mesa Water has selected to report demands and supplies using fiscal year as the basis (Table 2.3).

Table 2.2 Submittal Table 2-2: Plan Identification

Submittal Table 2-2: Plan Identification		
Select One or Both	**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.	Orange County 20x2020 Regional Alliance
☐	**Regional Urban Water Management Plan (RUWMP)**	
	If Supplier selected RUWMP, select name from the drop-down.	

Table 2.3 Submittal Table 2-3: Supplier Identification

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)	
7/1	
Units of measure used in UWMP (select from drop down)	
Unit	AF
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.	

2.2 Coordination and Outreach

2.2.1 Integration with Other Planning Efforts

Mesa Water, as the retail supplier to its customers, coordinated the preparation of this UWMP with its water supplier wholesaler MWDOC, the Orange County Water District (OCWD) as the manager of the Orange County Groundwater Basin, its regional wastewater management agency, Orange County Sanitation District (OCSD). Mesa Water has also developed this Plan in conjunction with other regionally consistent efforts such as population projections from the Center for Demographic Research at California State University, Fullerton (CDR) and the Orange County Water Demand Projection Model Technical Memorandum.

Key planning and reporting documents that were used to develop this UWMP are:

- **Metropolitan Water District of Southern California's (MET) 2025 UWMP** uses assumptions that fall within the plausible futures contemplated in MET's Integrated Water Resources Plan to evaluate MET's future imported water supply reliability.
- **MET's 2020 Integrated Water Resources Plan (IRP) Regional Needs Assessment** is a long-term, scenario-based planning document that guides Metropolitan's programs and investments to ensure reliable water supplies in Southern California and provides a basis for water supply reliability in Orange County.
- **MET's Climate Adaptation Master Plan for Water (CAMP4W)** is an ongoing planning and decision-making tool that accounts for the complexities and uncertainties of climate change. Part of the second phase of MET's long-term IRP planning process, CAMP4W incorporates the results and findings of MET's 2020 IRP Regional Needs Assessment into a collaborative process to identify and evaluate integrated regional solutions.

- **MET's 2025 Water Shortage Contingency Plan (WSCP)** provides a water supply availability assessment and guide for MET's intended actions during water shortage conditions.
- **MWDOC's 2025 WSCP** provides a water supply availability assessment and structured steps designed to respond to actual conditions that will help maintain reliable supplies and reduce the impacts of supply interruptions.
- **MWDOC's 2023 Orange County Water Reliability Study** is a planning document to help guide planning for future water supply reliability for water providers in Orange County and provide input on regional water supply issues for MET.
- **2025 Orange County Water Demand Projection Model Technical Memorandum** is a collaborative effort amongst MWDOC, OCWD, and all retail water suppliers in Orange County that developed water demand projections to produce regionally consistent forecasts across all Orange County water agencies.
- **OCWD's 2025 Groundwater Resilience Plan (GRP)** was completed in February 2025. The GRP is an adaptive strategies management plan outlining strategic projects to secure reliable future water supplies in the Orange County Groundwater Basin (OC Basin).
- **OCWD's 2023-24 Engineer's Report** provides information on the groundwater conditions, water supply and basin utilization of the OC Basin.
- **2022 Basin 8-1 Alternative** is an alternative to the Groundwater Sustainability Plan (GSP) for the OC Basin, provides significant information related to sustainable management of the basin in the past and hydrogeology of the basin, including groundwater quality and basin characteristics, and addresses DWR's recommendations to ensure long-term basin sustainability.
- **Orange County Water & Wastewater Multi-Jurisdictional Hazard Mitigation Plan (2024)** provides the basis for the seismic and other natural and natural disaster risk analysis of the water system facilities.
- **Mesa Water District Capital Improvement Plan** of Mesa Water's service area provides information on water infrastructure planning projects and plans to address any required water system improvements.

2.2.1.1 Statewide Water Planning

In addition to regional coordination with the various agencies described above, Mesa Water as a MWDOC member agency, is currently a part of MET's statewide planning effort to reduce reliance on the water imported from the Sacramento-San Joaquin Delta (Delta).

It is the policy of the State of California to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, technology innovation, partner collaborations and water use efficiency measures. This policy is codified through the Delta Stewardship Council's Delta Plan Policy WR P1 (Cal. Code Regs., tit. 23, § 5003) requires state and local water suppliers to reduce reliance on the Delta by improving regional water self-reliance. It mandates that water exported from, transferred through, or used in the Delta must demonstrate efforts in water conservation, recycling, and supply diversification.

Progress towards achieving the goal of WR P1 is measured through Supplier reporting in each Urban Water Management Planning cycle. WR P1 is relevant to water suppliers that plan to participate in multi-year water transfers, conveyance facilities, or new diversions in the Delta. Additionally, with the recent amendments to the Bay Delta Plan, tributary flow objectives to the Delta are being updated to account for quality and habitat improvements for local environmental resources. This results in reduced reliance on Delta water supplies. Since 2022, the Bay-Delta Plan Amendment update has been in development. This effort considers additional tributaries from the southern San Joaquin Valley, triggering a re-evaluation of Delta flow requirements and conservation objectives, which ultimately may impact available supply to the State Water Project (SWP).

Through significant local investment, collaboration at both a local and regional scale and integration with MWDOC's water use efficiency strategies and conservation programs, Mesa Water has demonstrated a reduction in Delta reliance. For member agencies of MWDOC that receive imported water from MET, or in Mesa Water's case, have the ability to receive imported water from MET, these agencies have passively demonstrated a reduction in Delta reliance and a subsequent improvement in regional self-reliance by participating in MWDOC led regional strategies. A detailed description and documentation of Mesa Water's consistency with Delta Plan Policy WR P1 is included in Chapter 7.4 and Appendix C.

2.2.2 Wholesale and Retail Coordination

Mesa Water developed its UWMP in conjunction with MWDOC's 2025 UWMP. As a retail water supplier, Mesa Water provided its historical water use and water use projections data to MWDOC (Table 2.4).

Table 2.4 Submittal Table 2-4 Retail: Water Supplier Information Exchange

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
Municipal Water District of Orange County
Orange County Water District
NOTES:

2.2.3 Public Participation

For further coordination with other key agencies, and to encourage public participation in the review and update of this Plan, Mesa Water held a public hearing on June 24, 2026, and notified key entities and the public per the Water Code requirements.

CHAPTER 3 SYSTEM DESCRIPTION

Mesa Water District (Mesa Water) is governed by a five-member Board of Directors and is located in a community that originated in about 1906. After the Costa Mesa District Merger Law was signed on June 30, 1959, Mesa Water (formerly known as the Costa Mesa County Water District) commenced operations on January 1, 1960, by acquiring the assets and obligations and assumed the responsibility of consolidating the City of Costa Mesa's Water Department, Fairview County Water District, Newport Mesa Irrigation District, and Newport Mesa County Water District.

Mesa Water's water service area covers approximately 18 square miles, along the coast of Southern California within the County of Orange and includes most of the City of Costa Mesa, portions of the City of Newport Beach and a small portion of unincorporated Orange County. Mesa Water operates nine wells, including seven clear water wells and two amber wells, two reservoirs with a total storage of 29 million gallons (MG), four metered imported water connections, and 15 emergency interconnections. Mesa Water's potable water distribution system consists of one pressure zone with approximately 317-miles of water mains system with approximately 24,425 service connections.

Mesa Water's climate is characterized by southern California's "Mediterranean" climate with mild winters, warm summers and moderate rainfall. In terms of land use, Mesa Water is almost built out with predominantly single and multi-family residential units. The City of Costa Mesa has some medium and high-density ongoing development projects. Most recently planned project is the One Metro West Project which will bring several 100's of high-density housing units. The current population (2025) of 110,432 is projected to increase by 9.5 percent over the next 25 years to 120,958. This equates to an annual growth rate of 0.38 percent.

3.1 Agency Overview

This section provides information on the formation and history of Mesa Water, its organizational structure, roles, and relationship to the Municipal Water District of Orange County (MWDOC).

3.1.1 Formation and Purpose

Mesa Water is located in a community that originated in about 1906. The La Habra Valley Land and Water Company, which drilled the first well in 1910, developed the first water system in the area. In 1913, the Fairview Farms Mutual Water Company constructed a system for agricultural purposes, and in 1918, the Newport Heights Irrigation District was formed to serve domestic and irrigation water. These two agencies acquired the facilities of the La Habra Water Company. With continued growth in the early 1900's the Newport Mesa Irrigation District and Santa Ana Heights Mutual Water Company were created. Fairview Farms Mutual Water Company later became the Fairview County Water District; Newport Mesa Irrigation District became the Newport Mesa County Water District. In 1953, the City of Costa Mesa became an incorporated city and in 1955 created a municipal water system to serve the areas beyond the four existing Mesa Water boundaries. On June 30, 1959, the Governor of the State of California signed Senate Bill 1375 (Costa Mesa District Merger Law), as introduced by Senator Murdy. The general provisions of this law called for the consolidation of four predecessor agencies: the Newport Heights Irrigation District, the

Fairview County Water District, the Newport Mesa County Water District, and the City of Costa Mesa Water Department.

On January 1, 1960, Mesa Water, formerly called the Costa Mesa County Water District, commenced operations pursuant to Sections 33200 et. seq. of the California Water Code (Water Code). The Santa Ana Heights Water Company was originally involved in merger discussions but withdrew before consolidation. Mesa Water set a precedent with this merger because it was the first water agency in California to consolidate two or more water agencies and assume both their assets and debt obligations.

Mesa Water represents a specific geographic area, is not subject to the State's Public Utility Commission, and is not part of any city or the government of the County of Orange. Mesa Water has maintained strong and cooperative relationships with cities and related public agencies that border or interact with it.

3.1.2 Board of Directors

A five-member Board of Directors governs Mesa Water, whose service area is divided into five geographic divisions of approximately equal population. One individual from each division is elected by the voting public to serve alternating four-year terms on the Board.

Mesa Water Board of Directors is responsible for establishing policies. The Board elects one of its members to serve as President and another to serve as First Vice President. The Board appoints a General Manager who serves at the discretion of the Board, as does (R Water Secretary, and Treasurer/Auditor. The General Manager is responsible for the administration of policies and the day-to-day operations.

The current members of the Board of Directors include:

- Marice H. DePasquale – President (Division 3).
- Shawn Dewane – Vice President (Division 5).
- Jim Atkinson – Director (Division 4).
- Fred R. Bockmiller, Jr., P.E. – Director (Division 1).
- James R. Fisler – Director (Division 2).

3.1.3 Relationship to MWDOC

Mesa Water is one of MWDOC’s 27 member agencies with the ability to purchase imported water from MWDOC, Orange County’s wholesale water supplier and a member agency of Metropolitan Water District of Southern California (MET), however Mesa Water relies on its local groundwater supply to provide water to its customers. Mesa Water’s location within MWDOC’s service area is shown on Figure 3.1.

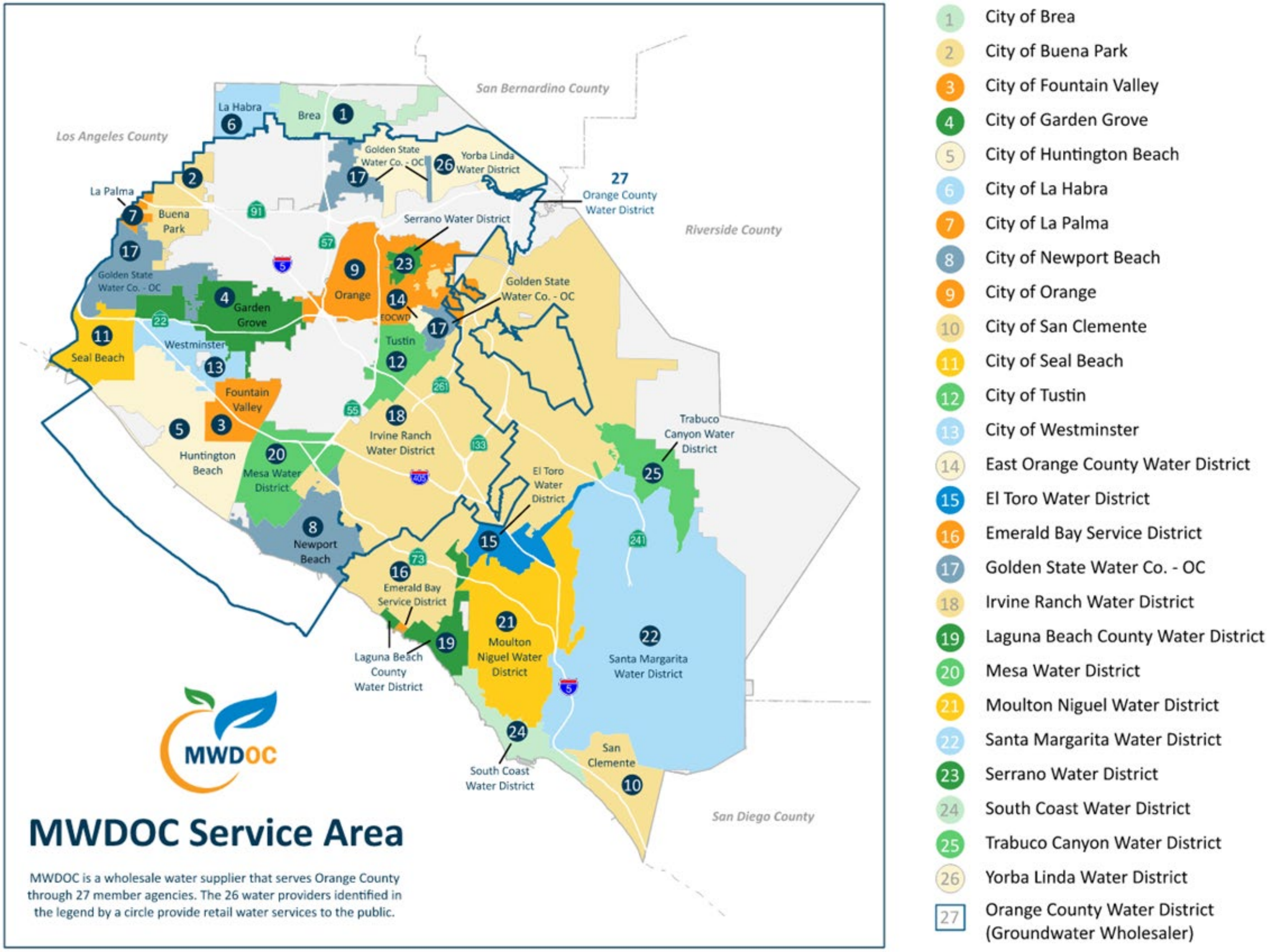


Figure 3.1 Regional Location of Mesa Water District and Other MWDOC Member Agencies

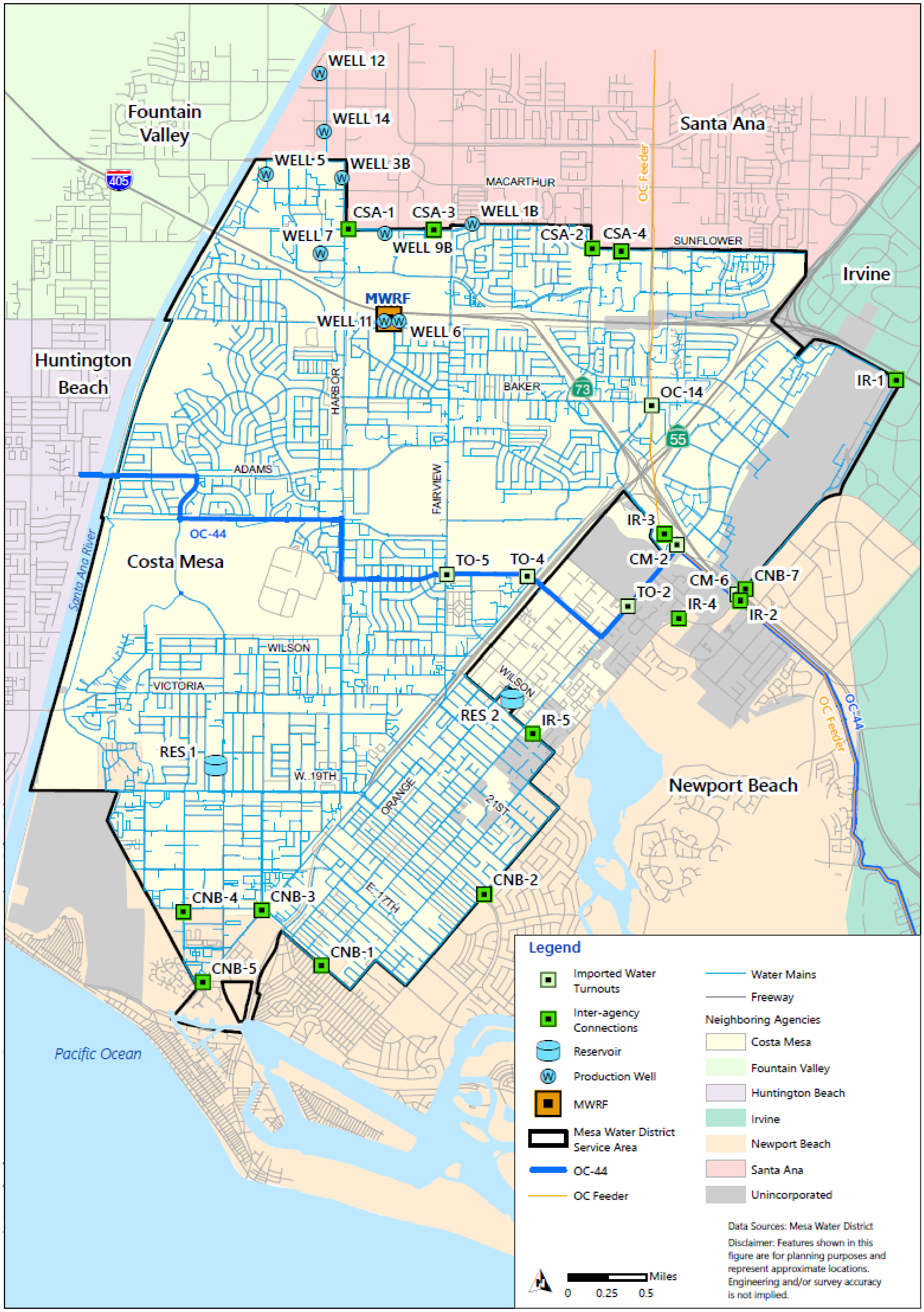
3.2 Water Service Area and Facilities

3.2.1 Water Service Area

Mesa Water's water service area is located along the coast of Southern California within the County of Orange. Mesa Water is between one-eighth of a mile to almost six miles inland of the Pacific Ocean. It is also approximately 37 miles southeast of Los Angeles, 88 miles north of San Diego and 475 miles south of San Francisco. The service area is approximately 18 square mile that includes most of the City of Costa Mesa, portions of the City of Newport Beach and a small portion of unincorporated Orange County. Mesa Water shares borders with the County of Orange, the Cities of Huntington Beach, Fountain Valley, Irvine, Santa Ana, and Newport Beach.

Mesa Water is located within the County of Orange, which has one of the most robust economies in California. Mesa Water's service area includes notable landmarks and major regional facilities such as the John Wayne Orange County Airport, State of California's Fairview Development Center, Segerstrom Center for the Arts, Orange County Fairgrounds, Orange Coast College, and South Coast Plaza shopping complex.

Unlike most typical coastal areas, elevation ranges from 30 to 110 feet above sea level near the ocean mesa and declines in elevation inland from the mesa. Mesa Water's geographic location places it over a portion of the Orange County Basin, a large underground aquifer that lies beneath the northern service area, and much of the rest of northern Orange County. Orange County Water District (OCWD) has managed the groundwater basin since 1933. A map of Mesa Water's water service area is shown as Figure 3.2.



Data Sources: Mesa Water District
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Figure 3.2 Mesa Water District Water Service Area

3.2.2 Water Facilities

Mesa Water typically supplies 100 percent of its water demands from groundwater. Mesa Water can use imported water as an emergency backup supply and serves recycled water from the Green Acres Project (GAP). Mesa Water operates seven wells that pump clear groundwater from the main production aquifer of the Orange County Basin, as well as two wells that pump amber-tinted water located below the main production aquifer. The amber-tinted water wells are treated at the Mesa Water Reliability Facility (MWRF), an advanced membrane treatment plant, before being pumped into the distribution system. Mesa Water has approximately 328 miles of water mains and two reservoirs with pump stations for operational and emergency storage. The reservoirs have a total storage of 29.45 MG. Mesa Water has four metered imported water connections. Additionally, Mesa Water has four emergency interconnections with the City of Santa Ana, and emergency interconnections with the City of Newport Beach, and five emergency interconnections with Irvine Ranch Water District (IRWD).

3.3 Climate

Mesa Water's service area is located within the South Coast Air Basin (SCAB) that encompasses all of Orange County, and the urban areas of Los Angeles, San Bernardino, and Riverside counties. The climate in the SCAB area is characterized by southern California's "Mediterranean" climate: a semi-arid environment with mild winters, warm summers, and moderate rainfall.

Local rainfall has limited impacts on reducing water demand in Mesa Water, except for the case of landscape irrigation demand. For example, in August 2023, Orange County as a region experienced the lowest seasonal water demand due to significant summer precipitation events from Tropical Storm Hilary. The increase in precipitation allowed landscape irrigation systems to be turned off, however other municipal and industrial uses (e.g., consumption, processing, and washing remained the same).

Water that infiltrates into the soil may enter groundwater supplies depending on the local geography. However, due to the large extent of impervious cover in Southern California, rainfall runoff quickly flows to a system of concrete storm drains and channels that lead directly to the ocean. OCWD has successfully captured stormwater along the Santa Ana River and in recharge basins for years and used it as an additional source of supply for groundwater recharge. Based on the 2022 Basin 8-1 Alternative Plan Update, OCWD captured an average annual stormwater volume of approximately 54,000 acre-feet (AF) over the period of five years, from Water Year 2016-17 to 2020-21.

MET's water supplies come from the State Water Project (SWP) and the Colorado River Aqueduct (CRA) are influenced by climate conditions in northern California and the Colorado River Basin, respectively. Both regions have variable hydrologic conditions that can significantly affect MET's supplies from year to year. This past decade has seen dramatic swings in annual precipitation, especially in the form of snowpack, which directly affect SWP supply allocations. Similarly, the Colorado River Basin also experienced year-to-year swings in hydrology ,and due to the prolonged drought conditions since 2000, storage within the Colorado River system has declined to less than half of its reservoir capacity and has been fluctuating at that level (MET, 2025).

3.4 Population, Demographics, and Socioeconomics

3.4.1 Service Area Population

Mesa Water serves a 2025 population of 110,432 according to Mesa Water's Capital Improvement Program. The Center for Demographic Research at California State University, Fullerton (CDR) provided more long-term population projections. Overall, the population is projected to increase 9.5 percent by 2050. Table 3.1 shows the population projections in five-year increments out to the year 2050 within Mesa Water's service area.

Table 3.1 Submittal 3-1 Retail: Population - Current and Projected

Submittal Table 3-1 Retail: Population - Current and Projected
Water Code Section 10631(a)

	2025	2030	2035	2040	2045	2050(opt)
Population Served	110,432	114,184	119,811	120,548	122,460	120,958

Notes:
Source (up to 2035): Transportation Analysis Zone level data provided by Southern California Association of Governments as used in 2024 Connect SoCal.
Source (from 2040 onwards): Center for Demographic Research at California State University, Fullerton, 2025.

3.4.2 Demographics and Socioeconomics

As shown below in Table 3.2, the total number of dwelling units in Mesa Water service area is expected to increase by 28.4 percent in the next 25 years from 42,899 in 2025 to 55,078 in 2050.

Table 3.2 Mesa Water District Service Area Dwelling Units by Type

Dwelling Units	2025	2030	2035	2040	2045	2050
Single Family	15,981	17,073	17,125	17,171	17,211	17,470
All Other(1)	26,918	30,091	33,423	35,688	37,423	37,608
Total	**42,899**	**47,164**	**50,548**	**52,859**	**54,634**	**55,078**

Notes:
Source: Center for Demographic Research at California State University, Fullerton, 2025.
(1) Includes duplex, triplex, apartment, condo, townhouse, mobile home, etc. Yachts, houseboats, recreational vehicles, vans, etc. are included if is primary place of residence. Does not include group quartered units, cars, railroad box cars, etc.

In addition to the types and proportions of dwelling units, various socio-economic factors such as age distribution, education levels, general health status, income and poverty levels affect Mesa Water's water management and planning. Based on the United States Census Bureau's 2023 American Community Survey, the City of Costa Mesa, which covers majority of Mesa Water service area, has about 12 percent of population of 65 years and over, 67 percent between the ages of 18 and 64 years, and 21 percent under the age of 18 years. Of Mesa Water's population over 25 years of age, 89.5 percent is at minimum a high school graduate, with 48.4 percent of this age group having at least a bachelor's degree.

3.4.3 Demographic Projection Methodology

CDR is a collaborative research center established in 1996 to provide accurate and timely demographic data on population, housing, and employment in Orange County. CDR serves as Orange County's authoritative source for demographic information. Mesa Water obtains its service area population and dwelling unit data from MWDOC via CDR.

MWDOC contracts with CDR to update the 2010 population estimates through the current year and to provide an annual estimate of population served by each of its retail water suppliers within its service area. CDR uses geographic information system (GIS) mapping and data from the 2000, 2010, and 2020 Unites States Decennial Censuses, State Department of Finance (DOF) population estimates, and the CDR annual population estimates and Housing Inventory System (HIS). These annual estimates incorporate annual revisions to the DOF annual population estimates, often for every year back to the most recent Decennial Census. As a result, all previous estimates are set aside and replaced with the most current set of annual estimates. Annexations and boundary changes for water suppliers are incorporated into these annual estimates.

Demographic projections used for this UWMP reflect the most recently available set of projections developed by CDR based on its 2022 Orange County Projections. Demographic projections for Orange County are updated every 4 years, with the next set of projections expected in the late fall of 2026. The 2022 Orange County Projections accounted for Draft RHNA rezone sites with jurisdictions including the number of dwelling units that are most likely to occur/get built by the end of 2050 under assumptions and trends existing at the time of the forecasting effort, including a parcel-level inventory of additional housing capacity from sites that were to be rezoned to accommodate the 6th RHNA cycle. In the summer of 2025, projections by water supplier for population and dwelling units by type were estimated using the 2022 Orange County Projections dataset. Growth for each of the five-year increments was allocated using GIS and a review of the traffic analysis zones (TAZ) data with a 2023 aerial photo. The growth was added to the 2025 estimates for each respective water supplier.

3.5 Land Uses

3.5.1 Current Land Uses

Mesa Water's service area can best be described as a predominantly residential community located along the coast in central Orange County, close to scenic beaches and natural preserves. The influx of tourists during the summer months creates higher demands within Mesa Water's service area, especially at the beach facilities, hotels and restaurants:

Based on the zoning designation collected and aggregated by Southern California Association of Government (SCAG) around 2018, the current land use within Mesa Water's service area can be categorized as follows:

- Single family residential: 1.8 percent.
- Multi-family residential: 40.4 percent.
- Commercial: 13.2 percent.
- Industrial: 10.3 percent.
- Institutional/Governmental: – 19.5 percent.

- Agriculture: 1.0 percent.
- Open space and parks: 12.0 percent.
- Other: 1.8 percent (e.g., Undevelopable or Protected Land, Water, and Vacant).

3.5.2 Projected Land Uses

Mesa Water's service area is close to being built out, except for limited infill development of vacant legal parcels in the existing residential neighborhoods and commercial areas. Some increase in water demands is also anticipated for redevelopment of existing, underutilized lands with increased densities. A few pending developments are listed in Table 3.3 that will change water demands in the future.

Table 3.3 Mesa Water District Major Planned Developments

Project Address	Project Description	Information
2501 Harbor Boulevard	Fairview Development Center	Minimum of 2,300 dwelling units and potentially 4,000 dwelling units with 35,000 square feet (sf) of commercial
2301 S. Shelley Circle	Southern Region Emergency Operations Center (SREOC)	The proposed project includes (2) two buildings: A +/-34,000 gross sf Main Office Building containing the Emergency Operation Center (EOC) and a +/- 20,000 gross sf warehouse building. In addition to the buildings, a 120-foot-tall communication tower, helipad, guard shack, trash enclosures, diesel generators, water storage tank (24-hour capacity), and a sanitary sewer tank (24-hour capacity) are part of the project scope.
1683 Sunflower	One Metro West	15 acres, Mixed-Us, Multi-Family Residential (957 dwelling units via Bldgs. A, B and C) and 6,000 sf retail. 1.5 acres open space.
3150 Bear Street	140-Unit Residential Single Family Homes	
W. 17th Street and Pomona Avenue	425 apartment complex and 46 multi-family residences	

It should be noted that the 2025 Orange County Water Demand Projection Model discussed in Chapter 4 was based on CDR's 20202 Orange County projections. The developments listed above may have been added or modified since. As a result, the future demands associated with these developments may increase Mesa Water's water demand beyond what is presented in this Urban Water Management Plan (UWMP).

In addition to the above developments, new developments may potentially also include accessory dwelling units (ADU) beyond 2025, which are separate small dwellings embedded within residential properties. There has been an increase in the construction of ADUs in California in response to the rise in interest in providing affordable housing supply.

The following requirements and changes in laws will impact Mesa Water's future land use moving forward:

- **Regional Housing Needs Assessment (RHNA)** - State law requires jurisdictions to provide their share of the RHNA allocation. SCAG determines the housing growth needs by income for local jurisdictions through RHNA. The cities lying in the service area of Mesa Water will continue planning for their RHNA allocation requirements as outlined in their respective General Plan Housing Elements.
- **Accessory Dwelling Units (ADUs)** – ADUs are separate small dwellings embedded within residential properties. There has been an increase in the construction of ADUs in California in response to the rise in interest to provide affordable housing supply. Since 2020, several landmark laws were passed by State Legislature, updating ADU law to simplify the construction, rental, and sale of ADUs in California. The most significant laws that have recently come into effect include:
  - AB-1033 Accessory dwelling units: local ordinances: separate sale or conveyance which authorizes local governments to adopt ordinances permitting the sale of ADUs separately from the primary residence as condominiums.
  - AB-976 Accessory dwelling units: owner-occupancy requirements which prohibits a local agency from requiring owner-occupancy for property owners to build and rent an ADU.
  - AB-1154 Junior accessory dwelling units which no longer requires owner-occupancy for Junior ADUs (JADU) as long as they have their own bathroom.
  - AB-1332 Accessory dwelling units: preapproved plans which requires local agencies to develop a program for pre-approved ADU plans, with projects using these plans having to be approved or denied within 30 days.
  - SB-543 Accessory dwelling units and junior accessory dwelling units which requires local agencies to determine if an ADU/JADU application is complete within 15 business days of submittal, revises ADU size to now be measured by "interior livable space", and now re-defines a JADU to be no more than 500 square feet of interior livable space.
  - SB-1211 Land use: accessory dwelling units: ministerial approval which authorizes multi-family property owners to build up to eight detached ADUs on a single lot, provided that the number of ADUs does not exceed the number of existing primary units.
  - AB-2533 Accessory dwelling units: junior accessory dwelling units: unpermitted developments which prohibits local agencies from denying permits for unpermitted ADUs/JADUs constructed before January 1, 2020, based on code violations unless the structure is a health or safety hazard.

In 2024, a total of 6,162 new residential units were permitted in Orange County, including those for ADUs (CDR, 2025). CDR projects that by 2050, approximately 13,000 more ADUs will be built in Orange County, with 1,206 ADUs expected within Mesa Water's service area. The increase in ADUs is likely to result in an increase in number of people per lot of land. Depending on whether the addition of ADUs results in a net replacement of irrigated area (or other high water use features such as swimming pools), ADUs could increase or decrease water demands.

CHAPTER 4 WATER USE CHARACTERIZATION

One of the main objectives of an Urban Water Management Plan (UWMP) is to provide an insight into the projected future water demands and supplies. This chapter describes Mesa Water District's (District) current and future water demands for their service area, factors that influence demands, and the methodology used to forecast future water demands over the next 25 years. For this 2025 UWMP, water demand projections will span from planning year 2025 through planning year 2050.

Known for its suburban coastal communities and densely populated inland areas, Orange County has evolved greatly from its beginnings as an agricultural region. As some of the earliest cities in Orange County, the Cities of Anaheim, Fullerton, and Santa Ana all joined with 10 other southern California cities to form the Metropolitan Water District of Southern California (MET) in 1928 with the ambitious dream to bring Colorado River water across the Mojave Desert. The Municipal Water District of Orange County (MWDOC) later joined MET as a member agency in 1951, and with the merger with Coastal Municipal Water District in 2001, now represents the remainder of Orange County to provide and manage the imported water supplies within its service area. Orange County is now mostly comprised of residential, mixed-use, and commercial developments, with less industry in the region. Agriculture in the region has also declined significantly as Orange County has grown more suburban. Thus, modern-day water use within Orange County can be largely summarized by the following four demand sectors:

- Single-family Residential.
- Multifamily Residential.
- Commercial, Industrial, and Institutional (CII).
- Dedicated Irrigation (potable, recycled and raw water).

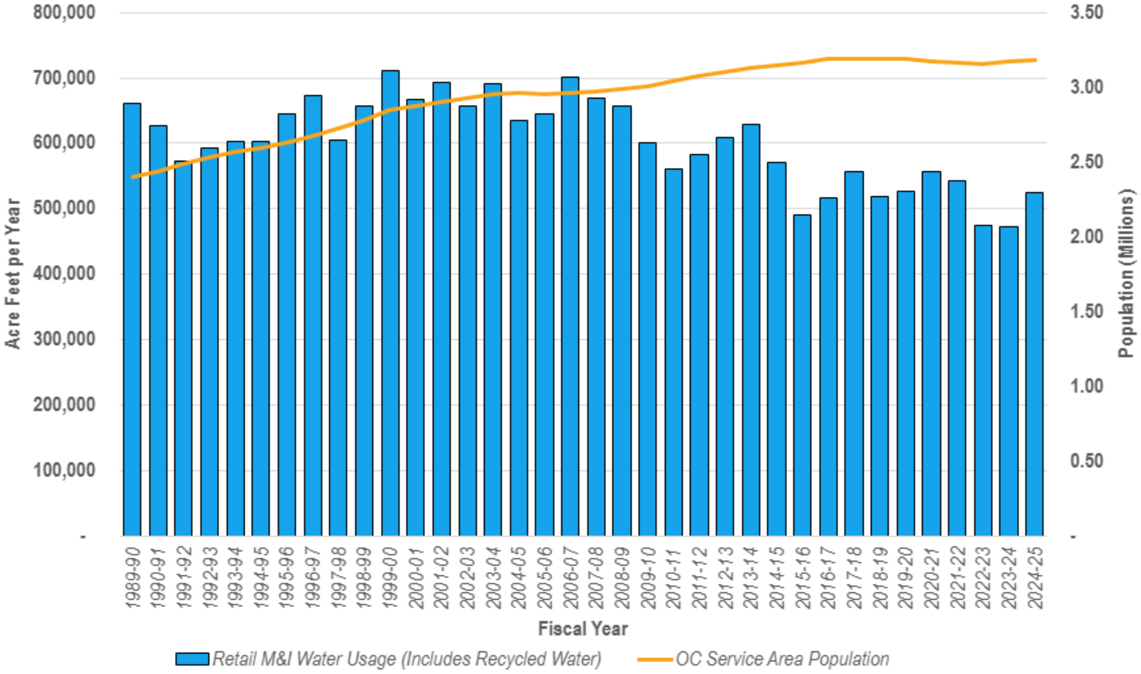


Figure 4.1 Historical Water Use and Population in Orange County

Figure 4.1 shows Orange County's overall historical water usage compared to population since 1990, when local water conservation programs were first established. As shown, from the early 1990s through the mid-2000s, Orange County's water usage increased as the population increased. Population figures slowed significantly in 2018 and began to decrease during the COVID-19 Pandemic in 2020-2021. Since 2007, retail, municipal, and industrial water use in Orange County has declined due to multiple contributing factors. Decades of sustained investments in water-use efficiency and public education have led to significant adoption of water-efficient appliances and fixtures, and increased public awareness of the need to use water wisely. Furthermore, in response to recurring droughts, growing urban demand, and increasingly limited water supplies, multiple regulatory requirements to promote water conservation have evolved and been implemented over the past two decades throughout California and Orange County.

Orange County's trending decline in water usage can most notably be attributed to Orange County water agencies' past efforts to achieve regional and individual compliance with Senate Bill (SB) X7-7, the Water Conservation Act of 2009, through the Orange County 20x2020 Regional Alliance and compliance with Executive Order (EO) B-29-15. EO B-29-15 mandated 25 percent reduction in potable water use in response to the 2013-2014 drought. Furthermore, Orange County water agencies' ongoing progress towards achieving SB 606 and Assembly Bill (AB) 1668, the "*Making Conservation a California Way of Life*" legislation, water use objectives continue to exemplify Orange County water agencies' commitment to water conservation, water use efficiency, and overall reduction in potable water usage in recent decades.

In 2025, MWDOC and Orange County Water District (OCWD), in collaboration with MWDOC's member agencies and the Cities of Anaheim, Fullerton, and Santa Ana, led the effort to develop the 2025 Orange County Water Demand Projection Model. The Orange County Water Demand Projection Model (MWDOC, 2025) was used to project long-term water demand under three hydrologic conditions (normal year, single dry year, and five consecutive dry years) over a 25-year horizon in 5-year increments, consistent with the 2025 UWMP requirements.

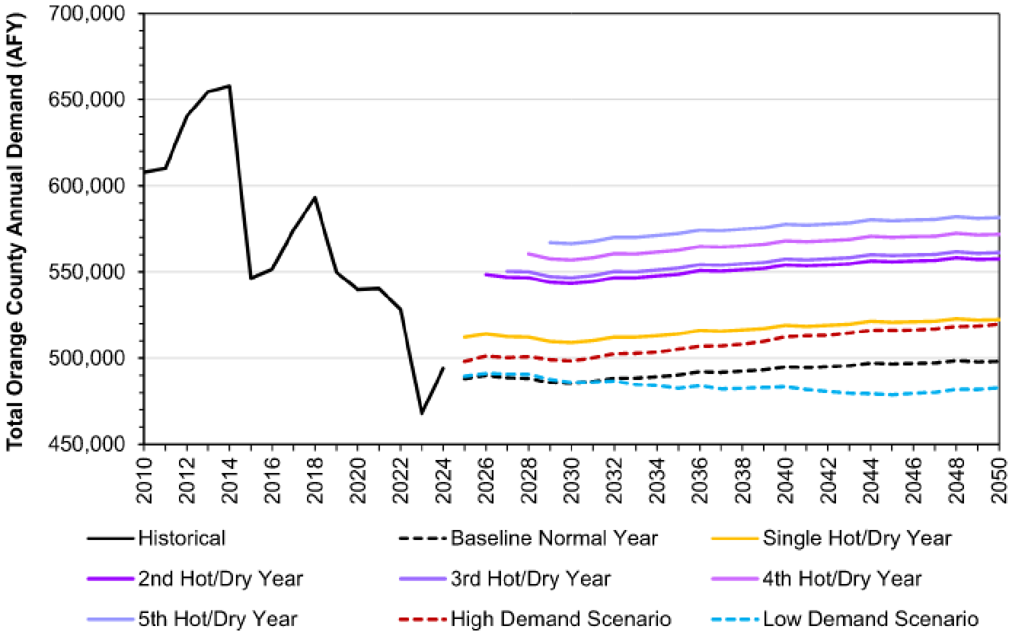


Figure 4.2 Projected Water Use Across All Orange County Water Agencies

Although Orange County demands are forecast to be relatively flat into the future, with water use efficiency efforts counterbalancing new growth, Figure 4.2 shows that annual variations in weather could cause high fluctuations, Some examples of this are described below:

- Single-family consumption is highly seasonal, and the model correlates well with seasonality and temperature by capturing fluctuations in single-family outdoor irrigation.
- Multi-family use is generally less responsive to weather than single-family demands, as much of multi-family outdoor irrigation has been shifted into the irrigation-specific water use sector (dedicated irrigation meters), and generally newer multi-family dwellings in Orange County have comparatively less landscaped area than generally older single-family dwellings due to Model Water Efficient Landscape Ordinances (MWELO) mandated since 1993. Seasonal price elasticity varies the least between months for the multi-family sector.
- Commercial, Industrial and Institutional use is positively correlated to each job proportion as well as gross domestic product throughout Orange County, which means a higher amount of CII jobs and production value trend in an increase in water demands.
- Irrigation is the most responsive to temperature and precipitation compared to the other sectors.

In terms of future development, north Orange County is substantially built out, with a majority residential land uses with some mixed-use areas dedicated to commercial, institutional, and governmental uses. Future developments planned in north Orange County are mainly redevelopment and infill projects. As for Mesa Water's service area specifically, future developments include a number of mixed use, industrial, and residential projects, housing to meet the Regional Housing Needs Assessment (RHNA) allocations for the cities within its service area, and Accessory Dwelling Units (ADU), which will all shape Mesa Water's future water use.

Water use within Mesa Water's service area has fluctuated in the past five years (Fiscal Year [FY] 2020-21 through FY 2024-25), with an annual average total water use of approximately 16,557 acre-feet (AF). Following one of the worst droughts in California history between 2017 and 2022, the significant wet year in 2023 saw a decrease in overall water use from FY 2021-22 to FY 2022-23 in Mesa Water's service area.

Water use in FY 2024-25 included 15,667 AF of potable water and 847 AF of non-potable water for landscape irrigation. Mesa Water's water use is primarily residential. The projected water use in 2050 is 17,590 AF for potable water and 577 AF for non-potable water.

4.1 Water Use in the Last Five Years

The five-year average water use within Mesa Water's service area is approximately 16,557 acre-feet per year (AFY) provided by potable and non-potable sources. Demand trends have remained flat due to water-use efficiency efforts and increased precipitation in recent wet years, such as FY 2023. As mentioned in Chapter 3, population within the service area is expected to increase in the long term. However, total demands have remained relatively stable due to ongoing water conservation programs and improved water use efficiency efforts.

FY 2020-21 through FY 2021-22 saw the highest water uses over the last five years due to region-wide drought conditions. FY 2022 23 proved to be one of the wettest years on record in the State and Mesa Water saw a general decrease in water demand following this wet year, as precipitation offsets landscape irrigation demands. These year-to-year fluctuations in precipitation will continue to influence Mesa

Water's annual demands. In general, Mesa Water saw a decrease in demands of 6.7 percent over the 5-year reporting period.

Table 4.1 presents Mesa Water's service area existing water use by source for direct uses. There are no indirect uses within Mesa Water's service area. As shown, Mesa Water's service area total water usage in FY 2024-25 was 16,515 AF. The total usage was met through a combination of potable and non-potable sources, including groundwater and recycled water. In FY 2024-25, about 94.9 percent of the total demand was met through Orange County Basin groundwater. In FY 2024-25, the total potable demand was 15,667 AFY, while 847 AFY or about 5.1 percent of the total demand was served with non-potable supplies for landscape irrigation.

Table 4.1 Submittal Table 4-1 Retail: Total Uses for Potable and Non-Potable Water – Actual

Submittal Table 4-1 Retail: 2025 Actual Total Uses for Potable and Non-Potable Water
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 WUE data online submittal tool		**Potable or Non-Potable** (OPTIONAL) Drop down list	Volume (AF)
Single Family		Potable	4,247
Multi-Family		Potable	4,931
Institutional/Governmental		Potable	1,667
Commercial		Potable	3,414
Industrial		Potable	235
Landscape		Potable	54
Other (optional)	Hydrant Meters and Construction	Potable	27
Landscape	Title 22 tertiary treated recycled water	Non-Potable	847
Distribution System Water Loss		Potable	1,093
		Subtotal Potable	15,667
		Subtotal Non-Potable	847
		Total	**16,515**

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:
Distribution System Water Loss is calculated as the difference between total potable production and use for FY 2025.

4.1.1 Potable Municipal and Industrial Use

Table 4.1 summarizes Mesa Water's potable water demand for FY 2024-25. As shown, a total of 15,667 AF of potable water was used. Mesa Water has a mix of single and multi- family residential water use which account for 58.6 percent of their total potable water demand. Combined CII use accounts for 33.9 percent of total potable demand while landscape irrigation accounts for 0.3 percent of total potable demand and other uses account for 0.2 percent of total potable demand. The total distribution system water loss to match supply and metered demand was calculated to be 1,093 AFY in FY 2024-25, or 7 percent of total potable water demand. It should be noted that this differs from Mesa Water's 653 AFY of water loss reported in the American Water Works Association (AWWA) Water Loss Audit for FY 2025, as the total Water Loss Audit accounts for authorized, unmetered demand such as Costa Mesa Sanitary District Sewer Clean In Place and Costa Mesa Fire Department's use of Mesa Water District fire hydrants.

Considering the planned developments mentioned in Chapter 3, potable water demands are expected to increase in the future given the possibility of population increases.

4.1.2 Non-Potable Municipal and Industrial Use

Table 4.1 summaries Mesa Water's non-potable, or outdoor irrigation, water demand for FY 2024-25. As shown, a total of 847 AF was used. Landscape irrigation accounts for 100 percent of total non-potable demand and encompasses delivery of Title 22 tertiary treated recycled water to the 43 recycled water customers within Mesa Water's service area. Non-potable demands are not expected to increase in the future.

4.2 Projected Water Use

The water use projection for this UWMP is separated into a near-term period covering the next five years (2026-2030) and a long-term period extending from 2030 through 2050. Mesa Water recently completed their 10-year water capital improvement plan which included water use projections through 2035. For this UWMP, Mesa Water included these water use projections in Table 4.2. Furthermore, water use projections from 2035 through 2050 are based on the 2025 Orange County Water Demand Projection Model Technical Memorandum (TM), which is included in Appendix H of this UWMP. The methodology used in this demand forecast links water use statistically to a set of explanatory variables through a regression, or econometric, model. Section 4.3 offers a description of the methodology used to calculate Mesa Water's demand projections.

4.2.1 Water Use Projections for 2026-2030

Total demands (direct) are met through groundwater and recycled water. Mesa Water's total water demand projection for the next five years is shown in Table 4.2. As shown, Mesa Water's total service area water demands are expected to have a net increase over the next five years (2026 to 2030) due to projected growth in the service area's Municipal and Industrial (M&I) demands.

Table 4.2 Mesa Water District's Service Area Total Potable and Non-Potable Demand for 2026-2030

Fiscal Year Ending	2026	2027	2028	2029	2030
Total Water Demand (AF)	16,794	17,073	17,353	17,632	17,911

Notes:
AF – acre-feet

4.2.2 Water Use Projections for 2030-2050

Mesa Water's service area's total water demands (by use type) for the next 25 years are shown in Table 4.3. As described in section 4.2, water use projections to 2035 were provided by Mesa Water's recently completed water system capital improvement plan and projections from 2035 to 2050 were provided by the 2025 Orange County Water Demand Projection TM. By 2050, total water demand is projected to be 17,767 AF, a 7.6 percent increase from the 2025 demand of 16,515 AFY. Table 4.4 indicates additional information for both future conservation efforts and low-income water demands included in the projections, while Table 4.5 presents the passive water savings included in Table 4.3 projections for 2030-2050.

Table 4.3 Submittal Table 4-2 Retail: Total Uses of Potable, and Non-Potable Water - Projected

Submittal Table 4-2 Retail: Total Uses of 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 WUE data online submittal tool		**Potable or Non-Potable** (OPTIONAL) Drop down list	**2030(1) (AF)**	**2035(1) (AF)**	**2040(2) (AF)**	**2045(2) (AF)**	**2050(2) (opt) (AF)**
Single Family		Potable	5,130	5,383	4,490	4,464	4,464
Multi-Family		Potable	5,673	5,953	5,947	6,087	6,063
Commercial	Includes Institutional and Industrial uses	Potable	5,139	5,139	3,711	3,707	3,713
Landscape	Includes Agriculture use	Potable	14	14	1,606	1,598	1,598
Landscape	Includes Agriculture use	Non-Potable	1,084	1,084	1,084	1,084	1,084
Distribution System Water Loss	Includes Other uses	Potable	871	898	842	847	846
		Subtotal Potable	16,827	17,387	16,597	16,703	16,683
		Subtotal Non-Potable	1,084	1,084	1,084	1,084	1,084
		Total	**17,911**	**18,471**	**17,681**	**17,787**	**17,767**

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:
(1) Source (up to 2035): Mesa Water District CIP Update.
(2) Source (from 2040 onwards): 2025 Orange County Water Demand Projection Model Forecast for Mesa Water District.

Table 4.4 Submittal Table 4-3 Retail: Inclusion in Water Use Projections

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.	Chapter 4.3
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.	Chapter 4.3
DWR NOTES: Additional guidance is provided in Appendix K.	
NOTES: Future water savings include passive conservation (defined as water savings that occur without incentives). Active conservation (defined as water savings that occur with incentives) is not included in the projections. The demand projection methodology accounted for the entire population of the service area (i.e., all income levels).	

Table 4.5 Optional Submittal Table 4-4 Retail: Passive Water Savings Projections

OPTIONAL Submittal Table 4-4 Retail: Passive Water Savings Projections **Water Code Section 10631(d)(4)(A)**					
Description (Codes, Standards, Ordinances, or Plans)	Passive Savings				
	2030 (AF)	**2035 (AF)**	**2040 (AF)**	**2045 (AF)**	**2050 opt (AF)**
Add additional rows as needed					
Passive Water Savings	187	194	199	201	201
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: Passive conservation here is defined as water savings that occur without incentives. Based on the 2025 Orange County Water Demand Projection Model, passive conservation is assumed to equal a 1.9 percent decrease in residential demand due to conservation by 2030 (linearly extrapolated), then remains constant in subsequent years.					

4.2.2.1 Potable Municipal and Industrial Use

As shown in Table 4.3, the total potable water demands are projected to reach 16,683 AF by the year 2050, a decrease of about 0.9 percent between 2030 and 2050. It is projected that combined single- and multi-family residential water use will account for 63.1 percent of total potable water demand, CII water use is expected to account for 22.3 percent, and landscape irrigation water use will account for 9.6 percent of total potable water use for Mesa Water by 2050. Combined distribution system water losses and other uses are expected to account for 846 AFY or 5.1 percent of total potable water demand by 2050.

4.2.2.2 Non-Potable Municipal and Industrial Use

As shown in Table 4.3, the total non-potable, or outdoor irrigation, water demands are projected to remain relatively constant and be 1,084 AF by the year 2050, per the 2025 Orange County Water Demand

Projection Model. Mesa Water does not anticipate any more users being connected to Mesa Water's recycled water system in the future.

4.3 Water Demand Projection Methodology

As described in section 4.2, Mesa Water used two different projection methodologies for water use from 2025 to 2035 and 2035 to 2050. The following sections briefly describe each one.

4.3.1 Water Demand Projections From 2025 to 2035

A population-based method was used to forecast water demand through 2035 for Mesa Water District Capital Improvement Program Update. Socioeconomic projections of population were provided by Southern California Association of Governments, a joint powers authority that encompasses six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura). The data was originally prepared for the 2024-2050 Regional Transportation Plan and Sustainable Communities Strategy, also known as Connect SoCal 2024. The Regional Housing Needs Assessment is included in the population projections, a process mandated by the State of California's housing laws to determine existing and future housing needs. The population within Mesa Water's service area is expected to increase from 108,360 in 2019 to 119,811 in 2035 according to an analysis of Transportation Analysis Zone level data provided by Southern California Association of Governments. This projection equates to an annual growth rate of approximately 0.6 percent.

4.3.1.1 Forecasted Demands

Discussed in detail in Technical Memorandum 1 – Water Demand of Mesa Water District Capital Improvement Plan Update (Appendix H), residential demand accounted for 67 percent of potable water billing in FY 2022 with the remaining 33 percent being non-residential demand. The residential indoor and outdoor per capita water demand during this year is 85.6 gallons per capita day. Assuming no increases due to employment or conservation, the projected demand is based on population growth only.

4.3.2 Water Demand Projection from 2035 to 2050

In 2025, MWDOC and OCWD, in collaboration with MWDOC's member agencies and the Cities of Anaheim, Fullerton, and Santa Ana, led the effort to develop the 2025 Orange County Water Demand Projection Model, (MWDOC, 2025). This effort developed a demand model by regressing historical water consumption data provided by each Orange County water agency against several explanatory variables known to influence water demand (including weather, water price, regional economic conditions, and housing density). The water demand projections were for the Orange County region as a whole and provided retail agency specific demands, spanning the years of 2025-2050. The full TM can be found in Appendix H.

The demand projections created four econometric, or regression, demand models representing the following four water billing sectors for each Orange County retail agency:

- Single-family Residential.
- Multifamily Residential.
- Commercial, Industrial, and Institutional (CII).
- Dedicated Irrigation (potable, recycled and raw water).

Prior to developing the forecasts, model calibration and fine tuning for each of the four demand sectors occurred at the individual retail agency level. The demand across all four models, plus other uses for each agency, is summed to a total forecast for each agency, the MWDOC service area, the OCWD service area, and total Orange County.

The demand projection methodology accounted for the entire population of each individual retail agency's service area (i.e., all income levels), thus accounting for the water demand projections for lower income households within Mesa Water's service area.

4.3.2.1 Econometric Approach, Data Acquisition, and Model Development

A regression, or econometric, approach to demand forecasting statistically links retail level water use to weather, economic, and socioeconomic factors (explanatory variables). The model relies on a comprehensive dataset of historical water-use data for almost 40 different billing sectors collected from Orange County retail agencies. MWDOC obtained explanatory variables from reputable sources, including weather databases and Census-based reports. The explanatory variables used in the regression were based on industry experience regarding what factors affect water use nationwide and in Southern California.

By statistically linking water use to explanatory variables, the econometric models provide a robust foundation for understanding variability and projecting future consumption patterns. Modeled water use is the product of the driver count (e.g., number of accounts), and the rate of water use per driver:

$$Water\ Use = Driver\ Count\ \times Rate\ of\ Use\ per\ Driver$$

Each of the four demand sectors modeled (single family, multifamily, CII, and irrigation) has a separate equation. Driver units change into the future based on housing, employment, and population projections. The rate of water use per driver is based on the historical response of the use rate to explanatory variables (measured by coefficients) and the future values of those same explanatory variables.

Linear regression produces the coefficients for each explanatory variable to closely reproduce the historical rate of use per driver unit. The coefficients explain how (both in terms of magnitude and sign) water use responds to changes to explanatory variables.

MWDOC identified driver units based on data provided by agencies and the Center for Demographic Research at California State University, Fullerton (CDR) that can be easily projected into the future. The rate of water use per driver is based on agency provided billing sector uses from 2010 through 2024. Table 4.6 shows the driver units and rate of use for each of the four models.

Table 4.6 Summary of Demand Sectors

Sector	Driver Units	Rate of Use Definition
Single-Family Residential	Accounts	Gallons/account/day
Multi-Family Residential		Gallons/account/day
Commercial, Institutional, Industrial (CII)	Jobs	Gallons/job/day
Dedicated Irrigation (potable, recycled & raw water)	Accounts	Gallons/account/day

The rates of water use for each sector model are based on the historical responses to explanatory variables, and the future values of those explanatory variables. Addressing multiple influences on demand improves the accuracy and precision of all estimated parameters, and the modeling team identified a large range of explanatory variables based on past experience with demand modeling and available data. Table 4.7 displays the explanatory variables.

Table 4.7 Summary of Historical Data Collected for Model Development

Dataset	Data Source(s)
Observed weather (monthly precipitation, monthly maximum temperature)	Parameter-elevation Regressions on Independent Slopes Model (PRISM)
Water Price	Retail agency provided (2010 – 2024)
Drought Restrictions	State Water Resources Control Board
Gross Domestic Product (GDP)	Federal Reserve Bank of St. Louis Real Gross Domestic Product: All Industries in Orange County, CA
Median Income	US Census American Community Survey (ACS)
Housing Density	US Census American Community Survey (ACS), California State University Fullerton Center for Demographics Research (CDR), Southern California Association of Government (SCAG) land use data
Persons Per Household	
Relative Sectoral Economic Activity	US Census LODES, CDR
Passive Efficiency Estimates	Analysis of trend indicators and MWDOC/FLUME insight
COVID-19 Binary Indicator	Assumed active from March 2020 – May 2023

The MWDOC Water Use Efficiency Group provided annual water savings achieved by various active conservation measures. To avoid potential errors in the classification of historical conservation data, total historical conservation was modeled in each sectoral regression model using a linear trend to capture steady change over time. While historical conservation is captured in a linear trend, projected passive conservation is based on best available data from the 2021 Orange County Residential Water Efficiency Potential and Opportunities Study and assumes a 1.9 percent decrease in annual residential demand from 2025 to 2030, at which point passive conservation is projected to remain constant . Future active conservation is not accounted for in baseline demand forecast, as water savings from active programs (programs that require customers to change behavior) are highly specific to retail agencies and to the formulation and timing of their implementation.

The process of identifying the explanatory variables to include in the regression equation and developing coefficients that accurately measure the response of water use to changes in these variables is the most time-intensive part of the demand forecasting process.

Prior to developing the forecasts, model calibration and fine tuning for each of the four demand sectors occurred at the individual retail agency level. The modeling team worked with each retail agency to calibrate sectoral model equations and quantify other uses (those not included in the single-family, multifamily, irrigation, or CII demand sectors).

Figure 4.3 presents the iterative process undergone to develop the econometric demand forecasts.

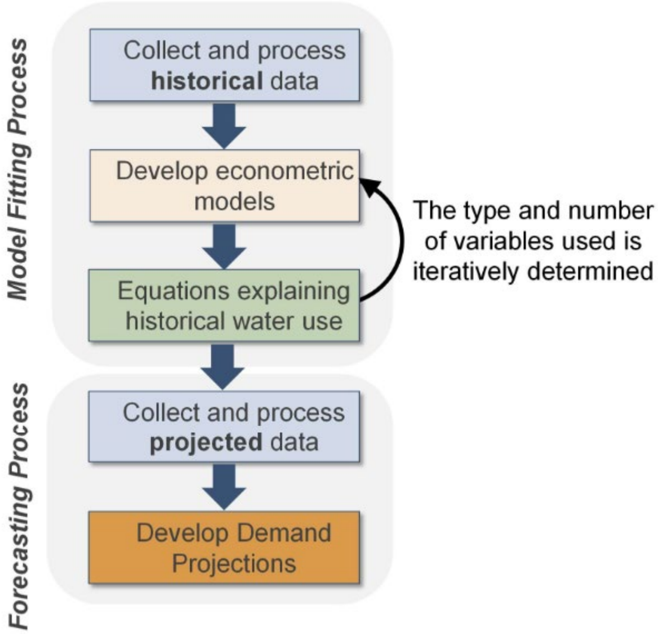


Figure 4.3 Econometric Demand Forecast Development Process

4.3.2.2 Forecasted Demands

Forecasted demand is a function of both the change in driver units into the future as well as the change in explanatory variables. Table 4.8 summarizes the future drivers and variables and assumptions for the baseline forecast. It should be noted that the CDR demographic forecast accounts for both the RHNA allocations and projected increase in ADUs. The 2022 Orange County Projections accounted for Draft RHNA rezone sites[1] with jurisdictions including the number of dwelling units that are most likely to occur/get built by the end of 2050 under assumptions and trends existing at the time of the forecasting effort.

Table 4.8 Future Model Parameters

Data Category	Variable	Source	Assumptions
Driver Units	Single-family and multifamily accounts	CDR	Historical households per account; averages are multiplied by households projected by CDR
	Irrigation accounts	Agency Billing Data	Accounts are assumed to be constant into the future
	Sectoral Employment	CDR	Proportion of jobs within CII sectors projected by CDR
Explanatory Variables	Monthly Maximum Temperature and Total Precipitation	PRISM	30-year historical normal weather
	Water Price	Retail Agencies	Prices increase by 3% per year above inflation for 2025-2030 and keeps pace with inflation thereafter (zero difference from inflation trend)
	Water Use Restrictions	State and Local Restrictions	None
	Seasonality		Sine/cosine functions to capture monthly pattern
	Median Income	US Census	Constant income at 2022 value (real dollars)
	Housing Density	CDR	Derived from CDR housing unit projections, assuming residential area remains at 2024 levels
	Persons Per Household	CDR	CDR projected demographics
	Gross Domestic Product	Federal Reserve	Long-term GDP trend
	Relative Sectoral Employment	CDR	Calculated based on CDR projections
	Passive Efficiency Estimates	Flume Insight	Assumes a 2% decrease in residential demand due to conservation by 2030 (linearly extrapolated), then no change
	COVID-19 Binary Indicator		None (occurred between March 2020 and May 2023)

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[1] For the 2022 Orange County Projections, CDR collected initial draft input from local jurisdictions in September 2021 on their anticipated jurisdiction-level housing growth for each projection year. In December 2021-February 2022, CDR reviewed and extracted data from jurisdictions' draft housing elements to create a parcel-level inventory of additional housing capacity from sites that were to be rezoned to accommodate the 6th RHNA cycle. These were reviewed by jurisdictions in spring 2022. Jurisdictions completed the rezoning of the final sites after their housing elements were certified by the State Housing and Community Development Department starting in 2022. The final adopted rezone sites will feed into CDR's 2026 Orange County Projections.

The normal year scenario was provided by the baseline forecast. In this model, the single dry year scenario used a hot-dry index (HDI) to identify the year with the most weather-sensitive demand, with 2014 selected for most agencies. The multiple dry year was developed to describe the potential impact of consecutive dry years.

The forecasts for individual agencies, including Mesa Water's, were then summed to the regional level, providing regionally consistent forecasts for all of Orange County.

4.4 Water Loss

Mesa Water has conducted annual water loss audits since 2015 per the American Water Works Association (AWWA) methodology per SB 555 to understand the relationship between water loss, operating costs and revenue losses. Non-revenue water for FY 2020-2024 consists of three components: real losses (e.g., leakage in mains and service lines, and storage tank overflows), apparent losses (unauthorized consumption, customer metering inaccuracies and systematic data handling errors), and unbilled water (e.g., hydrant flushing, firefighting). Table 4.9 summarizes the status of the last five years of water loss audit reporting for the water system. Reports can be found online at WUEdata - Water Audit Plans. Understanding and controlling water loss from a distribution system is an effective way for the City to achieve regulatory standards and manage their existing resources.

Table 4.9 Submittal Table 4-5 Retail: Water Loss Audit Reporting

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		
CA3010004	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: Water Loss Audits reported in Fiscal Years (FY).		

Signed in 2018 and adopted in 2024, the "*Making Conservation a California Way of Life*" legislation (SB 606 and AB 1668) establishes a new framework for long-term improvements in urban water use efficiency and drought planning as California adapts to climate change impacts. Under the regulation, Suppliers must annually calculate Urban Water Use Objectives based on standards applied at the service-area scale, including the Water Loss Performance Standard developed by the State Water Resources Control Board to minimize water waste through system leaks. The Water Loss Performance Standard requires that Suppliers must meet the real water loss standard and apparent water loss standard by 2028.

Table 4.10 presents Mesa Water's progress towards compliance with the 2028 Water Loss Standard, as of the time of writing this UWMP. The most recent AWWA Water Loss Audit for FY 2025 was utilized for the calculations presented.

Table 4.10 Submittal Table 4-6 Retail: Progress Towards 2028 Water Loss Standard

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**		Real Water Loss Per Unit per Day	**State Water Board Standard**		**Most Recent AWWA Water Loss Audit**	Apparent Water Loss Per Unit per Day
		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)		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)					(AF)	
Add additional rows as needed.											
CA3010004	Yes	16.7	Gallons per Service Connection per Day (GPSCD)	22,529	382.89	15.2	11.4	Gallons per Service Connection per Day (GPSCD)	22,529	270.54	10.7
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: Uses the Water Board's calculated water loss standards updated as of 01/30/2026 and AWWA Water Loss Audit for FY 2025. Connection count may differ from what is reported in Table 2.1 R for FY 2025.											

CHAPTER 5 CONSERVATION TARGET COMPLIANCE

The Water Conservation Act of 2009, also known as Senate Bill (SB) X7-7, mandated a 20 percent reduction in urban per-capita water use across California by 2020. To achieve this goal, the Act required each retail water supplier to establish an urban water-use target, contributing to the State's collective efforts. The Legislature stated that the combined reductions from all retail suppliers would fulfill the statewide legislative mandate.

The goal of this chapter is to allow the retail water supplier to report on their progress toward meeting their urban water-use targets in their Urban Water Management Plan (UWMP), pursuant to Water Code Section 10608.40. Suppliers that did not meet their 2020 target in 2020 are required to compare their 2025 water use to the 2020 target.

Retail water suppliers are required to comply with SB X7-7 individually or as a region in collaboration with other retail water suppliers or demonstrate they have a plan or have secured funding to be in compliance, in order to be eligible for water related state grants and loans.

When determining water use in an UWMP, two terms are often used interchangeably:

- **Daily Per-Capita Water Use.** The amount of water used per person per day. In the UWMP calculations, this is total water use within a service area, divided by population, and it is measured in gallons.
- **Gallons Per-Capita Per Day (GPCD).** This is the "daily per-capita water use" measured in gallons. Therefore, the term commonly used when referring to "daily per-capita water use" is "gallons per-capita per day" or GPCD[1].

5.1 Reporting Requirements

Municipal Water District of Orange County's (MWDOC) Water Use Efficiency (WUE) programs helped Orange County meet the state's 20x2020 mandate by coordinating conservation efforts across its member agencies, funding and implementing regionally cost-effective efficiency programs, and enabling compliance through the Orange County 20x2020 Regional Alliance. By aligning its WUE portfolio directly with SB X7-7 requirements, supporting high-impact measures (especially outdoor water savings), documenting eligible indirect potable reuse credits, and centrally handling regional target calculations and reporting, MWDOC allowed participating retailers to comply collectively rather than individually resulting in regional per-capita water use well below the required 2020 target.

As a result of MWDOC's WUE program, all Orange County water retailers, including all MWDOC's member agencies and the participating cities of Anaheim, Fullerton, and Santa Ana, achieved compliance prior

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[1] It is important to distinguish GPCD (as used in UWMPs) from the Residential Gallons Per Capita Per Day (R GPCD) that is used in some reporting to the California State Water Resources Control Board (SWRCB). GPCD is the total water use from all sectors within a service area (residential, commercial, institutional, and any others) minus allowable exclusions (as defined in SB X7 7), then divided by the population. This is used in UWMPs. R-GPCD is only a part of the GPCD; it is the estimated residential water use in a service area divided by population.

to 2020. The following table with information taken from the 2020 UWMP verifies that Mesa Water District met their SB X7-7 requirement. A discussion of programs implemented to support the achievement of the agency's per capita water reduction goals is covered in Section 9 – Demand Management Measures of this UWMP.

Table 5.1 Submittal Table 5-1 Retail: SB X7-7 2020 Target Progress

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	143	85	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. NA=Not Applicable						
NOTES: Supplier met the 2020 target, actual 2025 GPCD not required.						

CHAPTER 6 WATER SUPPLY CHARACTERIZATION

Orange County has a water supply portfolio made up from a variety of local and imported sources. Groundwater is produced from the Orange County Basin, which is managed by the Orange County Water District (OCWD). To enhance the reliability of groundwater, OCWD has implemented projects and programs over the years that include: (1) the Groundwater Replenishment System (GWRS), which is the world's largest water purification system for indirect potable reuse; (2) increased stormwater capture for groundwater recharge; and (3) participation in the Santa Ana River Conservation and Conjunctive Use Program (SARCCUP), a collaborative, watershed-scale approach for groundwater basin management, replenishment, and water transfers.

Imported water is provided by the Metropolitan Water District of Southern California (MET), the wholesale water provider to 26 member agencies in Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties. MET's imported water sources are delivered through its own Colorado River Aqueduct (CRA) and the California Aqueduct, under contract with the State Water Project (SWP). To enhance its reliability of its imported water, MET has implemented many programs such as canal lining and transfers of agricultural water, land fallowing programs with irrigation districts, water banking programs, and use of its storage reservoirs.

Local and imported water sources in Orange County are managed in such a way that they complement each other. For example, during wet and normal years additional MET water is purchased for groundwater replenishment in the Orange County Basin. During dry and drought years, when imported water is more limited, more groundwater can be produced to meet Orange County water demands. This coordinated management of water supplies has resulted in reliable water service even during multi-year droughts. Based on the water supply assessment described in this chapter and in Chapter 7, the Orange County region will continue to receive a reliable water supply through the next 25 years.

Specifically, this chapter includes: (1) descriptions of each water supply source and their management; (2) quantification of water supply sources through 2050 under normal, dry, and multi-dry weather conditions; (3) opportunities for exchanges and transfers; and (4) discussion regarding any planned or potential future water supply projects. This chapter also includes the energy intensity of the water service.

6.1 Water Supply Overview

Mesa Water meets all of its potable water demands with local groundwater. Mesa Water works together with the Municipal Water District of Orange County (MWDOC) and OCWD to ensure a safe and reliable water supply that will continue to serve the community in periods of average, dry and drought hydrologic conditions. MWDOC is the Orange County wholesaler of imported water and one of MET's 26 member agencies. MET's imported water is delivered from the California SWP and MET's CRA to Southern California. If Mesa Water needs imported water to supplement its local groundwater supplies, Mesa Water can purchase imported water through MWDOC.

Local supplies developed by other entities and retail agencies include groundwater, recycled water, and surface water. Local sources presently account for 100 percent of Mesa Water's water supplies, whereby groundwater is the major source of local supply. The primary source of groundwater originates from the

Orange County Basin (OC Basin), which is located in the middle portion of MWDOC's service area and is managed by OCWD. The GWRS is a joint project between OCWD and the Orange County Sanitation District (OC San). Using advanced treatment, recycled wastewater is transformed into a high-quality water supply for groundwater replenishment.

Mesa Water's main source of water supply is groundwater from the OC Basin. Recycled water makes up the rest of Mesa Water's water supply portfolio. In Fiscal Year (FY) 2024-25, Mesa Water used 100 percent local water supplies, relying on 94 percent groundwater and 6 percent recycled water (Table 6.1). Imported water is available as an emergency backup or supplemental supply, however Mesa has met all of its potable water demands with local groundwater. Imported water supply has not been a significant supply source for Mesa Water since 2013. In FY 2018, Mesa Water accepted MET water "in lieu" of pumping groundwater to help MET clear space in its reservoirs for snowmelt.

In 2025, MWDOC developed a water demand forecast model for its participating water agencies that statistically correlates municipal and industrial (M&I) water use with demographic, socioeconomic, conservation and weather variables—as reported in the 2025 Orange County Water Demand Projection Model Technical Memorandum (TM) (MWDOC, 2025). Because the model isolates weather, future water demand projects can be estimated under single and multiple-year droughts and under future climate change scenarios.

It is projected that by 2050, Mesa Water's water portfolio be approximately 94 percent groundwater and 6 percent recycled water (Table 6.2 and Figure 6.1). It should be noted that these representations of supply match the projected demand. Note that the GWRS supplies are included as part of groundwater pumping numbers.

The following subsections provide a detailed discussion of Mesa Water's water sources as well as the future water supply portfolio for the next 25 years.

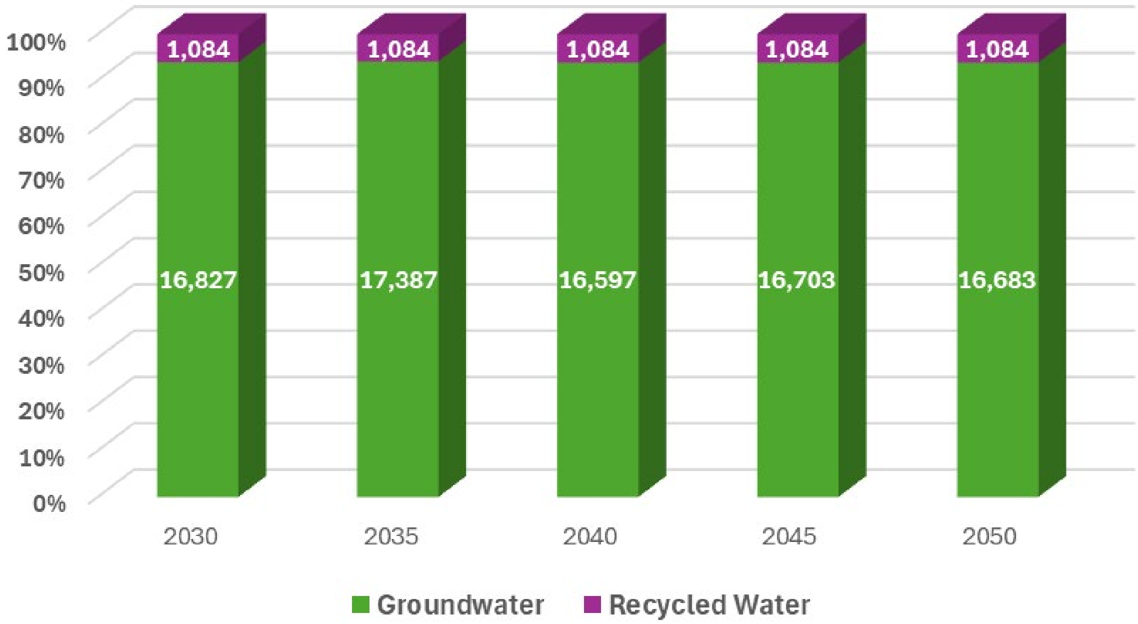


Figure 6.1 Projected Water Supply

Table 6.1 Submittal Table 6-8 Retail: Water Supplies – 2025 Actual

Submittal Table 6-8 Retail: Water Supplies — 2025 Actual Water Code Section 10631(b)			
Water Supply	Additional Description	2025	
		Water Type (after treatment if treated)	**Actual Volume** (AF)
Groundwater (not desalinated)	Orange County Groundwater Basin	Potable	15,667
Recycled Water	OCWD	Non-Potable	847
		Subtotal Potable	15,667
		Subtotal Non-Potable	847
		Total	16,515
NOTES: Sources - MWDOC, 2025 for groundwater, Mesa Water District for recycled water.			

Table 6.2 Submittal Table 6-9 Retail: Water Supplies – Projected

Submittal Table 6-9 Retail: Water Supplies — Projected
Water Code Section 10631 (b)

Water Supply	Additional Detail on Water Supply	**Water Type** (after treatment if treated)	**Projected Water Supply (Report to the Extent Practicable)**				
			2030	**2035**	**2040**	**2045**	**2050 (opt)**
			Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
			(AF)	(AF)	(AF)	(AF)	(AF)
Groundwater (not desalinated)	Orange County Groundwater Basin	Potable	16,827	17,387	16,597	16,703	16,683
Recycled Water	OCWD	Non-Potable	1,084	1,084	1,084	1,084	1,084
		Subtotal Potable	16,827	17,387	16,597	16,703	16,683
		Subtotal Non-Potable	1,084	1,084	1,084	1,084	1,084
		Total	17,911	18,471	17,681	17,787	17,767

NOTES: Sources – Mesa Water CIP for groundwater projections through 2035, MWDOC, 2025 for groundwater projections from 2040 through 2050, Mesa Water, 2026 for recycled water.

6.2 Imported Water

If needed, Mesa Water can supplement its water supply with imported water purchased from MET through MWDOC. In FY 2024-25, Mesa Water relied on no imported water to meet its demands.

MET's two principal sources of water are the Colorado River and the SWP. MET receives water from the Colorado River through the CRA and from the SWP through the California Aqueduct. For Orange County, the water obtained from these sources is treated at the Robert B. Diemer Filtration Plant located in Yorba Linda. Typically, the Diemer Filtration Plant receives a blend of Colorado River water from Lake Mathews through the MET Lower Feeder and SWP water through the Yorba Linda Feeder.

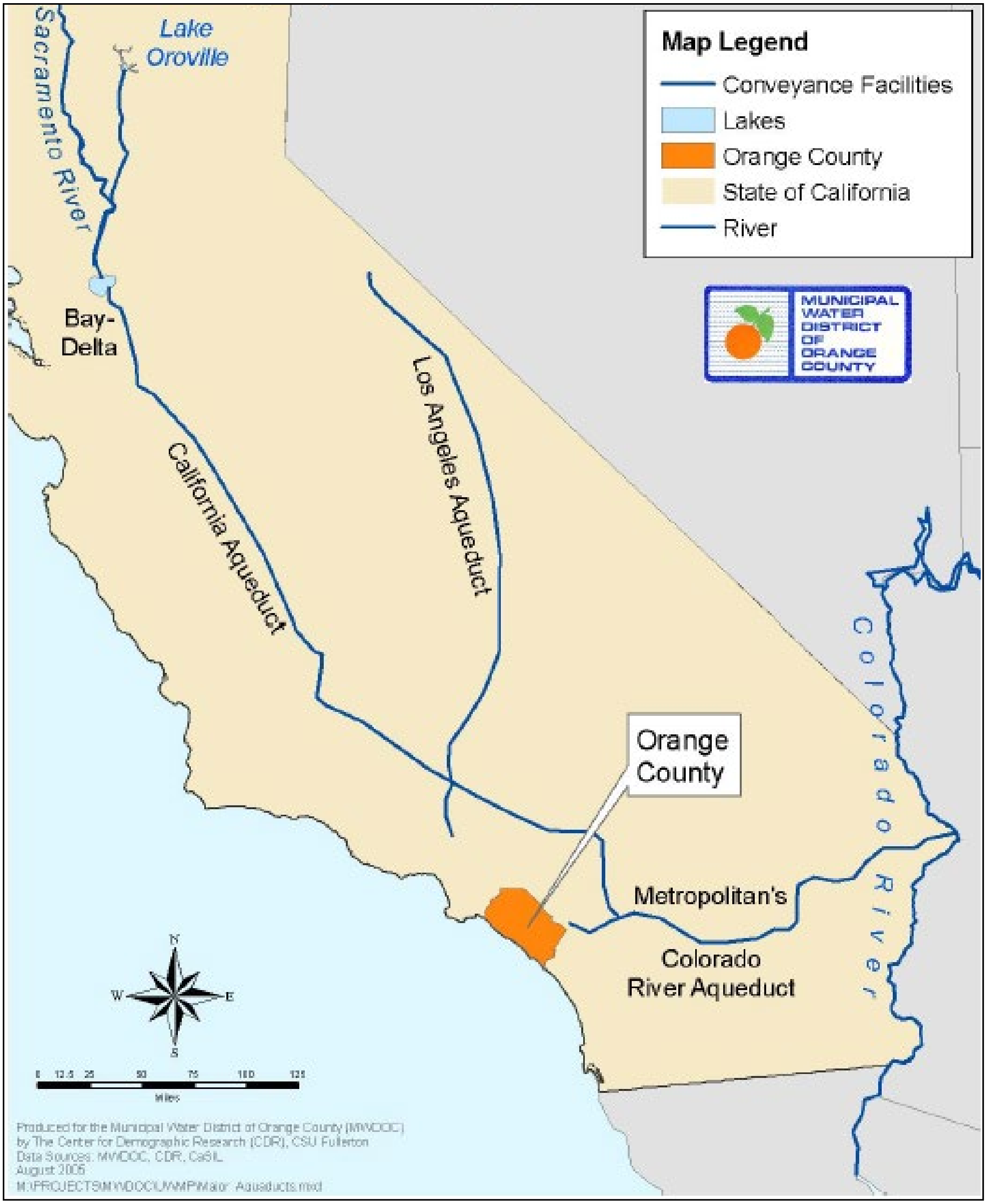
6.2.1 Metropolitan Water District of Southern California

MET is the largest water wholesaler in California, serving approximately 19 million customers in a 5,200 square mile service area. MET wholesales imported water supplies to 26 member agencies located in the six southern California counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura.

MET is governed by a Board of Directors comprised of 38 appointed individuals with a minimum of one representative from each of MET's 26 member agencies. The allocation of directors and voting rights is determined by each agency's assessed valuation. Each member of the Board is entitled to cast one vote for each ten million dollars of assessed valuation of property taxable for district purposes, in accordance with Section 55 of the Metropolitan Water District Act. Directors may be appointed by the chief executive officer of the member agency or by a majority vote of the agency's governing board. Directors are not compensated by MET for their service (The Metropolitan Water District Act, 1969).

MET is responsible for importing water into the region through its operation of the CRA, which brings Colorado River supply to its service area, and its SWP contract, which brings water from northern California via the California Aqueduct. MET supplements its direct deliveries of imported supplies with its storage reservoirs, water transfers, agricultural irrigation water conservation, and water banking programs. Major imported water aqueducts bringing water to southern California are shown in Figure 6.2. The Los Angeles Aqueduct, shown in the figure, is owned and operated by the Los Angeles Department of Water and Power, and not part of MET's imported water supplies. Member agencies receive water from MET through various delivery points and pay for service through a rate structure comprising volumetric rates, capacity charges, and readiness-to-serve charges. Member agencies provide MET with estimates of imported water demand in April each year, indicating the amount of water they anticipate they will need to meet their demands over the next five years.

MWDOC purchases both treated potable and untreated water from MET to supplement its retail agencies' local water supplies and for groundwater replenishment. Figure 6.3 illustrates the MET feeders and major transmission pipelines that deliver water within Orange County.



Produced for the Municipal Water District of Orange County (MWDOC)
by The Center for Demographic Research (CDR), CSU Fullerton
Data Sources: MWDOC, CDR, CaSIL
August 2005
M:\PROJECTS\MWDOC\UWMP\Major Aqueducts.mxd

Figure 6.2 Major Aqueducts that Supply Imported Water to Southern California (MET, 2025)

Figure 6.3 MET Feeders and Transmission Mains that Serve Orange County

6.2.2 Colorado River Aqueduct

6.2.2.1 Background

The Colorado River was MET's original source of water after MET's establishment in 1928. The original founding members created MET with the goal to build the CRA to bring water to Southern California. The CRA, which is owned and operated by MET, transports water from the Colorado River to its terminus Lake Mathews, in Riverside County. The actual amount of water per year that may be conveyed through the CRA to MET's member agencies is subject to the availability of Colorado River water. Approximately 40 million people rely on the Colorado River and its tributaries for potable water with 5.5 million acres of land using Colorado River water for irrigation. The CRA includes supplies from the implementation of the Quantification Settlement Agreement (QSA) and its related agreements to transfer water from agricultural agencies to urban uses. The 2003 QSA enabled California to implement major Colorado River water conservation and transfer programs to stabilize water supplies and reduce the state's demand on the river to its 4.4 million acre-feet (MAF) entitlement. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis. Water from the Colorado River or its tributaries is available to users in California, Arizona, Colorado, Nevada, New Mexico, Utah, Wyoming, and Mexico. California is apportioned the use of 4.4 MAF of water from the Colorado River each year plus one-half of any surplus that may be available for use collectively in Arizona, California, and Nevada. In addition, California has historically been allowed to use Colorado River water apportioned to, but not used by, Arizona or Nevada. MET has fourth-priority rights, with a basic entitlement of 550,000 acre-feet per year (AFY) of Colorado River water, plus surplus water up to an additional 662,000 AFY when the following conditions exist (MET, 2025):

- Water is unused by the California holders of priorities 1 through 3.
- Water is saved by the Palo Verde land management, crop rotation, and water supply program.
- When the U.S. Secretary of the Interior makes available either one or both of the following:
  - Surplus water.
  - Colorado River water that is apportioned to but unused by Arizona and/or Nevada.

6.2.2.2 Current Conditions and Supply

The Colorado River supply faces current and future imbalances between water supply and demand in the Colorado River Basin due to reductions in snowpack, long-term drought conditions, and climate change. The last 25-year period has been called a megadrought, with Lake Mead's elevation dropping from a high of 1,215 feet in 2000 to its lowest level of 1,040 feet in July 2022. While extreme wet conditions resulted in lake levels exceeding 1,077 feet in February 2024, levels have been persistently hovering around 1,057 feet since May of 2025. The United States Bureau of Reclamation (USBR) projects that there is a 53 percent likelihood that Lake Mead elevation could fall below 1,035 feet, which would trigger water shortages for MET under the current operating guidelines. As of August 2025, Lake Mead storage was approximately 31 percent of capacity per USBR's 24-Month Study, which also projected continued Lower Basin shortage conditions in 2026 (MET, 2025).

The current operating guidelines for the Colorado River expire at the end of 2026, and a new, long-term operating plan must be in place by November 2026 to manage the river's water supply. The ongoing Colorado River allocation negotiations are focused on creating a post-2026 operating plan, with states and the federal government aiming for consensus on how to manage the river's declining water supply due to the severe, prolonged drought in the Colorado River Basin. The drought on the Colorado River began around 2000 and has continued, in various degrees of severity, for over two decades, making it a historic megadrought that has significantly reduced water flow into the river and lowered water levels in reservoirs like Lake Powell and Lake Mead. Although some periods, like the wet winter of 2023, brought temporary relief with increased snowfall, they were not enough to fully replenish the system or overcome the prolonged lack of water and effects of climate change, such as aridification and increased evaporation according to the United States Geological Survey (USGS) 2024. Under the 2007 Interim Guidelines, together with the Lower Basin Drought Contingency Plan (2019), the Intentionally Created Surplus (ICS) program has allowed MET to store conserved water in Lake Mead for subsequent recovery; these frameworks sunset with the Guidelines at the end of 2026 and are expected to be addressed in the post-2026 rules (MET, 2025).

The USBR, which is part of the U.S. Department of the Interior, is the federal agency leading the negotiations and responsible for managing the river system. The ongoing Colorado River negotiations aim to find a fair and sustainable way to allocate the available water, which is significantly less than in the past. Talks are centering on a "natural flow" proposal that divides water based on current river conditions, rather than historical allocations. However, states remain at odds over how much water to allocate to the Upper and Lower Basins, with the federal government planning to impose its own plan if an agreement is not reached by the November 2026 deadline. Some key challenges that remain to be resolved are the different interests of the Upper Basin states (Colorado, Utah, Wyoming, New Mexico) and the Lower Basin states (California, Arizona, Nevada) to reach consensus on how much water the Upper Basin should send downstream. In addition, Tribal nations are also seeking recognition of their rights and a role in the future management of the river. Given MET's junior priority status within California's Colorado River priority system, reductions to MET's supplies are a possibility under future operating criteria; MET's planning reflects this risk (MET, 2025).

Consistent with MET's 2025 Urban Water Management Plan (UWMP), supply capability planning uses USBR's August 2023 Colorado River Simulation System assumptions, including a climate-adjusted flow reduction factor of approximately 9.3 percent per 1°C of warming over the planning horizon (2025-2050). MET continues to utilize supply, storage, transfer, and conservation programs, including ICS participation under the current Guidelines, to manage risk and buffer shortages. In addition, conserved QSA-related transfer water delivered at Lake Havasu (including Imperial Irrigation District and canal-lining exchanges) is categorized in MET's 2025 UWMP as Colorado River imported supply (previously treated as local supply), aligning accounting with current practice (MET, 2025).

6.2.2.3 MET Colorado River Current Programs

Over the years, MET has helped fund and implement various programs to improve Colorado River supply reliability and help resolve the imbalance between supply and demand. Implementation of such programs has contributed to achievements such as a record-low diversion of the Colorado River in 2019, a level not seen since the 1950s. Colorado River water management programs include:

- **Imperial Irrigation District / MET Conservation Program** – Under agreements executed in 1988 and 1989, this program allows MET to fund water efficiency improvements within Imperial Irrigation District's service area in return for the right to divert the water conserved by those investments. An average of 105,000 AFY of water has been conserved since the program's implementation.

- **Palo Verde Land Management, Crop Rotation, and Water Supply Program** – Authorized in 2004, this 35-year program allows MET to pay participating farmers to reduce their water use, and for MET to receive the saved water. Over the life of the program, an average of 84,500 AFY has been saved and made available to MET.
- **Bard Seasonal Fallowing Program** – Authorized in 2019, and subsequently expanded, this program allows MET to pay participating farmers in Bard to reduce their water use between the late spring and summer months of selected year. Under expanded program authorizations through 2026 (Quechan Seasonal Fallowing Program), this program can provide up to approximately 12,000 AFY in certain years.
- **Management of MET-Owned Land in Palo Verde** – Since 2001, MET has acquired approximately 21,000 acres of irrigable farmland that are leased to growers, with incentives to grow low water-using crops and experiment with low water-consumption practices. MET continues to evaluate opportunities to formally account for verified long-term water savings associated with these lands as part of its Colorado River supply reliability strategy.
- **Southern Nevada Water Authority (SNWA) and MET Storage and Interstate Release Agreement** – Entered in 2004, this agreement allows SNWA to store its unused, conserved water with MET, in exchange for MET to receive additional Colorado River water supply. MET has relied on the additional water during dry years, especially during the 2011-2016 California drought, and SNWA is not expected to call upon MET to return water until after 2026.
- **Lower Colorado Water Supply Projects** – Authorized in 1980s, this project provides up to 10,000 AFY of water to certain entities that do not have or have insufficient rights to use Colorado River water. A contract executed in 2007 allowed MET to receive project water left unused by the project contractors along the River – nearly 10,000 acre-feet (AF) were received in recent years when unused supplies were available.
- **Exchange Programs** – MET is involved in separate exchange programs with the USBR, which takes place at the Colorado River Intake and with San Diego County Water Authority (SDCWA), which exchanges conserved Colorado River water.
- **Lake Mead Storage Program** – Executed in 2006 and subsequently integrated with Lower Basin Drought Contingency Plan (DCP) operations, MET may intentionally leave conserved water in Lake Mead for exclusive future use. MET has significantly expanded its use of ICS storage in recent years, including record storage creation (450,000 AF) in 2023 under DCP-related conservation programs.
- **Quagga Mussel Control Program** – Developed in 2007, this program introduced surveillance activities and control measures to combat quagga mussels, an invasive species that impact the Colorado River’s water quality.
- **Lower Basin Drought Contingency Plan** – Signed in 2019, this agreement incentivizes storage in Lake Mead through 2026 and overall, it increases MET’s flexibility to fill the CRA as needed (MET, 2025).
- **Lower Basin Conservation and System Efficiency Programs** – In recent years, MET has participated in new, multi-agency conservation and system efficiency programs implemented between 2023 and 2026. These programs incentivize agricultural conservation, system efficiency improvements, urban conservation, and groundwater storage in the Lower Colorado River Basin, with the goal of

reducing system demands and increasing storage in Lake Mead during critically dry conditions. This includes programs such as the Quechan Diversion Forbearance program.

The Colorado River faces long-term challenges of water demands exceeding available supply with additional uncertainties due to climate change. Climate change impacts expected in the Colorado River Basin include the following:

- More frequent, more intense, and longer lasting droughts, which will result in water deficits.
- Continued dryness in the Colorado River Basin, which will increase the likelihood of triggering a first-ever shortage in the Lower Basin.
- Increased temperatures, which will affect the percentage of precipitation that falls as rain or snow, as well as the amount and timing of mountain snowpack (MET, 2025).

Given these uncertainties, MET plans to continue implementing and expanding Colorado River conservation, storage, exchange, and transfer programs, while also supporting increased water recycling and system efficiency improvements within the Colorado River Basin. MET continues to evaluate additional transfer and conservation opportunities to further enhance regional supply reliability through the 2025 UWMP planning horizon.

6.2.3 State Water Project

6.2.3.1 Background

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by California Department of Water Resources (DWR) and is an integral part of the effort to ensure that business and industry, urban and suburban residents, and farmers throughout much of California have sufficient water. Water from the SWP originates at Lake Oroville, which is located on the Feather River in Northern California. Much of the SWP water supply passes through the Sacramento-San Joaquin Delta (Delta). The SWP is the largest state-built, multipurpose, user-financed water project in the United States. Nearly two-thirds of residents in California receive at least part of their water from the SWP, with approximately 70 percent of SWP’s contracted water supply going to urban users and 30 percent to agricultural users. The primary purpose of the SWP is to divert and store water during wet periods in Northern and Central California and distribute it to areas of need in Northern California, the San Francisco Bay area, the San Joaquin Valley, the Central Coast, and Southern California (MET, 2025).

The Delta is key to the SWP’s ability to deliver water to its agricultural and urban contractors. All but five of the 29 SWP contractors receive water deliveries below the Delta (pumped via the Harvey O. Banks or Barker Slough pumping plants). However, the Delta faces many challenges concerning its long-term sustainability, such as climate change posing a threat of increased variability in floods and droughts. Sea level rise complicates efforts in managing salinity levels and preserving water quality in the Delta to ensure a suitable water supply for urban and agricultural use. Furthermore, other challenges include continued subsidence of Delta islands, many of which are already below sea level, and the related threat of catastrophic levee failure as water pressure increases or following a major seismic event.

In May 2019, DWR withdrew its permit for the two-tunnel WaterFix project in favor of a smaller one-tunnel project alternative. In July 2022, the draft Environmental Impact Report (EIR) for the recommended Delta Conveyance Project alternative was issued, with the project potentially operational by 2040, though its implementation faces strong opposition by environmental organizations and other interests in the Delta. The maximum value of the Delta Conveyance Project, when coupled with 250,000 AF of new regional storage, is estimated to be 367,000 AFY for MET and 63,000 AFY for Orange County. The Delta Conveyance Project also reduces the probability that any shortage occurs by about 10 percent, meaning a doubling of the time between shortage conditions from once every 5 years to once every decade (MWDOC, 2023).

6.2.3.2 Current Conditions and Supply

Just like the Colorado River, the amount of water that can be delivered from the SWP to its 29 contractors varies annually based on hydrology and reservoir storage along the SWP. The DWR publishes the maximum entitlement of SWP water for each water contracting agency in "Table A." DWR sets these allocations to balance the needs for human health and safety, agricultural, and municipal water, considering factors like reservoir storage, runoff forecasts, and Endangered Species Act (ESA) requirements. The primary drivers that influence allocations are hydrologic conditions (precipitation and snowmelt) along with storage levels, especially in Lake Oroville. Actual deliveries typically average less than 50 percent of Table A due to hydrologic and regulatory constraints (MET, 2025). MET's actual annual allocations based on springtime Table A values for the past UWMP cycles are summarized in Table 6.3.

Table 6.3 MET SWP Program Capabilities

Year	Average Annual Table A Spring Allocation (MAF)
2015	0.38
2020	0.38
2025	0.96
Percent Change(1)	+252.6%

Notes:
(1) Percent change is between the years 2020 and 2025. Source: SWP Allocations 1996-2026.

SWP contractors may additionally receive Article 21 water on a short-term basis in addition to Table A water if requested. Article 21 of SWP contracts allows contractors to receive additional water deliveries only under specific conditions, generally during wet months of the year (December through March). Because a SWP contractor must have an immediate use for Article 21 supply or a place to store it outside of the SWP, there are few contractors like MET that can access such supplies (MET, 2025).

Carryover water is SWP water allocated to an SWP contractor and approved for delivery to the contractor in a given year but not used by the end of the year. The unused water is stored in the SWP's share of San Luis Reservoir, when space is available, for the contractor to use in the following year (MET, 2025).

Turnback pool water is Table A water that has been allocated to SWP contractors who have exceeded their demands. This water can then be purchased by another contractor depending on its availability (MET, 2025).

The following factors affect the ability to estimate existing and future water delivery reliability:

- **Water availability at the source:** Availability can be highly variable and depends on the amount and timing of rain and snow that fall in any given year. Generally, during a single dry year or two, surface and groundwater storage can supply most water deliveries, but multiple dry years can result in critically low water reserves. Fisheries issues can also restrict the operations of the export pumps even when water supplies are available.

- **Water rights with priority over the SWP:** Water users with prior water rights are assigned higher priority in DWR's modeling of the SWP's water delivery reliability, even ahead of SWP Table A water.
- **Climate change:** Mean temperatures are predicted to vary more significantly than previously expected. This change in climate is anticipated to bring warmer winter storms that result in less snowfall at lower elevations, reducing total snowpack. From historical data, DWR projects that by 2050, the Sierra snowpack will be reduced from its historical average by 25 to 40 percent. Increased precipitation as rain could result in a larger number of "rain-on-snow" events, causing snow to melt earlier in the year and over fewer days than historically, affecting the availability of water for pumping by the SWP during summer. Furthermore, water quality may be adversely affected due to the anticipated increase in wildfires. Rising sea levels may result in potential pumping cutbacks on the SWP and CVP. DWR's recent planning documents and the Draft 2025 DCR describe climate-adjusted "existing conditions" baselines and future scenarios used by agencies for UWMPs.
- **Regulatory restrictions on SWP Delta exports:** The federal Biological Opinions (BiOps) protect special-status species such as delta smelt and spring- and winter-run Chinook salmon and imposed substantial constraints on Delta water supply operations through requirements for Delta inflow and outflow and export pumping restrictions. Restrictions on SWP operations imposed by state and federal agencies contribute substantially to the challenge of accurately determining the SWP's water delivery reliability in any given year (DWR, [2020]b).
- **Ongoing environmental and policy planning efforts:** Following the 2019 withdrawal of WaterFix, DWR certified the Delta Conveyance Project Final EIR and approved the Bethany alignment in December 2023, a key modernization initiative for the SWP. EcoRestore and related habitat efforts continue to advance.
- **Delta levee failure:** The levees are vulnerable to failure because most original levees were simply built with soils dredged from nearby channels and were not engineered. A breach of one or more levees and island flooding could affect Delta water quality and SWP operations for several months. When islands are flooded, DWR may need to drastically decrease or even cease SWP Delta exports to evaluate damage caused by salinity in the Delta.

It can be concluded that the federal regulatory framework affecting the Bay-Delta's ecosystem, species, and water supply are constantly evolving by adapting to new scientific information, changing climate conditions, and legal challenges. This dynamic and complex regulatory landscape, along with hydrologic and storage conditions along the SWP, continues to result in water supply uncertainties that impact all SWP contractors, including MET, MWDOC, and its member agencies (MET, 2025).

6.2.3.3 SWP Programs/Plans

In the past five years, MET has updated and implemented planning, regulatory, infrastructure, and operational programs to improve the reliability of the SWP supplies while addressing environmental, seismic, and climate-related risks in the Delta and along the California Aqueduct. Key SWP programs and planning efforts include:

- **SWP BiOps and California Incidental Take Permit** – Updated federal BiOps and a California ITP issued in 2024 provide a new operating framework intended to improve flexibility and species protection. The 2025 MET UWMP characterizes the net reliability benefit at approximately +60,000 AFY relative to prior permits, subject to hydrologic and regulatory conditions.

- **Healthy Rivers and Landscapes (HRL) Voluntary Agreements** – MET supports the State's proposed Healthy Rivers and Landscapes program, which establishes a voluntary framework for improving Delta ecosystem conditions through coordinated flow contributions and habitat restoration projects. The HRL approach is intended to provide regulatory stability while supporting environmental objectives consistent with SWP operations.

6.2.4 Storage, Transfers, and Conveyance Programs

Storage is a major component of MET's dry year resource management strategy. MET's likelihood of having adequate supply capability to meet projected demands, without implementing its Water Supply Allocation Plan (WSAP) depends on its storage resources. Following a significant drawdown during the 2020-2022 drought, MET rebuilt storage as hydrologic conditions improved. By the end of 2023, MET had approximately 3.4 MAF of regional dry-year storage. Storage increased to 3.8 MAF by the end of 2024, with levels projected to reach approximately 3.9 MAF by the end of 2025. MET also maintains approximately 750 TAF of emergency storage dedicated to catastrophic supply interruption conditions, including a major seismic failure of the Delta levees.

In its 2025 UWMP, MET evaluates storage based on median starting storage at the beginning of each five-year increment, representing a 50 percent probability that actual storage will be higher or lower. This approach differs from earlier UWMPs, which relied on average storage assumptions, and provides a more conservative and realistic representation of storage availability. All storage capability values incorporate conveyance and recovery constraints associated with SWP terminal reservoirs, the CRA, and MET's in-region and out-of-region groundwater banking programs.

Lake Oroville continues to serve as the SWP's largest storage facility with a capacity of approximately 3.5 MAF. Water released from Oroville moves to the Feather River and then to the Sacramento River before being pumped south at the Harvey O. Banks pumping plant into the California Aqueduct. MET's storage portfolio includes surface reservoirs such as Diamond Valley Lake, Lake Mathews, and Lake Skinner; SWP terminal storage in San Luis Reservoir; groundwater banking programs including Semitropic, Arvin-Edison, the High Desert Water Bank, Kern Delta, and Mojave; and ICS storage in Lake Mead. These storage assets provide operational flexibility during dry years and help maintain supplies during extended droughts or emergency events.

MET endeavors to increase the reliability of water supplies through the development of flexible storage and transfer programs including groundwater storage (MET, 2025). These include:

- **Semitropic Storage Program:** The maximum storage capacity of the program is 350,000 AF, and the minimum and maximum annual yields available to MET are 34,700 AF and 236,200 AF, respectively. The specific amount of water MET can expect to store in and subsequently receive from the program depends on hydrologic conditions, any regulatory requirements restricting MET's ability to export water for storage and demands placed by other program participants. During wet years, MET has the discretion to use the program to store portions of its SWP supplies which are in excess, and during dry years, the Semitropic Water Storage District returns MET's previously stored water to MET by direct groundwater pump-in or by exchange of surface water supplies.

- **Arvin-Edison Storage Program:** The storage program is estimated to deliver 75,000 AF, and the specific amount of water MET can expect to store in and subsequently receive from the program depends on hydrologic conditions and any regulatory requirements restricting MET's ability to export water for storage. During wet years, MET has the discretion to use to program to store portions of its SWP supplies which are in excess, and during dry years, the Arvin-Edison Water Storage District returns MET's previously stored water to MET by direct groundwater pump-in or by exchange of surface water supplies.
- **Antelope Valley-East Kern (AVEK) Water Agency Exchange and Storage Program:** Under the exchange program, for every 2 AF MET receives, MET returns 1 AF back to AVEK, and MET will also be able to store up to 30,000 AF in the AVEK's groundwater basin, with a dry-year return capability of 10,000 AF.
- **High Desert Water Bank Program:** Developed in partnership with Antelope Valley-East Kern Water Agency, this regional groundwater banking program allows MET to store up to 280,000 AF of SWP Table A or other available supplies in the Antelope Valley groundwater basin. The program provides a put-and-take capability of up to approximately 70,000 AF per year, with infrastructure including monitoring and production wells, California Aqueduct turnouts, pipelines, recharge basins, and pump facilities. Phase 1 became operational in 2023, with full build-out expected by approximately 2030.
- **Kern-Delta Water District Storage Program:** This groundwater storage program has 250,000 AF of storage capacity, and water for storage can either be directly recharged into the groundwater basin or delivered to Kern-Delta Water District farmers in lieu of pumping groundwater. During dry years, the Kern-Delta Water District returns MET's previously stored water to MET by direct groundwater pump-in return or by exchange of surface water supplies.
- **Mojave Storage Program:** MET entered into a groundwater banking and exchange transfer agreement with Mojave Water Agency that allows for the cumulative storage of up to 390,000 AF. The agreement allows for MET to store water in an exchange account for later return.
- **Diamond Valley Lake to Rialto Pipeline** – Planned for completion in 2028, this project creates new conveyance that improves the ability to move non-SWP supplies (120 cubic feet per second (cfs), including CRA and banked water) into areas historically dependent on SWP deliveries, increasing drought and seismic resilience.
- **Sepulveda Feeder Pump Stations (Stage 1)** – This program includes pumping improvements that expand westward movement of CRA/SWP/banked supplies across service areas to address localized system constraints. Pumping capacity is expected to be 30 cfs upon completion of Stage 1 in 2027.
- **Richvale & Western Canal Water Transfers** – These multi-year transfer options will provide supplemental dry-year supplies when available, with volumes up to approximately 54,000 AF (2025-2027).
- **Yuba Accord Extension** – This project is a continuation of an established dry year transfer program from the Yuba watershed that can be accessed subject to hydrologic and regulatory conditions. As of 2025, the extension is under negotiation for approximately 250,000 AFY in supply.
- **San Bernardino Valley MWD Surplus SWP Program** – Programmatic access to surplus SWP supplies (approximately 13,0000 AFY) will be available from SBVMWD under certain hydrologic and operational conditions.

6.2.5 Potential Future Water Projects

6.2.5.1 Climate Adaptation Master Plan for Water

In February 2023, the MET's Board directed its staff to integrate water resources planning, climate resilience planning, and financial planning into a *Climate Adaptation Master Plan for Water* (CAMP4W). Then a Joint Task Force of Board Members and Member Agency Managers was convened to facilitate the development of CAMP4W in a timely and transparent process. The main elements of CAMP4W include:

1. Identify climate and growth scenarios, building from analyses conducted for MET's *Integrated Resources Plan* (IRP);
2. Develop time-bound targets for new regional water supplies and system improvements;
3. Establish a framework for decision-making and annual reporting;
4. Form policies, initiatives, and partnerships; and
5. Evaluate business models and funding strategies

Because investments for regional supply reliability and system resilience are significant, it is important that decisions are made through an adaptive management process to avoid the risks associated with over-investment or under-performance. Tracking signposts and progress towards time-bound targets is therefore critical for CAMP4's annual reporting. Currently, regional projects being explored by MET include Pure Water Southern California, new reservoir storage in Southern California of up to 155,000 AFY, regional seawater desalination, and participation in California's Delta Conveyance Project. These projects will be scored against the following CAMP4W criteria: (1) reliability; (2) resilience; (3) financial; (4) adaptability/flexibility; (5) equity; and (6) environmental co-benefits.

Pure Water Southern California – The potential Pure Water Southern California program, a partnership with the Sanitation Districts, will purify wastewater that currently flows to the ocean to produce high quality recycled water. The purified water would be delivered to Metropolitan's member agencies to meet their groundwater replenishment and storage requirements. The 2025 MET UWMP does not include Pure Water yield in projected supplies (MET, 2025).

Sites Reservoir – This potential project includes a water storage reservoir of 1.5 MAF and would require the construction of two large dams up to 310 feet high and nine smaller saddle dams. The water stored in the reservoir, located north of Sacramento, would be diverted from the Sacramento River during high flow events and returned to the Sacramento River during dry and critical years, thereby providing additional dry-year water for environmental flows and project partners including SWP agencies south of the Delta. The current operations model estimates the annual water yield of the Sites Reservoir Project at approximately 270 TAF per year by 2032, when the Sites Reservoir Project is scheduled to be operational (MET, 2025). The 2025 MET UWMP does not include Sites Reservoir in projected supplies (MET, 2025).

Delta Conveyance Project – Following the withdrawal and termination of the California WaterFix project, the State advanced a new single-tunnel Delta Conveyance Project to address seismic risk, sea-level rise, extreme weather, and regulatory uncertainty while improving long-term SWP delivery reliability. The environmental review was completed in 2023 and DWR has approved the project. Potential yield used in planning analyses is on the order of approximately 400,000 AFY, but the 2025 MET UWMP does not include Delta Conveyance Project yield in projected supplies pending future milestones and contracting decisions (MET, 2025).

6.2.6 Supply Reliability within MET

MET's 2025 UWMP reports on its water reliability and identifies projected supplies to meet the long-term demand within its service area. The MET 2025 UWMP discusses the current water supply conditions and long-term plans for supply implementation and continued development of a diversified resource mix. It describes the programs being implemented, such as the CRA, SWP, Central Valley storage/transfer programs, water use efficiency programs, local resource projects, and in-region storage that will enable the region to meet its water supply needs. MET's 2025 UWMP also presents MET's supply capacities from 2025 through 2050 for average year, single dry year, five consecutive dry years, and more frequent and severe droughts, as specified in the UWMP Act.

Information concerning MET's UWMP, including the background, associated challenges, and long-term development of programs for each of MET's supply sources and capacities have been summarized and included in the following subsections. Additional information on MET can be found directly in MET's 2025 UWMP.

6.2.6.1 MET's Water Service Reliability Assessment Results

In MET's 2025 UWMP, MET evaluated supply reliability by projecting supply and demand under a normal year, single-dry year, and five-year consecutive dry years, based on conditions affecting the SWP (MET's largest and most variable supply). For this supply source, the average of historical years 1922-2021 most closely represents water supply conditions in a normal water year, the single driest year was 1977 and the five-year dry period was 1988-1992. The analyses also include Colorado River supplies under the same hydrological variations.

MET also incorporated the SWP and Colorado River's reliability factors, such as water quality objectives set by the SWRCB, BiOps, and amendments to the Coordinated Operations Agreement for the SWP and Quantification Settlement Agreements for the Colorado River into their assessment.

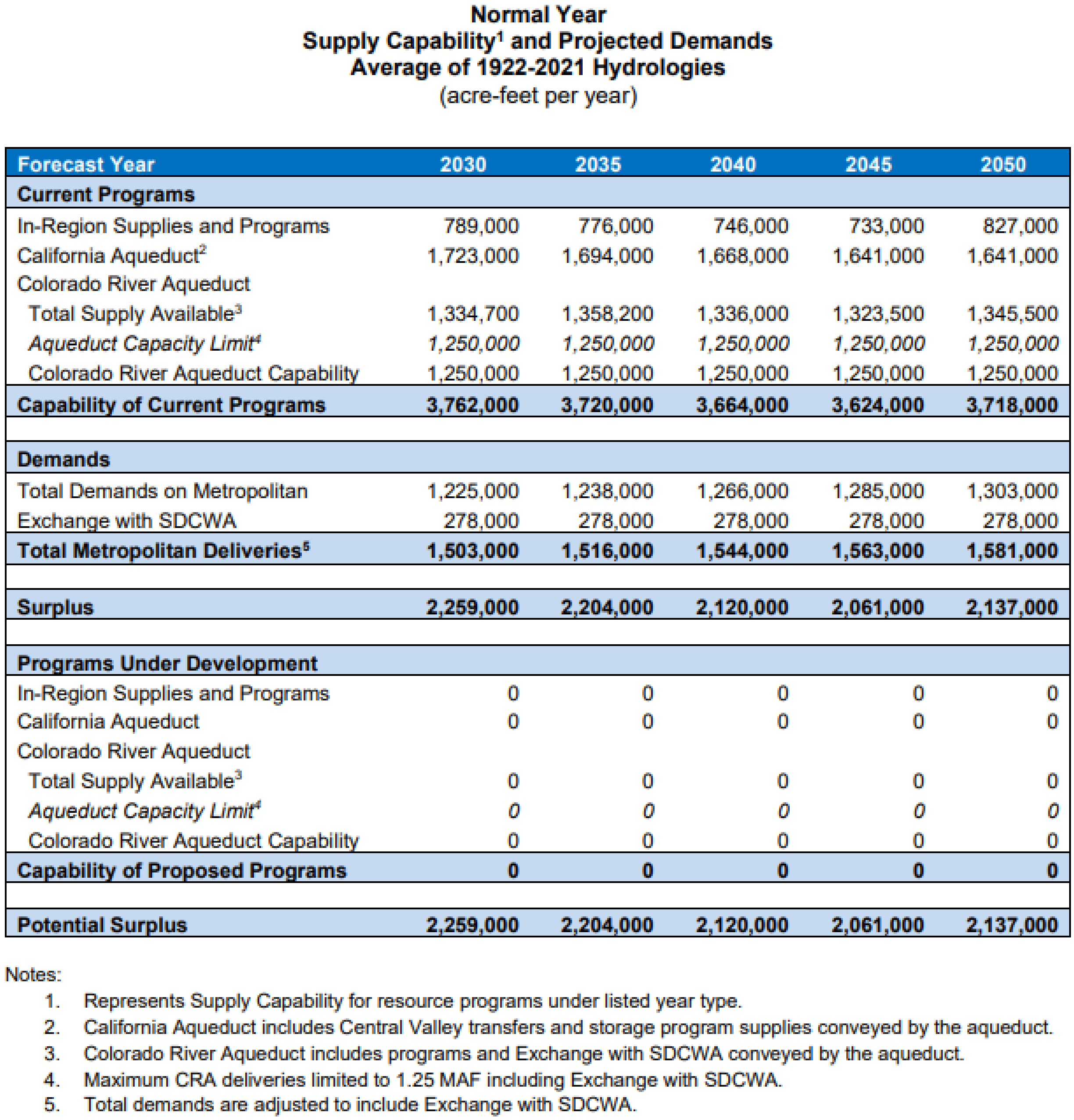
MET has concluded that the region can provide reliable water supplies under normal, single-dry, and five-year consecutive dry conditions (Table 6.4, Table 6.5, Table 6.6, respectively).

In each of the following tables, "Current Programs" supplies include:

- In-Region Supplies and Programs:
  - Metropolitan Surface Storage (Diamond Valley Lake, Lake Mathews, Lake Skinner).
  - Flexible Storage in Castaic Lake and Perris Lake.
  - Groundwater Storage for Conjunctive Use.
- California Aqueduct (SWP), including Central Valley transfers and storage program supplies conveyed by the aqueduct.
- Colorado River Aqueduct, including deliveries, programs, and exchanges with SDCWA.

These supplies are impacted - typically reduced - by the single dry year and multiple dry year scenarios. Though demands increase in these drought conditions, MET projects reliable supply, even surplus, through 2050. MWDOC is a MET member agency, and MET's projections take into account the imported demands from Orange County. As so, MET's water reliability assessments are used to determine that demands within MWDOC can be met for all three hydrological conditions.

Table 6.4 MET's Projected Supply Capability and Demands Through 2050 for a Normal Year



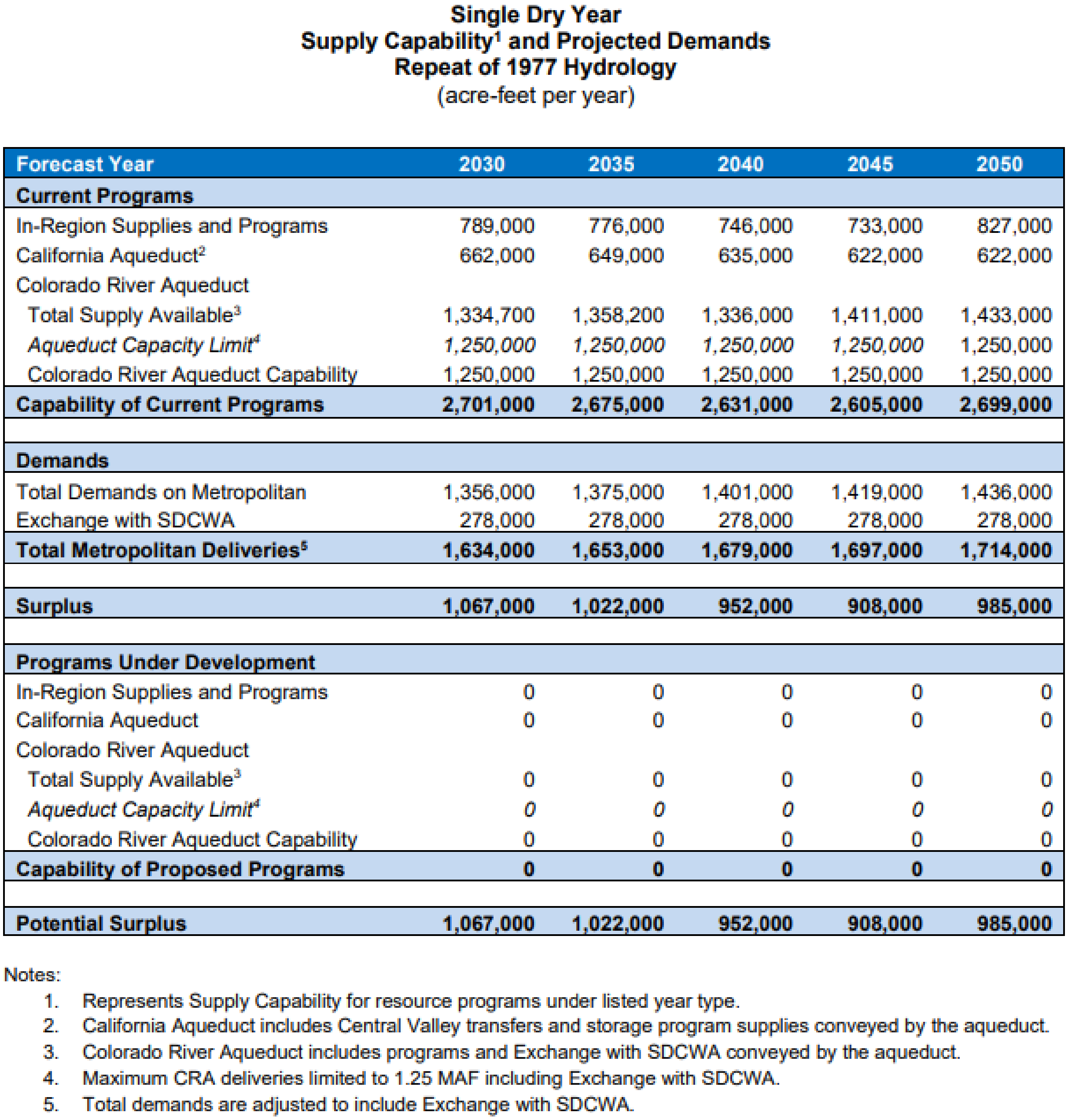
Normal Year
Supply Capability[1] and Projected Demands
Average of 1922-2021 Hydrologies
(acre-feet per year)

Forecast Year	2030	2035	2040	2045	2050
Current Programs					
In-Region Supplies and Programs	789,000	776,000	746,000	733,000	827,000
California Aqueduct[2]	1,723,000	1,694,000	1,668,000	1,641,000	1,641,000
Colorado River Aqueduct					
Total Supply Available[3]	1,334,700	1,358,200	1,336,000	1,323,500	1,345,500
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**3,762,000**	**3,720,000**	**3,664,000**	**3,624,000**	**3,718,000**
Demands					
Total Demands on Metropolitan	1,225,000	1,238,000	1,266,000	1,285,000	1,303,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,503,000**	**1,516,000**	**1,544,000**	**1,563,000**	**1,581,000**
Surplus	**2,259,000**	**2,204,000**	**2,120,000**	**2,061,000**	**2,137,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**2,259,000**	**2,204,000**	**2,120,000**	**2,061,000**	**2,137,000**

Notes:

1. Represents Supply Capability for resource programs under listed year type.
2. California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
3. Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
4. Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
5. Total demands are adjusted to include Exchange with SDCWA.

Table 6.5 MET's Projected Supply Capability and Demands Through 2050 for a Single Dry Year



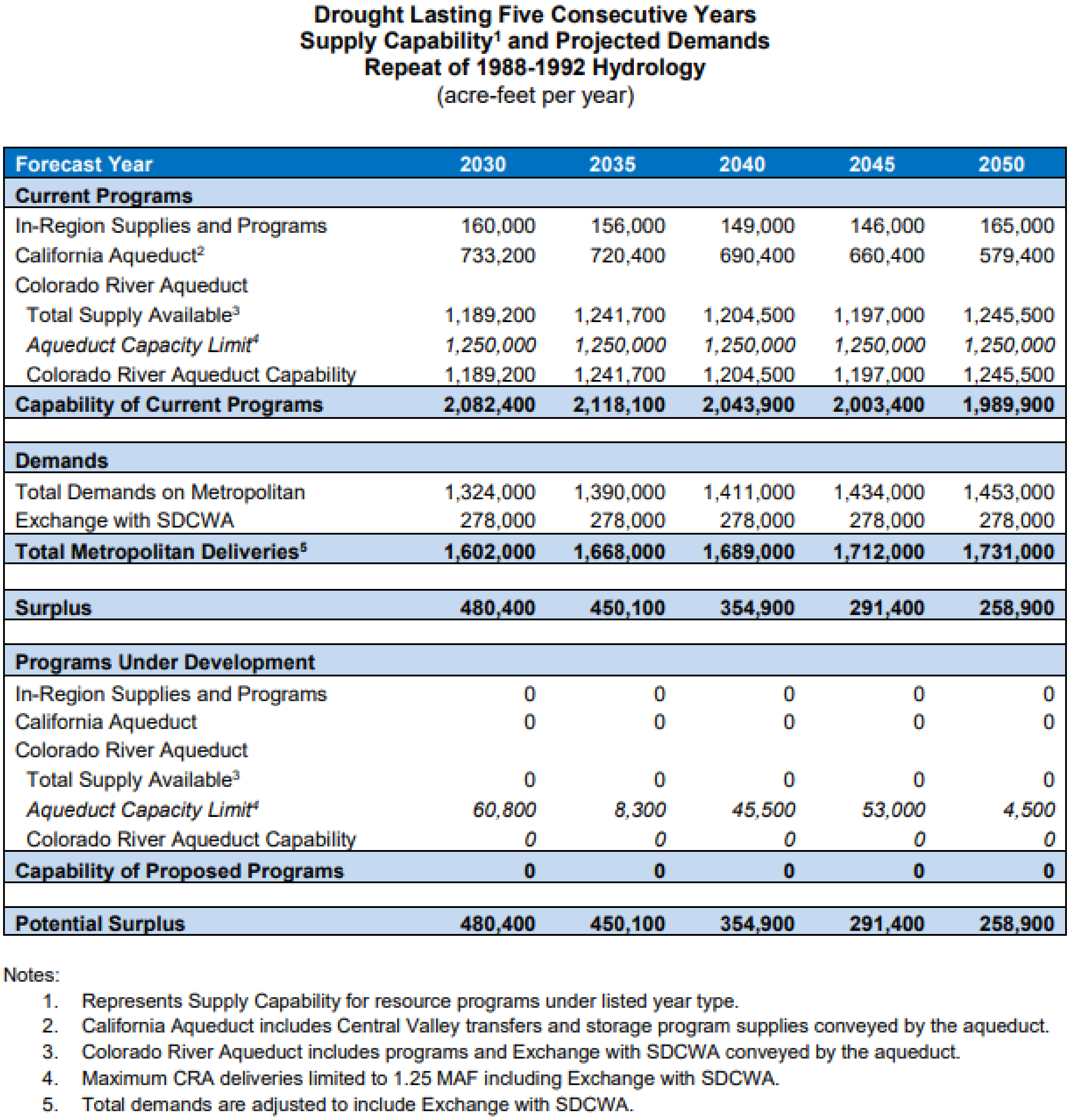
Single Dry Year
Supply Capability[1] and Projected Demands
Repeat of 1977 Hydrology
(acre-feet per year)

Forecast Year	2030	2035	2040	2045	2050
Current Programs					
In-Region Supplies and Programs	789,000	776,000	746,000	733,000	827,000
California Aqueduct[2]	662,000	649,000	635,000	622,000	622,000
Colorado River Aqueduct					
Total Supply Available[3]	1,334,700	1,358,200	1,336,000	1,411,000	1,433,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	1,250,000
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,701,000**	**2,675,000**	**2,631,000**	**2,605,000**	**2,699,000**
Demands					
Total Demands on Metropolitan	1,356,000	1,375,000	1,401,000	1,419,000	1,436,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,634,000**	**1,653,000**	**1,679,000**	**1,697,000**	**1,714,000**
Surplus	**1,067,000**	**1,022,000**	**952,000**	**908,000**	**985,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**1,067,000**	**1,022,000**	**952,000**	**908,000**	**985,000**

Notes:

1. Represents Supply Capability for resource programs under listed year type.
2. California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
3. Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
4. Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
5. Total demands are adjusted to include Exchange with SDCWA.

Table 6.6 MET's Projected Supply Capability and Demands Through 2050 for a Drought (5 Consecutive Water Years)



Drought Lasting Five Consecutive Years
Supply Capability[1] and Projected Demands
Repeat of 1988-1992 Hydrology
(acre-feet per year)

Forecast Year	2030	2035	2040	2045	2050
Current Programs					
In-Region Supplies and Programs	160,000	156,000	149,000	146,000	165,000
California Aqueduct[2]	733,200	720,400	690,400	660,400	579,400
Colorado River Aqueduct					
Total Supply Available[3]	1,189,200	1,241,700	1,204,500	1,197,000	1,245,500
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,189,200	1,241,700	1,204,500	1,197,000	1,245,500
Capability of Current Programs	**2,082,400**	**2,118,100**	**2,043,900**	**2,003,400**	**1,989,900**
Demands					
Total Demands on Metropolitan	1,324,000	1,390,000	1,411,000	1,434,000	1,453,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,602,000**	**1,668,000**	**1,689,000**	**1,712,000**	**1,731,000**
Surplus	**480,400**	**450,100**	**354,900**	**291,400**	**258,900**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*60,800*	*8,300*	*45,500*	*53,000*	*4,500*
Colorado River Aqueduct Capability	*0*	*0*	*0*	*0*	*0*
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**480,400**	**450,100**	**354,900**	**291,400**	**258,900**

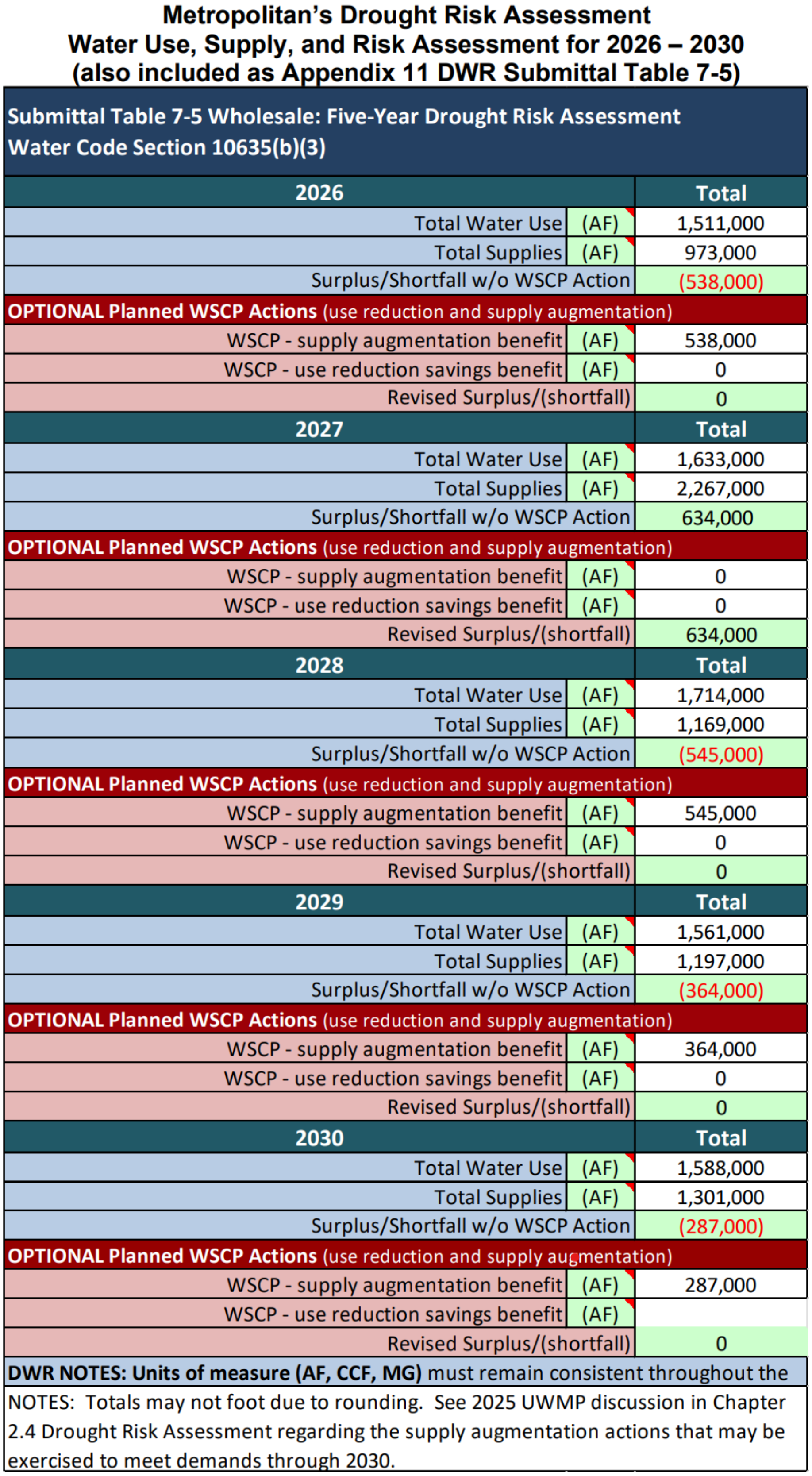
Notes:

1. Represents Supply Capability for resource programs under listed year type.
2. California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
3. Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
4. Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
5. Total demands are adjusted to include Exchange with SDCWA.

6.2.6.2 MET's Drought Risk Assessment Results

For its Drought Risk Assessment (DRA), MET assessed the reliability of each individual water supply source over the five-consecutive-year drought through a modeling method using the same historical hydrologic conditions as the water service reliability assessment: 1922 to 2021. MET used the five consecutive years of 1988 to 1992 to complete its DRA, because this represents the driest five-consecutive year historical sequence for MET's supply. Even without activating Water Shortage Contingency Plan (WSCP) actions, according to MET's 2025 UWMP Table 2-8, MET's water supply from the SWP and CRA can reliably meet the demands of a five-year drought from FY 2025-26 through FY 2029-30 (Table 6.7).

Table 6.7 MET's Water Use, Supply, and Drought Risk Assessment for 2026-2030



Metropolitan's Drought Risk Assessment
Water Use, Supply, and Risk Assessment for 2026 – 2030
(also included as Appendix 11 DWR Submittal Table 7-5)

Submittal Table 7-5 Wholesale: Five-Year Drought Risk Assessment
Water Code Section 10635(b)(3)

2026		**Total**
Total Water Use	(AF)	1,511,000
Total Supplies	(AF)	973,000
Surplus/Shortfall w/o WSCP Action		(538,000)
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	(AF)	538,000
WSCP - use reduction savings benefit	(AF)	0
Revised Surplus/(shortfall)		0
2027		**Total**
Total Water Use	(AF)	1,633,000
Total Supplies	(AF)	2,267,000
Surplus/Shortfall w/o WSCP Action		634,000
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	(AF)	0
WSCP - use reduction savings benefit	(AF)	0
Revised Surplus/(shortfall)		634,000
2028		**Total**
Total Water Use	(AF)	1,714,000
Total Supplies	(AF)	1,169,000
Surplus/Shortfall w/o WSCP Action		(545,000)
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	(AF)	545,000
WSCP - use reduction savings benefit	(AF)	0
Revised Surplus/(shortfall)		0
2029		**Total**
Total Water Use	(AF)	1,561,000
Total Supplies	(AF)	1,197,000
Surplus/Shortfall w/o WSCP Action		(364,000)
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	(AF)	364,000
WSCP - use reduction savings benefit	(AF)	0
Revised Surplus/(shortfall)		0
2030		**Total**
Total Water Use	(AF)	1,588,000
Total Supplies	(AF)	1,301,000
Surplus/Shortfall w/o WSCP Action		(287,000)
OPTIONAL Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit	(AF)	287,000
WSCP - use reduction savings benefit	(AF)	
Revised Surplus/(shortfall)		0

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the

NOTES: Totals may not foot due to rounding. See 2025 UWMP discussion in Chapter 2.4 Drought Risk Assessment regarding the supply augmentation actions that may be exercised to meet demands through 2030.

6.3 Local Groundwater

Among all local supplies available to Mesa Water's service area, groundwater supplies make up the majority, with the primary supply from the OC Basin. The water supply resources within Mesa Water's service area are enhanced by the existence of groundwater basins, which provide a reliable local source and, additionally, are used as reservoirs to store water during wet years and draw from storage during dry years. Table 6.8 shows a breakdown of historical groundwater production by Mesa Water.

Mesa Water pumps groundwater through seven active groundwater wells. Seven of these active wells pump "clear" groundwater directly into the distribution system, following disinfection with chloramines. Clear wells are subject to OCWD's Basin Production Percentage (BPP). Additionally, two wells that pump amber colored groundwater from a deeper aquifer are first treated at the Mesa Water Reliability Facility (MWRF). Treated groundwater is then pumped into the distribution system. This groundwater production is exempt from the Basin Equity Assessment (BEA), extra fees for pumping beyond the BPP. As of early 2026, Mesa Water wells are not affected by per and polyfluoroalkyl substances (PFAS).

This section describes the groundwater basin(s) used by Mesa Water and provides a 25-year projection of the service area's groundwater supply (Table 6.8).

Table 6.8 Submittal Table 6-1 Retail: Groundwater Pumped in Past 5 Years Within Mesa Water's Service Area (AF)

Submittal Table 6-1 Retail: Groundwater Volume Pumped Water Code Section 10631(4) and 10631(4)(c)							
Groundwater Type	Water Type (Potable/ Non-Potable)	Location or Basin Name	2021	2022	2023	2024	2025
			(AF)	(AF)	(AF)	(AF)	(AF)
Alluvial Basin		Orange County Groundwater Basin	16,551	16,326	14,778	14,860	15,667
		Total	16,551	16,326	14,778	14,860	15,667
NOTES: Source – MWDOC, 2025. These values include groundwater pumped from both clear wells and MWRF amber wells.							

6.3.1 Orange County Groundwater Basin

This section describes the OC Basin and the management measures taken by OCWD, the basin manager and member agency of MWDOC, to optimize local supply and minimize overdraft.

The OCWD was formed in 1933 by a special legislative act of the California State Legislature to protect and manage the County's vast, natural, groundwater supply using the best available technology and defend its water rights to the OC Basin. This legislation is found in the State of California Statutes, Water – Uncodified Acts, Act 5683, as amended. The OC Basin is managed by OCWD under the Act, which functions as a statutorily-imposed physical solution. The OCWD Management Area includes approximately 89 percent of the land area of the OC Basin, and 98 percent of all groundwater production occurs within the area. Approximately 2.5 million residents live within OCWD's boundaries and rely upon the basin for their primary water supply. OCWD manages water resource monitoring programs, land use elements related to basin management, groundwater elevation, groundwater quality, and coastal area monitoring through a number of monitoring programs. OCWD monitors the basin by collecting groundwater elevation and quality data from approximately 400 District-owned wells and manages an electronic database that stores water elevation, water quality, production, recharge, and other data on over 2,000 wells and facilities within and outside OCWD boundaries (OCWD, 2023). For detailed monitoring programs and management information, refer to the 2022 Basin 8-1 Alternative Plan (Appendix E).

Groundwater levels are managed within a safe basin operating range to protect the long-term sustainability of the OC Basin and to protect against land subsidence. OCWD, a member of agency of MWDOC, purchases untreated water from MET for basin recharge, as needed. In addition, OCWD regulates groundwater levels in the OC Basin by regulating the annual amount of pumping and setting the BPP for the water year. As defined in the District Act, the BPP is the ratio of water produced from groundwater supplies within the OCWD service area to all water produced within the area from both supplemental sources and groundwater within the OCWD (OCWD, 2020a). More information regarding the BPP is discussed in Section 6.3.1.3.

6.3.1.1 Basin Characteristics

The OC Basin underlies the northern half of Orange County beneath broad lowlands. The OC Basin, managed by OCWD, covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, and the Pacific Ocean to the southwest. The OC Basin boundary extends to the Orange County-Los Angeles Line to the northwest, where groundwater flows across the county line into the Central Groundwater Basin of Los Angeles County. A map of the OC Basin is shown on Figure 6.4. The total thickness of sedimentary rocks in the OC Basin is over 20,000 feet, with only the upper 2,000 to 4,000 feet containing fresh water. The OC Basin's estimated full storage volume is approximately 66 MAF.

There are three major aquifer systems that have been subdivided by OCWD, namely the:

- Shallow Aquifer System.
- Principal Aquifer System.
- Deep Aquifer System.

These three aquifer systems are hydraulically connected as groundwater can flow between each other through intervening aquitards or discontinuities in the aquitards. The Shallow Aquifer system occurs from the surface to approximately 250 feet below ground surface. Most of the groundwater from this aquifer system is pumped by small water systems for industrial and agricultural use. The Principal Aquifer system occurs at depths between 200 and 1,300 feet below ground surface. Over 90 percent of groundwater production is from wells that are screened within the Principal Aquifer system. Only a minor amount of groundwater is pumped from the Deep Aquifer system, which underlies the Principal Aquifer system and is up to 2,000 feet deep in the center of the OC Basin.

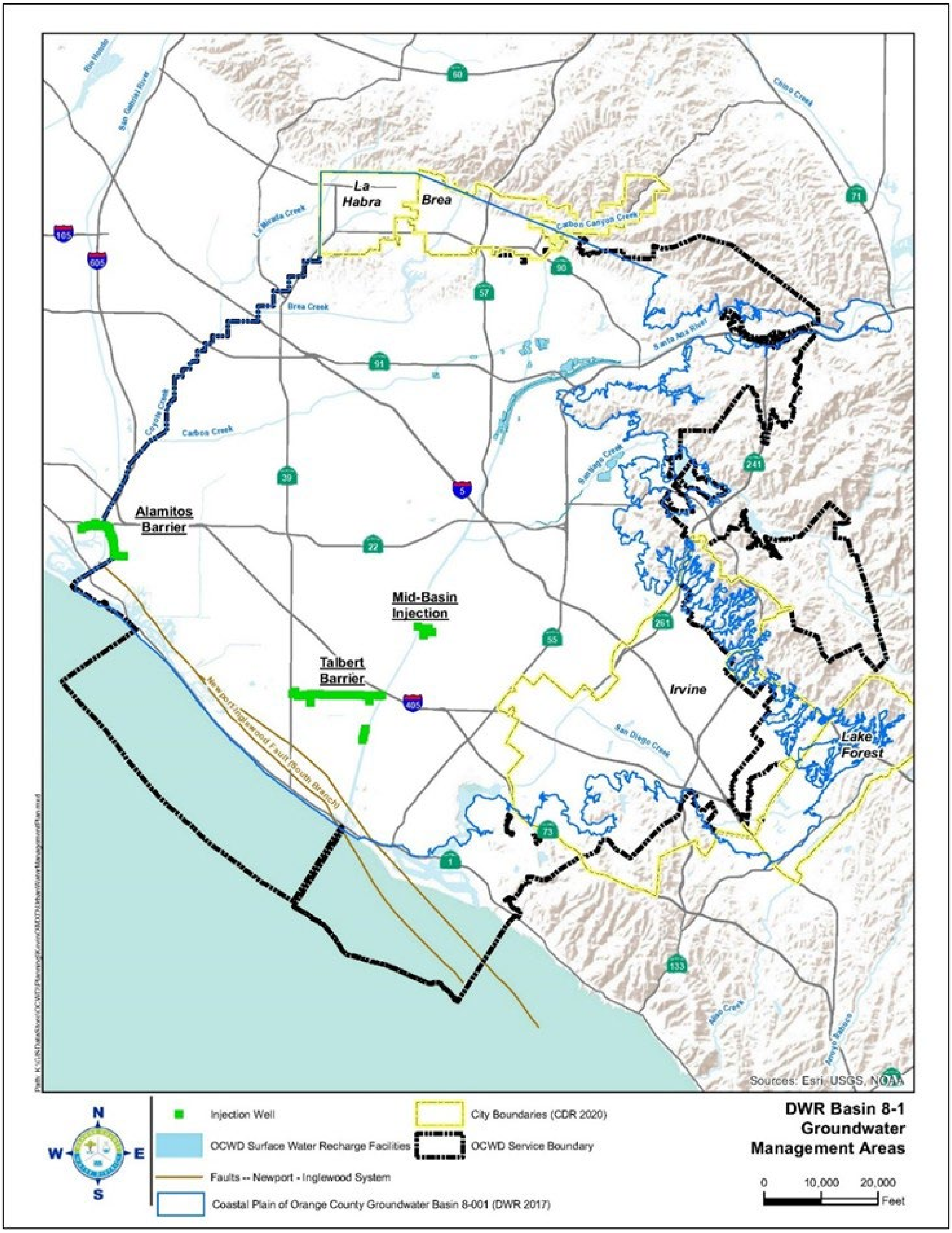


Figure 6.4 Map of the OC Basin (OCWD, 2022)

6.3.1.2 Sustainable Groundwater Management Act

In 2014, the State of California adopted the Sustainable Groundwater Management Act (SGMA) to promote sustainable groundwater management and limit "undesirable results" including significant groundwater-level declines, land subsidence, and water quality degradation. SGMA requires all high- and medium-priority basins, as designated by DWR, to be sustainably managed. DWR designated the Coastal Plain of Orange County Groundwater Basin (Basin 8-1) as a medium-priority basin, primarily due to heavy reliance on groundwater as a water supply source.

Compliance with SGMA can be achieved in one of the following two ways (OCWD, 2023):

1. Formation of a Groundwater Sustainability Agency (GSA) and adoption of a Groundwater Sustainability Plan (GSP).
2. Preparation of submittal of an Alternative to a GSP by eligible agencies, including special act districts such as OCWD.

Agencies within Basin 8-1, including OCWD, the City of La Habra, and the Irvine Ranch Water District (IRWD), collaborated to submit the original Alternative to a GSP in 2017, titled the "Basin 8-1 Alternative" to demonstrate compliance with SGMA. Under SGMA, alternatives and GSPs must be updated every 5-years. OCWD prepared its first periodic update in 2022

For the remainder of this report, when the term "OC Basin" is used, it refers to the portion of Basin 8-1 that is within OCWD's service area (see Figure 6.5).

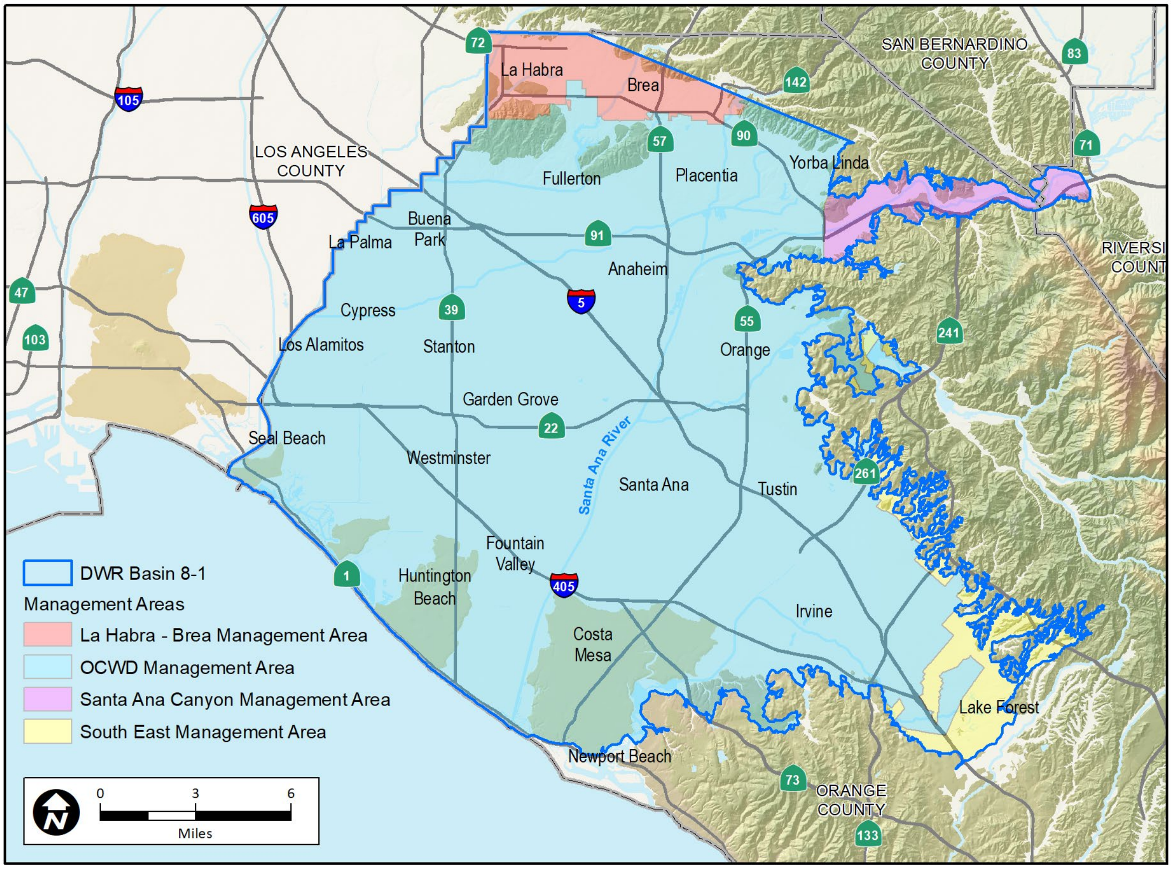


Figure 6.5 Basin 8-1 Management Areas (OCWD, 2023)

6.3.1.3 Basin Production Percentage

Background

The OC Basin is not adjudicated; therefore, groundwater production is managed through a framework that uses financial incentives to encourage sustainable pumping. The framework is based on the BPP, which represents the percentage of each Producer's total water supply that comes from groundwater pumped from the OC Basin. Groundwater production at or below the BPP is assessed by the Replenishment Assessment (RA). While there is no legal limit as to how much an agency pumps from the OC Basin, there is a financial impact to pump above the BPP. The BPP is set uniformly for all Producers by OCWD on an annual basis. Agencies that pump above the BPP are charged the RA plus the BEA. The BEA is calculated so that the cost of groundwater production above the BPP is equivalent to the cost of importing potable water supplies. This approach ensures there is no financial advantage for production above the BPP. The BEA can be increased to discourage production above the BPP if necessary.

The BPP is set annually by OCWD based on groundwater conditions, availability of imported water supplies, and OC Basin management objectives. The supplies available for recharge must be estimated for a given year. The estimated supplies of recharge water include: 1) stormflow from the Santa Ana River and Santiago Creek, 2) natural incidental recharge, 3) Santa Ana River baseflow, 4) GWRS supplies, and 5) other supplies such as imported water and recycled water purchased for the Alamitos Barrier. The BPP is a major factor in determining the cost of groundwater production from the OC Basin. For the 2026–27 water year, OCWD maintained a BPP of 85 percent. Under normal hydrologic conditions, groundwater production could reach approximately 315,000 AFY. However, actual production in FY 2026-27 is expected to be approximately 299,000 AFY due to PFAS-related impacts that continue to limit groundwater availability among several producers.

BPP Adjustments for Basin Management

OCWD has established management guidelines that are used to establish future BPPs, as seen in Table 6.9. Raising or lowering the BPP allows OCWD to manage the amount of pumping from the basin. OCWD has a policy to manage the groundwater basin within a sustainable range to avoid adverse impacts to the basin. OCWD seeks to maintain some available storage space in the basin to maximize surface water recharge when such supplies are available, especially in relatively wet years. By keeping the basin relatively full during wet years, and for as long as possible in years with near-normal recharge, the maximum amount of groundwater could be maintained in storage to support pumping in future drought conditions. During dry hydrologic years, when less water is available for recharge, the BPP could be lowered to maintain groundwater storage levels. A component of OCWD's BPP policy is to manage the groundwater basin so that the BPP will not fluctuate more than 5 percent from year to year.

The OCWD's GWRS came online in 2008 with a capacity of approximately 70 million gallons per day (mgd) and was expanded to 100 mgd in 2015. In 2023, it was expanded again to a final capacity of 130 mgd. The GWRS provides a resilient local water supply that recharges the OC Basin with advanced treated wastewater. The additional yield supported OCWD's move to raise the BPP from the long-standing approximately 77 percent level prior to 2023 to 85 percent beginning in February 2023. Monthly water-resources reports show agencies achieving 86 percent to 88 percent pumping shares after the final expansion in late-2024 to early-2025, which reflects increased reliance on local groundwater supplies enabled by GWRS production along with the reduced water demands of approximately 400,000 AFY.

Modeling and forecasts generate estimates based on historical averages. Consequently, forecasts use average hydrologic conditions, which smooth the dynamic and unpredictable local hydrology. Variations in local hydrology are the most significant impact to supplies of water available to recharge the groundwater basin. The current BPP of 85 percent is based on modeling of average annual rainfall weather patterns and estimated groundwater recharge volumes. If OCWD were to experience a relatively dry period, the BPP could be reduced to maintain water storage levels, along with other management actions shown in Table 6.9.

Table 6.9 Management Actions Based on Changes in Groundwater Storage

Available Storage Space(1)	Basin Management Action to Consider
Less than 100,000 AF	Raise BPP
100,000 to 300,000 AF	Maintain and / or raise BPP towards 85% goal
300,000 to 350,000 AF	Seek additional supplies to refill basin and / or lower the BPP
Greater than 350,000 AF	Seek additional supplies to refill basin and lower the BPP

Notes:
(1) Amount below full basin condition.

Basin Equity Assessment Exemptions

In some cases, OCWD encourages treating and pumping groundwater that does not meet drinking water standards to protect water quality. This is achieved by using a financial incentive called the BEA Exemption. A BEA Exemption is used to promote beneficial uses of poor-quality groundwater and reduce or prevent the spread of poor-quality groundwater into non-degraded aquifer zones. OCWD uses a partial or total exemption of the BEA to compensate a qualified participating agency or Producer for the costs of treating poor quality groundwater, which typically include capital, interest and operations and maintenance costs for treatment facilities (City of La Habra et al., 2017). Similarly, for proactive water quality management, OCWD occasionally exempts a portion of the BEA for their Coastal Pumping Transfer Program (CPTP). The CPTP encourages inland groundwater producers to increase pumping and coastal producers to decrease pumping to reduce the groundwater basin drawdown at the coast and protect against seawater intrusion. Inland pumpers can pump above the BPP without having to pay the full BEA for the amount pumped above the BPP (OCWD, 2015). Coastal pumpers receive BEA revenue from OCWD to assist in offsetting their additional water supply cost from taking less groundwater.

OCWD Resilience Plan

To address evolving conditions within OCWD's service area, it is important to anticipate potential challenges and proactively plan for strategies that sustain and enhance water supply reliability, water quality, and overall system resilience. The OCWD Resilience Plan is an adaptive management plan that evaluates future water demands and available supplies, while also identifying potential projects and response strategies to address risks to key District assets, including the groundwater basin, Santa Ana River, groundwater replenishment facilities, and natural resources.

The plan builds on OCWD's historical planning efforts and provides a flexible, project-based framework to maintain sustainable basin conditions and strengthen the long-term resilience of the District's water resources over a 5- to 25-year planning horizon.

The Resilience Plan also supports evaluation of future water supply projects, recharge strategies, and operational improvements to guide management of the OC Basin under changing hydrologic, regulatory, and demand conditions.

The Basin 8-1 Alternative submitted to DWR in 2017 showed that Basin 8-1 had been sustainably managed for the prior 10 years, which was a SGMA requirement. Based on avoiding undesirable results as defined in SGMA, the OC Basin has been sustainably managed since the construction of the Talbert Seawater Intrusion Barrier in the mid-1970s. Required annual reports and periodic updates submitted to DWR show that Basin 8-1 continues to be sustainably managed.

Current water demand projections show a relatively slow increase over the 25-year planning horizon, which is generally of similar magnitude as the additional production from the GWRS since its final expansion in early 2023 to 130 mgd. This locally controlled, drought proof supply of water reduces the region’s dependance on imported water.

Historically, the Santa Ana River has served as the primary source of water to recharge the OC Basin. To determine the availability of future Santa Ana River flows, OCWD utilized surface water flow modeling of the upper watershed. Modeling was developed to predict the impacts future stormwater capture and wastewater recycling projects in the upper watershed would have on future Santa Ana River flow rates at Prado Dam. Santa Ana River base flows are expected to decrease as more water recycling projects are built in the upper watershed. OCWD continues to work closely with the US Army Corps of Engineers (USACE) to temporarily impound and slowly release up to approximately 20,000 AF of stormwater in the Prado Dam Conservation Pool. The amount of water that can be temporarily impounded in the conservation pool has grown over time and in 2025, it was increased to over 25,000 AF. To some extent, the losses in baseflow are partially offset through the capture of additional stormwater held in the Prado Dam Conservation Pool. When available, OCWD will continue to augment groundwater recharge through the purchase of imported water through MET. OCWD will diligently monitor and evaluate future water supply projects to sustainably manage and protect the OC Basin for future generations.

OCWD Engineer’s Report

The OCWD Engineer’s Report documents groundwater conditions and evaluates water supply and Basin utilization within OCWD’s service area. The most recent report is the 2024–25 Engineer’s Report filed in March 2026. As reported, the BPP for the 2024–25 water year was maintained at 85 percent by the OCWD Board of Directors. The overall BPP achieved within OCWD for non-irrigation use was 83.8 percent, with the reduced achievement attributed primarily to PFAS-related well shutdowns. Groundwater stored in the Basin decreased by 50,000 AF for the 2024–25 water year, and the annual overdraft was 165,300 AF, which reflects the amount by which natural replenishment was exceeded. The decrease in storage was reflected by a relatively dry year and the total groundwater recharge of 252,214 AF, which included contributions from supplemental water recharged by the GWRS.

For the 2026–27 water year, OCWD is proposing to maintain a BPP of 85 percent. Under normal hydrologic conditions, groundwater production could reach approximately 315,000 AF; however, OCWD anticipates groundwater production during 2026–27 will be approximately 299,000 AF due to PFAS-related impacts that continue to limit groundwater availability among several producers.

It is estimated that approximately 13,500 AF of additional production above the BPP will be undertaken by the City of Tustin, City of Huntington Beach, Mesa Water District, and Irvine Ranch Water District to support groundwater quality improvement projects. As in prior years, groundwater produced above the BPP for these water-quality projects will be partially or fully exempt from the BEA due to the Basin-wide benefit of pumping and treating poor-quality groundwater.

During the 2024–25 water year and current 2025-26 water year, MET untreated full-service water supplies were available for groundwater replenishment; however, OCWD did not purchase replenishment water due to favorable Basin storage conditions. OCWD likewise does not plan to purchase untreated full-service water for replenishment in 2026-27.

6.3.1.4 Recharge Management

Recharging water into the OC Basin through natural and artificial means is essential to support pumping from the OC Basin. Active recharge of groundwater began in 1936, in response to increasing drawdown of the OC Basin and, consequently, the threat of seawater intrusion. The OC Basin's primary source of recharge is supplied from the Santa Ana River, which is diverted into recharge basins and its main Orange County tributary, Santiago Creek. Other sources of recharge water include natural infiltration, recycled water, and imported water. Natural recharge consists of subsurface inflow from local hills and mountains, infiltration of precipitation and irrigation water, recharge in small flood control channels, and groundwater underflow to and from Los Angeles County and the ocean.

Recycled water for OC Basin recharge is from two sources. The main source is the GWRS, which completed its final expansion in 2023 and now produces up to 130 mgd of advanced-purified water for recharge at the Talbert Seawater Barrier and in the Kraemer, Miller, Miraloma, and La Palma basins. The second source is recycled water purified at the Water Replenishment District of Southern California's (WRD) Leo J. Vander Lans Advanced Water Treatment Facility, which provides up to 8 mgd for injection at the Alamitos Seawater Barrier (owned and operated by the Los Angeles County Department of Public Works). In recent years, WRD's upgrades and operations have increased the use of recycled water at the Alamitos Barrier and reduced reliance on imported supplies. Injection of recycled water into these barriers is an ongoing effort by OCWD (in coordination with WRD and Los Angeles County) to control seawater intrusion into the OC Basin; operation of the injection wells forms a hydraulic barrier to seawater intrusion.

OCWD also purchases imported water for recharge through MWDOC. Untreated imported water can be used to recharge the OC Basin through the surface recharge system at multiple locations, such as Anaheim Lake, the Santa Ana River, Irvine Lake, and San Antonio Creek, while treated imported water may be used for in-lieu recharge when appropriate. For current planning context and detailed recharge management strategies, refer to OCWD's most recent planning documents, including the 2024 OCWD Resilience Plan, in addition to prior foundational documents (Appendix E).

6.3.1.5 MET Imported Water for Groundwater Replenishment

In the past, OCWD, MWDOC, and MET have coordinated water management to increase storage in the OC Basin when imported supplies are available for this purpose. MET's groundwater replenishment program was discontinued on January 1, 2013, and currently MET via MWDOC sells replenishment water to OCWD at the full-service untreated MET rate. Figure 6.6 shows MWDOC's imported water sales to OCWD since FY 1990-91, which averages approximately 27,888 AF per year. In three of the past five water years, OCWD did not need to purchase more imported water to replenish groundwater.

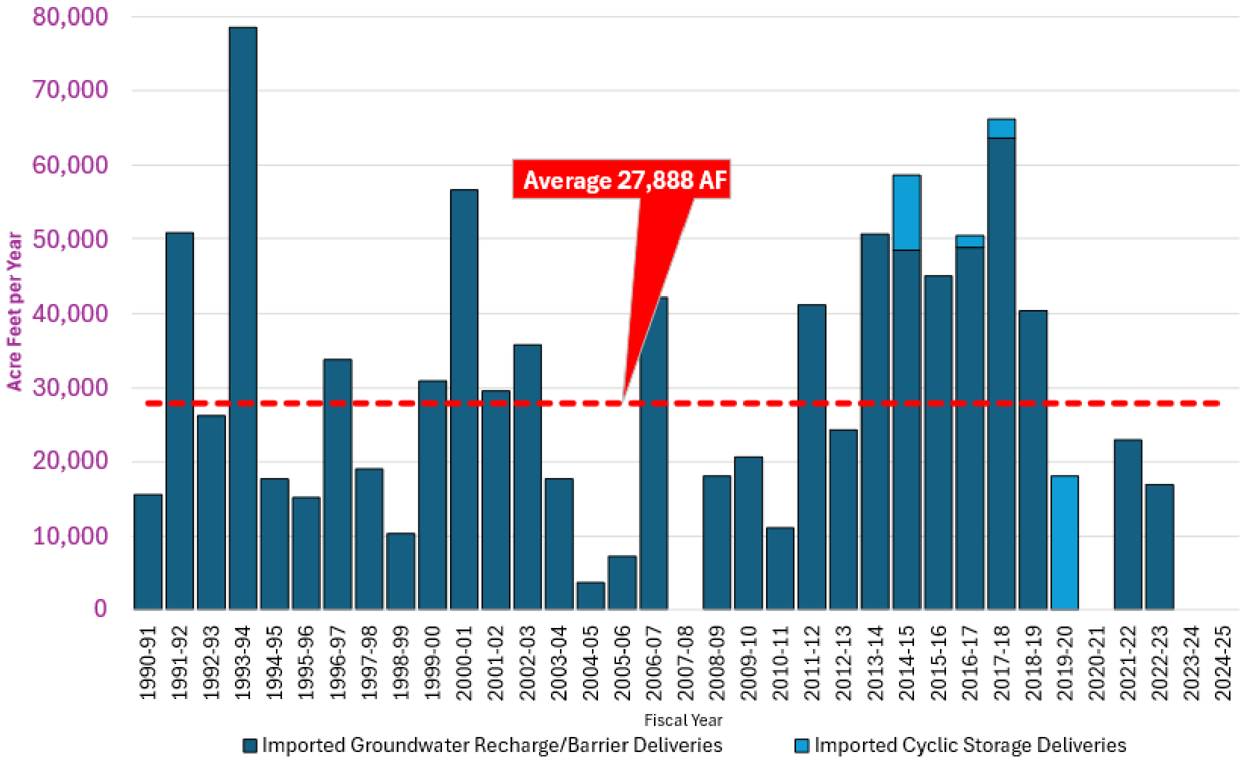


Figure 6.6 MWDOC Imported Water Sales for Groundwater Replenishment

6.3.2 Planned Future Groundwater Sources

Mesa Water has plans for a local supply improvement project involving brackish water desalination. This project would increase supply up to 1,000 AFY by 2035-2040. This project is further described in Section 6.9.

On a regional scale, OCWD regularly evaluates potential projects and conducts studies to review the feasibility of new projects or sources. Groundwater basin-related projects that are planned or in progress are described below:

Forecast Informed Reservoir Operations (FIRO) at Prado Dam – Stormwater represents a significant source of water used by OCWD to recharge the OC Basin. Much of this recharge is made possible by the capture of Santa Ana River stormflows behind Prado Dam in the Conservation Pool. FIRO represents the next generation of operating water reservoirs using the best available technology. Advances in weather and stormwater runoff forecasting hold promise to allow USACE to safely impound more stormwater while maintaining equivalent flood risk management capability behind Prado Dam. Analyses indicate that FIRO would increase average annual recharge by approximately 4,000–6,000 AFY, and up to 23,000 AF in very wet years, consistent with earlier preliminary analyses. Federal and local partners have indicated FIRO at Prado Dam is moving from technical assessment toward implementation via Water Control Manual updates.

6.4 Surface Water

6.4.1 Existing Surface Water Sources

There are, currently, no direct stormwater uses in Mesa Water's service area.

6.4.2 Planned Future Surface Water Sources

As of 2025, there are no planned stormwater uses in Mesa Water's service area.

6.5 Stormwater

6.5.1 Existing Stormwater Sources

There are, currently, no direct stormwater uses in Mesa Water's service area.

6.5.2 Planned Future Stormwater Sources

As of 2025, there are no planned stormwater uses in Mesa Water's service area.

6.6 Wastewater and Recycled Water

Mesa Water is not directly involved in wastewater services and does not own or operate the wastewater collection system or wastewater treatment facilities in its service area. The Costa Mesa Sanitary District (CMSD) provides wastewater collection within Mesa Water's service area to 25,000 parcels via 325-miles of sewer line. However, CMSD does not own a wastewater treatment plant and therefore the wastewater that is collected is conveyed to OC San facilities for treatment and disposal.

Recycled water is wastewater that is treated through primary, secondary and tertiary processes and is acceptable for most non-potable water purposes such as irrigation, and commercial and industrial process water per Title 22 requirements. Recycled water opportunities have continued to grow in Southern California as public acceptance and the need to expand local water resources continues to be a priority. Recycled water also provides a degree of flexibility and added reliability during drought conditions when imported water supplies are restricted. Mesa Water is indirectly involved in recycled water production, through its supply of wastewater for indirect potable reuse (IPR). The following sections expand on the existing agency collaboration involved in these efforts, as well as Mesa Water's projected recycled water use over the next 25 years.

6.6.1 Agency Coordination

Mesa Water does not own or operate wastewater treatment facilities and sends all collected wastewater to OC San for treatment and disposal. OC San provides treated water to OCWD, the manager of the Orange County Groundwater Basin. OCWD is the manager of the Orange County Groundwater Basin and strives to maintain and increase the reliability of the Orange County Groundwater Basin through replenishment with imported water, stormwater, and advanced treated wastewater. A full description of the Orange County Groundwater Basin is available in Section 6.3.1. OCWD and OC San have jointly constructed and expanded two water recycling projects to meet this goal that include: 1) OCWD Green Acres Project (GAP) and 2) OCWD GWRS.

6.6.1.1 Orange County Sanitation District

OC San collects wastewater from residential, commercial, and industrial customers in 20 cities, four special districts, and portions of unincorporated Orange County, totaling 479 square miles that serves more than 2.6 million residents in northwest and central Orange County (OC San, 2025). These flows include dry weather urban runoff collected from 15 diversion points and discharged into the sewer system for treatment and Santa Ana River Interceptor flows from the upper Santa Ana watershed (OC San, 2017).

OC San operates and maintains two treatment plants: Reclamation Plant No. 1, located in Fountain Valley with a capacity of 320 mgd, and Reclamation Plant No. 2 located in Huntington Beach with a capacity of 312 mgd. OC San also operates 572 miles of collection system pipelines along with 15 offsite pump stations. Approximately 150 mgd of secondary effluent undergoes advanced treatment at the GWRS facility operated by the OCWD and 7 mgd undergoes tertiary treatment at OCWD's GAP facility. Treated wastewater is discharged to the Pacific Ocean via an ocean outfall in compliance with state and federal requirements as set forth in OC San's National Pollutant Discharge Elimination System (NPDES) permit. OC San's ocean outfall is 120-inch diameter and extends five miles off the coast of Huntington Beach. A 78-inch diameter emergency outfall also exists that extends 1.3 miles off the coast (OC San, 2017).

OC San Reclamation Plant No. 1 - Reclamation Plant No. 1 treats raw wastewater and has a maximum treatment capacity of 320 mgd. The plant provides primary and secondary treatment and supplies secondary effluent to OCWD for further tertiary treatment at their GAP facility and advanced treatment at their GWRS. Reclamation Plant No. 1 is the only plant that provides water to OCWD for additional treatment and recycling. An interplant pipeline allows flows to be conveyed to Treatment Plant No. 2.

OC San Treatment Plant No. 2 - Treatment Plant No. 2 provides primary and secondary treatment to raw wastewater and has a maximum treatment capacity of 312 mgd. All secondary effluent from their plant is discharged to the ocean through the ocean outfall.

6.6.1.2 Orange County Water District

OCWD is the manager of the OC Basin and provides water to 19 municipal water agencies and special districts. A full description of the OC Basin is available in Section 6.3.1. OCWD and OC San have jointly constructed and expanded two water recycling projects that include: 1) OCWD GAP and 2) OCWD GWRS.

OCWD GAP

OCWD owns and operates the GAP, a water recycling system that treats up to 7.5 mgd and provides 8,400 AFY of recycled water for irrigation and industrial uses. GAP provides an alternate source of water that is mainly delivered to parks, golf courses, greenbelts, cemeteries, and nurseries in the cities of Costa Mesa, Fountain Valley, Newport Beach, and Santa Ana. Approximately 100 customer sites use GAP water, current recycled water users include Mile Square Park and Golf Courses in Fountain Valley, Costa Mesa Country Club, Chroma Systems carpet dyeing, Kaiser Permanente, and Caltrans.

OCWD GWRS

OCWD's GWRS allows southern California to decrease its dependency on imported water and creates a local and reliable source of water. OCWD's GWRS purifies secondary treated wastewater from OC San to levels that meet and exceed all state and federal drinking water standards. The GWRS Phase 1 plant has been operational since January 2008 and uses a three-step advanced treatment process consisting of MF, RO, and ultraviolet light with hydrogen peroxide. A portion of the treated water is injected into the seawater barrier to prevent seawater intrusion into the groundwater basin. The other portion of the water is pumped to ponds where the water percolates into deep aquifers and becomes part of Orange County's water supply. The treatment process is described on OCWD's website. (OCWD, GWRS, 2020).

The GWRS first began operating in 2008 producing 70 mgd and in 2015, it underwent a 30 mgd expansion. Approximately 39,200 AFY of the highly purified water is pumped into the injection wells and 72,900 AFY is pumped to the percolation ponds in the City of Anaheim where the water is naturally filtered through sand and gravel to deep aquifers of the groundwater basin. The OC Basin provides approximately 77 percent of the potable water supply for north and central Orange County. The design and construction of the first phase (78,500 AFY) of the GWRS project was jointly funded by OCWD and OC San; Phase 2 expansion (33,600 AFY) was funded solely by OCWD.

The Final Expansion of the GWRS is the third and final phase of the project and was completed in 2023. The plant now produces 130 mgd and requires additional treated wastewater from OC San. This additional water comes from OC San's Treatment Plant 2, which is in the City of Huntington Beach approximately 3.5 miles south of the GWRS. The Final Expansion project included expanding the existing GWRS treatment facilities, constructing new conveyance facilities at OC San Plant 2 and rehabilitating an existing pipeline between OC San Plant 2 and the GWRS. Following completion, the GWRS plant now recycles 100 percent of OC San's reclaimable sources and produces enough water to meet the needs of over one million people.

6.6.2 Wastewater

Mesa Water does not own a wastewater collection system. CMSD formed in 1944 under the Sanitary District Act of 1923, provides wastewater collection within Mesa Water's service area. CMSD boundaries encompass all of the City of Costa Mesa and portions of Newport Beach and unincorporated Orange County. CMSD provides wastewater collection services to 25,000 parcels via 325-miles of sewer line. The wastewater collected is conveyed to OC San facilities for treatment and disposal. Table 6.10 shows the volume of wastewater collection from Mesa Water's service area.

Table 6.10 Submittal Table 6-2 Retail: Wastewater Collected within Mesa Water's Service Area in 2025

<table>
<tr><th colspan="5">Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2025
Water Code Section 10633(a)</th></tr>
<tr><th colspan="3">Wastewater Collection</th><th colspan="2">Recipient of Collected Wastewater</th></tr>
<tr><th rowspan="2">Name of Wastewater Collection Agency</th><th rowspan="2">Wastewater Volume Metered or Estimated? OPTIONAL</th><th>Volume of Wastewater Collected from UWMP Service Area 2025</th><th rowspan="2">Name of Wastewater Treatment Plant (WWTP) and Place ID Number</th><th rowspan="2">Is WWTP Located Within UWMP Area?</th></tr>
<tr><th>(AF)</th></tr>
<tr><td>Costa Mesa Sanitary District (CMSD)</td><td>Estimated</td><td>9,248</td><td>OCSD Plant 1, Place ID 758392</td><td>No</td></tr>
<tr><td>City of Orange</td><td>Estimated</td><td>X</td><td>OCSD Plant 2, Place ID 259158</td><td>No</td></tr>
<tr><td colspan="2">Total Wastewater Received from UWMP Service Area in 2025:</td><td>9,248</td><td colspan="2"></td></tr>
<tr><td colspan="5">NOTES: Based on a return rate of 56% (based on 2013 return rate study).</td></tr>
</table>

6.6.3 Current Recycled Water Uses

Mesa Water currently uses recycled water from OCWD's GAP for direct non-potable reuse such as landscape irrigation. Currently, Mesa Water has 43 recycled water service connections. Some of the recycled water customers include the City of Costa Mesa, the County of Orange, Cal Trans, Costa Mesa Country Club, Orange Coast Community College, and several shopping and business centers. In FY 2024-25, 847 AF of recycled water from OCWD's GAP was used in Mesa Water's service area for landscape irrigation. Recycled water use accounts for approximately 6 percent of annual demand.

For indirect use, Mesa Water also benefits from OCWD's GWRS system that provides IPR through replenishment of OC Basin with water that meets state and federal drinking water standards.

6.6.4 Projected Recycled Water Uses

As of April 2019, the State of California amended its recycled water policy to expand its numeric goal of recycled water use to 2.5 million AFY by 2030 and added annual required reporting requirements for wastewater and recycled water. Mesa Water will continue to receive recycled water from GAP and supply it to the various landscape irrigation sites. Mesa Water will continue to supply wastewater to support the region's IPR via GWRS. Current and projected recycled water use through 2050 are shown in Table 6.11, and the 2020 projected 2025 recycled water use compared to the 2020 actual use is shown in Table 6.12. Tertiary recycled water usage is limited to landscape irrigation.

Table 6.11 Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area
Water Code Section 10633 (c)(e)

Use Type	Water Type (after treatment if treated)	Additional Information	2025	2030	2035	2040	2045	2050 (opt)
			(AF)	(AF)	(AF)	(AF)	(AF)	(AF)
Landscape irrigation (exc golf courses)	Non-Potable	OCWD	847	1,084	1,084	1,084	1,084	1,084
Golf course irrigation	Non-Potable	OCWD						
Total			847	1,084	1,084	1,084	1,084	1,084

NOTES: Table does not include groundwater recharge (IPR) numbers as they are not separate from OCWD's supply.

Table 6.12 Submittal Table 6-5 Retail: 2020 UWMP Recycled Water Use Projection Compared to 2025 Actual

Submittal Table 6-5 Retail: 2020 UWMP Recycled Water Use Projection Compared to 2025 Actual
Water Code Section 10633 (e)

Use Type	2020 Projection for 2025	2025 Actual Use
	(AF)	(AF)
Landscape Irrigation (exc golf courses)	500	847
Golf Course Irrigation	600	
Total	1,100	847

NOTES: Source – Mesa Water District

6.6.5 Potential Recycled Water Uses

Mesa Water supports the continued development of recycled water through consumption of OCWD's GWRS produced water and recharge to the Basin. Currently, direct irrigation type recycled water use is expected to remain at 1,100 AFY through the 25-year period, with landscape irrigation as its sole use with no plans to expand this program as it is not overall beneficial to the Basin Pumpers like the GWRS IPR provides.

6.6.6 Optimization Plan

Studies of water recycling opportunities within Southern California provide a context for promoting the development of water recycling plans. It is recognized that broad public acceptance of recycled water requires continued education and public involvement. Currently, most of the recycled water available being directed toward replenishment of the groundwater basin and improvements in groundwater quality. As a user of groundwater, Mesa Water supports the efforts of OCWD and OC San to use recycled water as a primary resource for groundwater recharge in Orange County.

6.6.6.1 Public Education

Mesa Water participates in the MWDOC public education and school education programs, which include extensive sections on water recycling. MWDOC's water use efficiency public information programs are a partnership with agencies throughout the county. Through a variety of public information programs, MWDOC reaches the public, including those in Mesa Water, with information regarding present and future water supplies, the demands for a suitable quantity and quality of water, including recycled water, and the importance of implementing water efficiency techniques and behaviors. Through MWDOC, water education programs have reached thousands of students in Mesa Water with grade-specific programs that include information on recycled water.

6.6.6.2 Financial Incentives

The implementation of recycled water projects involves a substantial upfront capital investment for planning studies, EIRs, engineering design and construction before recycled water is available to the market. The establishment of new supplemental funding sources through federal, state and regional programs now provides significant financial incentives for water agencies to develop and make use of recycled water locally. Potential sources of funding include federal, state and local funding opportunities. These funding sources include the USBR, California Proposition 13 Water Bond, Proposition 84 and MET Local Resources Program (LRP). These funding opportunities may be sought by Mesa Water or possibly more appropriately by regional agencies. Mesa Water will continue to support seeking funding for regional water recycling projects and programs.

6.6.6.3 Optimization Plan

Mesa Water does not produce recycled water, therefore, there is no need for a recycled water optimization plan. In other areas of Orange County, recycled water is used for irrigating golf courses, parks, schools, businesses, and communal landscaping, as well as for groundwater recharge. Analyses have indicated that present worth costs to incorporate recycled water within Mesa Water are not cost effective as compared to purchasing imported water from MWDOC or using groundwater. Mesa Water will continue to conduct feasibility studies for recycled water and seek out creative solutions such as funding, regulatory requirements, institutional arrangement, and public acceptance for recycled water use with MWDOC, OCWD, MET, and other cooperative agencies.

6.7 Desalination Opportunities

6.7.1 Ocean Water Desalination

There are currently no ocean water desalination opportunities within Mesa Water’s service area.

6.7.2 Groundwater Desalination

Per Mesa Water’s 2025 CIP Update TM2, a local brackish groundwater desalination supply improvement project is currently being evaluated. It is a joint project with OCWD and the cities of Huntington Beach and Newport Beach. Mesa Water's initial share would be 1,000 AFY with earliest project completion around 2035-2040.

6.8 Water Exchanges and Transfers

6.8.1 Existing Exchanges and Transfers

Interconnections with other agencies result in the ability to share water supplies during short-term emergency situations or planned shutdowns of major water systems. Transfers of water can help with short-term outages but can also be involved with longer-term water exchanges to deal with droughts or long-term emergency situations. MWDOC helps its retail agencies develop both local and regional transfer and exchange opportunities that promote reliability within their systems.

Mesa Water maintains two metered interconnections with the City of Huntington Beach and the Irvine Ranch Water District (IRWD) and 15 emergency interconnections with the City of Santa Ana, City of Newport Beach, and IRWD.

6.8.2 Planned and Potential Exchanges and Transfers

Currently Mesa Water has no formal transfer or exchange plan. Opportunities are being explored that may develop into potential transfers or exchanges. This may include the selling of excess pumped water from the expansion of the MWRF.

MWDOC supports its retail agencies, such as Mesa Water, in developing both local and regional transfer and exchange opportunities that promote reliability within their systems. Examples of these future projects include:

Santa Ana River Conservation and Conjunctive Use Project – SARCCUP is a joint project established by five regional water agencies within the Santa Ana River Watershed (Eastern Municipal Water District, Inland Empire Utilities Agency, Western Municipal Water District, Orange County Water District, and San Bernardino Valley Municipal Water District). In September 2021, the participating agencies, in coordination with MET, executed a regional agreement framework establishing SARCCUP as a watershed-scale groundwater banking program to improve drought reliability across Orange, Riverside, and San Bernardino counties.

In 2016, SARCCUP received $55 million in Proposition 84 funding from DWR; however, implementation has since advanced with the 2021 agreements and subsequent program updates. The overall SARCCUP program consists of three main elements: (1) Watershed-Scale Cooperative Water Banking Program; (2) Water Use Efficiency—landscape design/irrigation improvements and water budget assistance; and (3) Habitat creation and Arundo donax removal within the Santa Ana River.

The Watershed-Scale Cooperative Water Banking Program is the largest component of SARCCUP. Under MET's arrangement with San Bernardino Valley Municipal Water District (Valley), when Valley declares surplus SWP water and offers it to MET, MET offers at least 50 percent of an equivalent amount to SARCCUP member agencies for storage and later use in the Santa Ana River watershed, consistent with MET policy. This structure formalizes the purchase and storage pathway that had been under development and aligns with MET's extraordinary supply policy during allocations.

Program capacity planning identifies up to approximately 137,000 AF of storage across six basins, including up to 36,000 AF in the Orange County Groundwater Basin for use in dry years. Stored SARCCUP supplies may be designated "extraordinary supplies" during a MET allocation if managed consistent with MET's Water Supply Allocation Plan, thereby enhancing participating agencies' drought reliability.

Within Orange County, extraordinary supply assignment agreements among MET, MWDOC/OCWD, and certain retail agencies (e.g., Anaheim, Fullerton, Santa Ana) document how SARCCUP extraordinary supply is assigned and delivered locally. Program implementation and participation details continue to be refined among OCWD, retail agencies, and MWDOC.

6.9 Future Water Projects

Mesa Water continually reviews practices that will provide its customers with adequate and reliable supplies. Trained staff continue to ensure the water quality is safe and the water supply will meet present and future needs in an environmentally and economically responsible manner. Although Mesa Water has various projects planned to maintain and improve the water system, only projects that have both a concrete timeline and a quantifiable increase in supply are listed in Table 6.13. The descriptions of each project are taken from Mesa Water's 2025 CIP Update TM2.

Replacement of Clear Groundwater Well 5 – Although active, Well 5 currently produces sand when run at more than 2,200 gpm, while it used to operate at 3,800 gpm (2011 WMP) and 2,800 gpm (2013 step-down test). Moreover, despite efforts to swage the casing, the remaining service life of Well 5 was estimated at 3-5 years in 2018. Hence, replacement of this well is a logical investment that would likely result in additional clearwell production capacity. Based on historical pumping capacity and location in the Basin, it is assumed that a Well 5 replacement could produce approximately 2,800 gpm or 4.0 mgd. Hence, replacing Well 5 could result in an additional maximum day demand capacity of 600 gpm or 0.9 mgd (970 AFY if operated year-round). To estimate the annual yield of this project, a BPP of 85 percent was used, which was calculated to equate to an average operation of 60 percent when the replacement of Well 5 would increase the clearwell production capacity from 17,200 AFY to 17,800 AFY. Hence, the annual average additional production capacity of the replacement of Well 5 is estimated at approximately 580 AFY.

Brackish Groundwater Desalination (Local Supply Improvement Project) - In response to the need to increase local supply resilience, Mesa Water, in partnership with OCWD and the cities of Huntington Beach and Newport Beach, is leading efforts to evaluate the feasibility of a brackish groundwater Local Supply Improvement Project. The Local Supply Improvement Project feasibility study will investigate the benefits of brackish water desalination along the coast to increase local supplies for the agencies that pump water from the aquifer.

According to the funding proposal submitted for the Local Supply Improvement Project, the study will evaluate alternative groundwater well locations in areas of the Basin impacted by brackish groundwater and potentially protect existing production wells that may be susceptible to seawater intrusion. The study also will identify locations for the construction of a brackish groundwater desalination facility.

With the project facility having an expected initial capacity of 5 to 8 mgd, the total yield of this project could range from 5,600 to 9,000 AFY, respectively. For planning purposes, it was estimated that Mesa Water's share in this project could yield 1,000 AFY or 0.9 mgd. It is anticipated that implementation will take at least another 10-15 years; hence, the earliest completion year would be around 2035-2040. Due to the brackish nature of the source water, the potable water produced by the Local Supply Improvement Project is expected to be the most expensive water source in Mesa Water's portfolio.

Local Supply Improvement Project Expansion - Another option would be to increase the allocation Mesa Water would receive from the Local Supply Improvement Project described above. Assuming an equal share with the other two partners (cities of Huntington Beach and Newport Beach) in the ultimate planned capacity 9,000 AFY, would equate to an annual yield for Mesa Water of 3,000 AFY. Hence, the expanded share at the maximum planned capacity would result in an additional yield of 2,000 AFY.

Table 6.13 Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs
Water Code Section 10631 (f)

Name of Future Projects or Programs	Joint Project with other suppliers?		Planned Implementation Year	Expected Increase in Water Supply to Supplier
	(yes/no)	If Yes, Supplier Name		(AFY)
Replacement of Clear Groundwater Well 5	No	N/A		580
Brackish Groundwater Desalination (Local Supply Improvement Project)	Yes	Orange County Water District and the Cities of Huntington Beach and Newport Beach	2035-2040	1,000
Increase in Local Supply Improvement Project Capacity	Yes	City of Huntington Beach and City of Newport Beach		2,000

NOTES: The additional annual yield of clearwell 5 considers a BPP of 85 percent. All values are rounded to nearest 10 AFY.

6.10 Energy Intensity

Mesa Water owns and operates a water distribution system. This section reports the energy intensity for each system using data from FY 2025. Water and energy resources are inextricably connected. Known as the "water-energy nexus", the California Energy Commission estimates the transport and treatment of water, treatment and disposal of wastewater, and the energy used to heat and consume water account for nearly 20 percent of the total electricity and 30 percent of non-power plant related natural gas consumed in California. In 2015, California issued new rules requiring 50 percent of its power to come from renewables, along with a reduction in greenhouse gas (GHG) emissions to 40 percent below 1990 levels by 2030. Consistent with energy and water conservation, renewable energy production, and GHG mitigation initiatives, Mesa Water reports the energy intensity of its water and wastewater operations.

The methodology for calculating water energy intensity outlined in Appendix O of the UWMP Guidebook was adapted from the California Institute for Energy Efficiency exploratory research study titled “Methodology for Analysis of the Energy Intensity of California’s Water Systems” (Wilkinson 2000).

The study defines water energy intensity as the total amount of energy, calculated on a whole-system basis, required for the use of a given amount of water in a specific location. UWMP reporting is limited to available energy intensity information associated with water processes occurring within an urban water supplier’s direct operational control. Operational control is defined as authority over normal business operations at the operational level. Any energy embedded in water supplies imparted by an upstream water supplier (e.g., water wholesaler) or consequently by a downstream water purveyor (e.g., retail water provider) is not included in the UWMP energy intensity tables. Mesa Water’s calculations conform to methodologies outlined in the UWMP Guidebook and Wilkinson study.

6.10.1 Water Supply Energy Intensity

In FY 2025, Mesa Water consumed 3421.1 kilowatt-hours (kWh) per million gallons (MG) for water extraction, treatment, and distribution services (Table 6.14). It is important to note that many of the retail agencies in Orange County do not have water treatment and therefore, Mesa Water's energy intensity cannot be directly compared with these agencies. The basis for calculations is provided in more detail in the following subsections.

Table 6.14 Optional Submittal Table O-1A: Energy Efficiency

Optional Submittal Table O-1A: Recommended Energy Reporting - SINGLE DELIVERY PRODUCT - WATER SUPPLY PROCESS APPROACH										
Water Delivery Product	Retail Potable Deliveries	**Only for Water Delivery Products Under the Urban Water Supplier's Operational Control**								
Start Date of Reporting Period	7/1/2024	**Water Management Process**							**Non-Consequential Hydropower**	
End Date of Reporting Period	6/30/2025									
Is upstream embedded energy included in the values reported?	No									
		Units for Water Volume	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	**Total Utility**	Hydropower	Net Utility
Volume of Water Entering Process		AF	15,624			3,123	14,875	14,875		14,875
Energy Consumed (kWh)		N/A	13,435,338			640,247	2,506,937	16,582,522		16,582,522
Energy Intensity (kWh/vol. converted to MG)		N/A	2,639	0.0	0.0	629	517	3,421	0.0	3,421
Quantity of Self-Generated Renewable Energy										
0	kWh									
Data Quality (Estimate, Metered Data, Combination of Estimates and Metered Data)										
Combination of Estimates and Metered Data										
Data Quality Narrative:										
Volume of Water Entering Process: Extraction data based on MWDOC Compiled Water Audits “Volume From Own Sources” and Distribution data based on MWDOC Compiled Water Audits “Authorized Consumption.” Non-Revenue Water is not considered in this calculation – the energy efficiency is based on water delivered to customers. **Energy Consumed**: Based on metered data.										
Narrative:										
Mesa Water relies on local groundwater, and recycled water to meet its customers' water needs. Operational control is limited to groundwater wells, a treatment facility, and potable water booster stations.										

6.10.1.1 Operational Control and Reporting Period

As described throughout the report, Mesa Water is a retail agency that relies on groundwater and has the ability to purchase and receive imported water. Water supply energy intensity was calculated for the 2025 financial year. Calendar Year data is used more frequently for energy intensity calculations to provide consistency in the time frame among various organizations, but financial year data was used given the completeness of what was available.

6.10.1.2 Volume of Water Entering Processes

According to Mesa Water District water production meters, Mesa Water extracted 15,624 AF of groundwater from the OC Basin. Approximately 3,123 AF of water was treated at the MWRF. According to MWDOC water audits, Mesa Water distributed 14,875 AF of water to customers which was primarily groundwater extracted by Mesa Water.

6.10.1.3 Energy Consumption and Generation

According to Southern California Edison Electricity Bills and SoCal Gas bills, groundwater wells consumed 13,435,338 kWh equivalent of electricity with one well running on gas, treatment facilities consumed 640,247 kWh of electricity, and pump stations along the distribution system consumed 2,506,937 kWh equivalent of electricity with two pump stations running on gas. Currently, Mesa Water does not generate renewable energy. Energy consumption is based on metered data.

6.10.2 Wastewater and Recycled Water Energy Intensity

Mesa Water does not have energy data for the wastewater system readily available and has therefore chosen not to calculate an energy intensity for the wastewater system.

6.10.3 Key Findings and Next Steps

Calculating and disclosing direct operationally controlled energy intensities is another step towards understanding the water-energy nexus. However, much work is still needed to better understand upstream and downstream (indirect) water-energy impacts. When assessing water supply energy intensities or comparing intensities between providers, it is important to consider reporting boundaries as they do not convey the upstream embedded energy or impacts energy intensity has on downstream users. Engaging one’s upstream and downstream supply chain can guide more informed decisions that holistically benefit the environment and are mutually beneficial to engaged parties. Suggestions for further study include:

- Supply-chain engagement – Mesa Water relies on a variety of water sources for their customers. While some studies have used life cycle assessment tools to estimate energy intensities, there is a need to confirm this data. The 2025 UWMP requirement for all agencies to calculate energy intensity will help Mesa Water and neighboring agencies make more informed decisions that would benefit the region as a whole regarding the energy and water nexus. A similar analysis could be performed with upstream supply chain energy, for example, with SWP.
- Internal benchmarking and goal setting – With a focus on energy conservation and a projected increase in water demand despite energy conservation efforts, Mesa Water’s energy intensities will

likely decrease with time. Conceivably, in a case where water demand decreases, energy intensities may rise as the energy required to pump or treat is not always proportional to water delivered. In the course of exploring the water-energy nexus and pursuing renewable energy goals, there is a need to assess whether energy intensity is a meaningful indicator or if it makes sense to use a different indicator to reflect Mesa Water's commitment to energy and water conservation. Current efforts could be expanded with the addition of a wastewater energy intensity evaluation.

- Regional sustainability – Water and energy efficiency are two components of a sustainable future. Efforts to conserve water and energy, however, may impact the social, environmental, and economic livelihood of the region. In addition to the relationship between water and energy, over time, it may also be important to consider and assess the connection these resources have on other aspects of a sustainable future.

CHAPTER 7 WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

This chapter of the Urban Water Management Plan (UWMP) describes Mesa Water District's water service reliability assessment for three long-term hydrological conditions: a normal year, a single dry year, and a drought period lasting five consecutive years. The Drought Risk Assessment (DRA) assesses water supply reliability during a severe drought lasting the next five consecutive years, from 2026 to 2030. Factors affecting reliability, such water quality, regulations and climate change, are also summarized in this assessment of reliability.

7.1 Water Service Reliability Overview

Every urban water supplier is required to assess the reliability of their water service to its customers under a normal year, a single dry year, and multiple dry years. Mesa Water District's water sources are primarily from local groundwater and recycled water. Mesa Water can import water purchased from the Municipal Water District of Orange County (MWDOC), however is able to meet all of its potable water demands from local sources. MWDOC is one of 26 member agencies of the Metropolitan Water District of Southern California (MET), which imports water from the Colorado River through its own Colorado River Aqueduct (CRA) and from Northern California through the California Aqueduct managed by the State Water Project (SWP).

Local groundwater in the Orange County Basin is managed by the Orange County Water District (OCWD). As summarized in Chapter 6, OCWD has developed programs and projects to improve groundwater recharge and augment groundwater through recycled water, conjunctive use and water transfers. OCWD assesses groundwater conditions and sets its Basin Production Percentage (BPP), which determines how much water will be pumped from the basin year, and the Basin Equity Assessment (BEA), which is a surcharge for exceeding the BPP. Currently, the BPP is set at 85 percent. Likewise MET has also invested in numerous programs and projects to augment its direct deliveries of imported water such as water transfers, groundwater banking, and use of its reservoir storage as summarized in Chapter 6. MET's draft 2025 UWMP demonstrates that MET will be able to meet its projected water demands for the next 25 years under normal, dry and multiple dry year conditions (MET, 2025).

Table 7.1 shows the basis of water year data used to predict drought supply availability. In 2025, MWDOC developed a water demand forecast model for its participating water agencies that statistically correlates municipal and industrial (M&I) water use with demographic, socioeconomic, conservation and weather variables—as reported in the 2025 Orange County Water Demand Projection Model TM (MWDOC, 2025). Because the model isolates weather, future water demand projects can be estimated under single and multiple-year droughts and under future climate change scenarios. The model shows the average (normal) hydrologic condition for the MWDOC service area is represented by Fiscal Years (FY) 1991-2024 and the single-dry year hydrologic condition by FY 2013-14. The five consecutive years of FYs 1991-2024 represent the driest five consecutive year historical sequence for MWDOC's service area. Locally, Orange County rainfall for the five-year period totaled 36 inches, the driest on record.

Table 7.1 Optional Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)

<table>
<tr><th colspan="5">OPTIONAL Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)</th></tr>
<tr><th rowspan="4">Year Type</th><th rowspan="4">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</th><th colspan="3">Available Supplies if Year Type Repeats</th></tr>
<tr><td>☐</td><td colspan="2">Check the box if quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP.
Location: [insert location from UWMP]</td></tr>
<tr><td colspan="3">Quantification of available supplies is provided in this table as either volume only, percent only, or both.</td></tr>
<tr><th colspan="2">Volume Available</th><th>% of Average Supply</th></tr>
<tr><td>Average Year</td><td>1991-2024</td><td colspan="2"></td><td>100%</td></tr>
<tr><td>Single-Dry Year</td><td>2014</td><td colspan="2"></td><td>107%</td></tr>
<tr><td>Consecutive Dry Years 1st Year</td><td>1991-2024*</td><td colspan="2"></td><td>107%</td></tr>
<tr><td>Consecutive Dry Years 2nd Year</td><td>1991-2024*</td><td colspan="2"></td><td>112%</td></tr>
<tr><td>Consecutive Dry Years 3rd Year</td><td>1991-2024*</td><td colspan="2"></td><td>113%</td></tr>
<tr><td>Consecutive Dry Years 4th Year</td><td>1991-2024*</td><td colspan="2"></td><td>115%</td></tr>
<tr><td>Consecutive Dry Years 5th Year</td><td>1991-2024*</td><td colspan="2"></td><td>117%</td></tr>
<tr><td colspan="5">NOTES: A regression model was developed to estimate water demand under multiple dry year conditions (i.e., prolonged dry conditions without conservation measures), using a 33-year dataset (1991-2024) that excluded drought years to reflect unconstrained demand. Correlation coefficients between demand, temperature, and precipitation were applied to the hottest and driest historical sequences to calculate high-demand scenarios, which were expressed as scaling factors relative to the 33-year average demand.</td></tr>
</table>

7.2 Factors Affecting Water Supply Reliability

To prepare realistic water supply reliability assessments, various factors affecting reliability were considered. These include climate change and environmental requirements, regulatory changes, water quality impacts, and locally applicable criteria.

7.2.1 Climate Change and the Environment

Changing climate patterns are expected to shift precipitation patterns and affect water supply availability. Unpredictable weather patterns will make water supply planning more challenging. Although climate change impacts are associated with exact timing, magnitude, and regional impacts of these temperature and precipitation changes, researchers have identified several areas of concern for California water planners (CAMP4W, 2025). These areas include:

- A reduction in Sierra Nevada Mountain snowpack.
- Extreme heat threatens both infrastructure and the health and safety of human lives.
- Prolonged drought periods.
- Water quality issues associated with increase in wildfires.

- Rising sea levels resulting in:
  - Impacts to coastal groundwater basins due to seawater intrusion.
  - Increased risk of damage from storms, high-tide events, and the erosion of levees.
  - Potential pumping cutbacks to the SWP and Central Valley Project (CVP).

Other important issues of concern due to global climate change include:

- Effects on local supplies such as groundwater.
- Changes in urban and agricultural demand levels and patterns.
- Alterations to power generation and pumping regime.
- Increases in ocean algal blooms affected seawater desalination supplies.

The major impact in California is that without additional surface storage, winter snowpack retaining water storage in the mountains will not last resulting in more water being lost to the oceans.

In addition, the Colorado River Basin supplies have been inconsistent since about the year 2000, with precipitation near normal while runoff has been less than average in two out of every three years. Climate models are predicting a continuation of this pattern whereby hotter and drier weather conditions will result in continuing lower runoff, pushing the system toward a drying trend that is often characterized as long-term drought.

Dramatic swings in annual hydrologic conditions have affected water supplies available from the SWP over the last decade. The declining ecosystem in the Delta has also led to a reduction in water supply deliveries, and operational constraints will likely continue until a long-term solution to these problems is identified and implemented (MET, 2025).

7.2.2 Regulatory and Legal

Ongoing regulatory restrictions, such as those imposed by the Biological Opinions (BiOps) on the effects of SWP and the federal CVP operations on certain marine life, also contribute to the challenge of determining water delivery reliability. Endangered species protection and conveyance needs in the Delta have resulted in operational constraints that are particularly important because pumping restrictions impact many water resources programs – SWP supplies and additional voluntary transfers, Central Valley storage and transfers, and in-region groundwater and surface water storage. BiOps protect special-status species listed as threatened or endangered under the Endangered Species Act (ESA) and imposed substantial constraints on Delta water supply operations through requirements for Delta inflow and outflow and export pumping restrictions.

In addition, the State Water Resources Control Board (SWRCB) has set water quality objectives that must be met by the SWP including minimum Delta outflows, limits on SWP and CVP Delta exports, and maximum allowable salinity level. SWRCB has implemented the new Lower San Joaquin River flow objectives from the Phase 1 Delta Plan amendments through adjudicatory (water rights) and regulatory (water quality) processes. The Lower San Joaquin River flow objectives are estimated to reduce water available for human consumptive use. New litigation, listings of additional species under the ESA, or regulatory requirements imposed by the SWRCB could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage, or other operational changes impacting water supply operations.

The difficulty and implications of environmental review, documentation, and permitting pose challenges for multi-year transfer agreements, recycled water projects, and seawater desalination plants. The timeline and roadmap for getting a permit for recycled water projects are challenging and inconsistently implemented in different regions of the state. Indirect potable reuse projects face regulatory restraints such as treatment, blend water, retention time, and Basin Plan Objectives, which may limit how much recycled water can feasibly be recharged into the groundwater basins. New regulations and permitting uncertainty are also barriers to seawater desalination supplies, including updated Ocean Plan Regulations, Marine Life Protected Areas, and Once-Through Cooling Regulations (MET, 2025).

7.2.3 Water Quality

The following sub-section describes the water quality of the region's water supplies and the measures being taken to continue to deliver high-quality drinking water that meets federal and state regulations.

7.2.3.1 Imported Water

MET is responsible for providing high quality potable water throughout its service area. Over 250,000 water quality tests are performed per year on MET's water to test for regulated contaminants and additional contaminants of concern to monitor the safety of its waters (MET, 2025). MET's supplies originate primarily from the CRA and from the SWP. A blend of these two sources, proportional to each year's availability of the source, is then delivered throughout MET's service area.

Although the CRA and SWP have different water quality characteristics, MET has implemented effective treatment and management strategies to maintain high-quality water. The CRA water source contains higher total dissolved solids (TDS) and the SWP contains higher levels of naturally-occurring organic matter, lending to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's high level of organic matter, MET blends CRA and SWP supplies and has upgraded all its treatment facilities to include ozone treatment processes. In addition, MET has been engaged 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 the following emerging contaminants: N-nitrosodimethylamine, pharmaceuticals and personal care products, microplastics, per- and polyfluoroalkyl substances (PFAS), and 1,4-dioxane (MET, 2025).

PFAS is a group of widely used man-made "forever chemicals" that include both PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate). MET has voluntarily monitored PFAS in its source and treated waters since 2017. Most samples have shown non-detect (ND) for all tested PFAS, including PFOA and PFOS. A limited number of other PFAS—such as PFHxA, PFBA, PFPeA, PFDoA, PFTA, and PFBS, have been detected only at trace levels below their method detection limits. PFOA and PFOS have not been detected in Metropolitan's imported or treated water supplies. Some member agencies, however, have detected these compounds in local groundwater wells, which may require treatment or source management to comply with emerging Division of Drinking Water (DDW) regulations. As DDW and The U.S. Environmental Protection Agency (EPA) establish enforceable maximum contaminant levels (MCL) for PFOA and PFOS, some agencies may supplement their local supplies with increased purchases of Metropolitan water (MET, 2025).

EPA finalized the first national drinking water standards for six PFAS compounds in April 2024. These standards include enforceable MCLs for PFOA and PFOS set at 4 parts per trillion (ppt). In May 2025 the

EPA announced that it would extend the compliance deadline for PFOA and PFOS from 2029 to 2031 to provide additional time for testing, planning, and installation of treatment technologies. While MET and its member agencies continue to monitor and test PFAS in imported and local sources, the delay in the federal compliance date allows additional time to evaluate treatment options, coordinate funding, and plan system upgrades necessary to meet forthcoming federal PFAS standards.

The presence of quagga mussels in water sources is a water quality concern. Quagga mussels are an invasive species that was first discovered in 2007 at Lake Mead, on the Colorado River. This species of mussels forms massive colonies in short periods of time, disrupting ecosystems and blocking water intakes. They can cause significant disruption and damage to water distribution systems. MET has had success in controlling the spread and impacts of the quagga mussels within the CRA; however, the future could require more extensive maintenance and reduced operational flexibility than current operations allow. It also resulted in MET eliminating deliveries of CRA water into Diamond Valley Lake (DVL) to keep the reservoir free from quagga mussels (MET, 2025).

In addition, Golden Mussels, another invasive species capable of disrupting pipelines and altering ecosystems, were detected in the Sacramento–San Joaquin Delta in October 2024 and are now spreading through the SWP. These mussels pose similar concerns due to their ability to obstruct raw water conveyance facilities and negatively affect aquatic environments. Although their presence does not typically result in violations of drinking water standards, unmanaged infestations can degrade habitats, clog infrastructure, and reduce the aesthetic and recreational value of lakes and reservoirs. State and regional agencies continue to monitor golden mussel movement and evaluate appropriate response strategies to limit their spread (MET, 2025).

7.2.3.2 Groundwater

Groundwater is a reliable component of the water supply for Orange County, and the OCWD manages the basin to ensure its long-term quality and sustainability. The basin supports a significant portion of the region’s water demands and is monitored through an extensive network of production, monitoring, and recharge wells that provide data on water levels and water quality conditions across the aquifer system

Orange County Groundwater Basin

OCWD is responsible for managing the Orange County (OC) Groundwater Basin. To maintain groundwater quality, OCWD conducts an extensive monitoring program that serves to manage the OC Basin’s groundwater production, control groundwater contamination, and comply with all required laws and regulations. A network of nearly 700 groundwater wells provides OCWD a source for samples, which are tested for a variety of purposes. OCWD collects samples each month to monitor Basin water quality. The total number of water samples analyzed varies year-to-year due to regulatory requirements, conditions in the basin, and applied research and/or special study demands. These samples are collected and tested according to approved federal and state procedures as well as industry-recognized quality assurance and control protocols (City of La Habra et al., 2017). OCWD routinely tests for hundreds of regulated constituents, but the parameters discussed, PFAS, TDS, and nitrate, are of focus because they represent the most relevant regional and regulatory considerations that influence groundwater management and long-term supply planning. These issues do not indicate that the groundwater basin is unsafe; rather, they are discussed because they are key focus areas for state agencies and water suppliers throughout Southern California. These issues do not indicate that the groundwater basin is unsafe; rather, they are discussed because they are key focus areas for state agencies and water suppliers throughout Southern California.

PFAS are of particular concern for groundwater quality, and since the summer of 2019, DDW requires testing for PFAS compounds in some groundwater production wells in the OCWD area. According to the California State Water Resources Control Board, the federal MCL for PFAS is 4 nanograms per liter (ng/L) (ppt) (California State Water Resources Control Board, 2024).

By 2025 OCWD had restored 49 wells to service with operational treatment systems, with an additional 57 wells in planning, design, or construction stages (ACWA, 2025).These systems continue to rely primarily on granular activated carbon and ion-exchange media operated in lead–lag configuration to achieve non-detect PFAS levels consistent with evolving state and federal regulatory standards (Santa Ana Regional Water Quality Control Board & Orange County Water District, 2023).

Groundwater production in FY 2023–24 totaled 280,420 AF, with slight increases projected over the next two years as additional treatment systems come online, showing continued reductions associated with PFAS-impacted wells that remain offline across several agencies. Salinity is a significant water quality problem in many parts of southern California, including Orange County. Salinity is a measure of the dissolved minerals in water including both TDS and nitrates. OCWD continuously monitors the levels of TDS in wells throughout the Orange County (OC) Basin. TDS currently has a California Secondary MCL of 500 milligrams per liter (mg/L). The portions of the OC Basin with the highest levels are generally located in the cities of Irvine, Tustin, Yorba Linda, Anaheim, and Fullerton. There is also a broad area in the central portion of the OC Basin where TDS ranges from 500 to 700 mg/L. Sources of TDS include the water supplies used to recharge the OC Basin and from onsite wastewater treatment systems, also known as septic systems. The TDS concentration in the OC Basin increased on average from 415 mg/L in 2022-23 to 432 mg/L in 2023-24 (OCWD, 2025).

Nitrates are one of the most common and widespread contaminants in groundwater supplies, originating from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. The MCL for nitrate in drinking water is set at 10 mg/L. OCWD regularly monitors nitrate levels in groundwater and works with producers to treat wells that have exceeded safe levels of nitrate concentrations. OCWD manages the nitrate concentration of water recharged by its facilities to reduce nitrate concentrations in groundwater. This includes the operation of the Prado Wetlands, which was designed to remove nitrogen and other pollutants from the Santa Ana River before the water is diverted to be percolated into OCWD’s surface water recharge system. Although water from the deep aquifer system is of very high quality, it is amber-colored and contains a sulfuric odor due to buried natural organic material, requiring treatment before use as drinking water. The principal aquifer, which supplies most basin pumping, occurs at depths of roughly 300-1,200 feet below ground surface (OCWD, 2025). The total volume of amber-colored groundwater in the deep system is estimated at approximately 1 MAF.

7.2.4 Locally Applicable Criteria

Within Mesa Water, some infrastructure investments, such as the upgrades of Reservoirs 1 and 2 directly affect reliability. The Reservoir Upgrades Project will allow Mesa Water to help manage peak water demands by storing up to an additional 11 million gallons of water at two reservoirs (Mesa Water District, 2024). The project will replace pumps, generators and motors, add new infrastructure to pumping systems and make upgrades to the reservoir management system. Both Reservoirs upgrades began in 2024 and are still in progress.

Over the years, the water agencies in Orange County have made tremendous efforts to integrate their systems to provide flexibility for interchanging with different sources of supply. There are emergency agreements in place to ensure all parts of the County have an adequate supply of water. In the northern part of the County, agencies can meet most of their demands from groundwater with very little limitation, except for the OCWD BPP. For the agencies in south Orange County, most of their demands are met with imported water, and their limitations are based on the capacity of their systems, which are very robust. However, if a major earthquake on the San Andreas Fault occurs, it can potentially be damaging to key water aqueducts and disrupt imported supplies to the entire Southern California for up to six months. The MET region would likely require a water-use reduction of 10-25 percent until the system is repaired. However, MET has taken proactive steps to handle such disruption, such as constructing DVL, which mitigates potential impacts. DVL, along with other local reservoirs, can store a six to twelve-month supply of emergency water (MET, 2025).

7.3 Water Service Reliability Assessment

This section assesses the reliability of Mesa Water District's water service to its customers. This is completed by comparing the projected long-term water demand (Chapter 4), to the projected water supply sources available to Mesa Water District (Chapter 6), in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years.

7.3.1 Normal Year Reliability

In 2025, MWDOC developed water demand forecast models for participating water agencies in Orange County, described in detail in Chapter 4. This 25-year demand forecast uses statistical models to account for demographic, socioeconomic, conservation, and weather variables (MWDOC, 2025). For normal year reliability, the demand forecast represents average weather conditions.

Mesa Water District is 100 percent reliable using locally pumped groundwater for normal year demands from 2025 through 2050. Mesa Water District can receive imported water from MWDOC, if needed to supplement locally pumped groundwater, via connection to MET's regional distribution system. Although pipeline and connection capacity rights do not guarantee the availability of water, they do guarantee the ability to convey water into the local system when it is available to the MET distribution system

A comparison between the supply and demand for projected years between 2025 and 2050 is shown in Table 7.2. The table demonstrates that projected supplies and demands are equal in every planning year, with no anticipated surpluses or shortfalls. As stated above, the available supply will meet projected demands due to a diversified supply and conservation measures limiting and reducing imported demands in the later years.

Table 7.2 Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison

Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison Water Code Section 10635 (a)					
	2030	2035	2040	2045	2050 (Opt)
	(AF)	(AF)	(AF)	(AF)	(AF)
Supply totals (autofill from Submittal Table 6-9 R)	17,911	18,471	17,681	17,787	17,767
Use totals (autofill from Submittal Table 4-2 R)	17,911	18,471	17,681	17,787	17,767
Surplus/(shortfall)	0	0	0	0	0
NOTES: This table compares the projected demand and supply volumes determined in Sections 4.3.2 and 6.1, respectively.					

Table 7.3 Optional Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison-Potable

OPTIONAL Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison - POTABLE					
	2030	2035	2040	2045	2050 (Opt)
	(AF)	(AF)	(AF)	(AF)	(AF)
Supply totals (autofill from Submittal Table 6-9 R)	16,827	17,387	16,597	16,703	16,683
Use totals (autofill from Submittal Table 4-2 R)	16,827	17,387	16,597	16,703	16,683
Surplus/(shortfall)	0	0	0	0	0
NOTES:					

Table 7.4 Optional Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison-Non-Potable

OPTIONAL Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison - NON-POTABLE					
	2030	2035	2040	2045	2050 (Opt)
	(AF)	(AF)	(AF)	(AF)	(AF)
Supply totals (autofill from Submittal Table 6-9 R)	1,084	1,084	1,084	1,084	1,084
Use totals (autofill from Submittal Table 4-2 R)	1,084	1,084	1,084	1,084	1,084
Surplus/(shortfall)	0	0	0	0	0
NOTES:					

7.3.2 Single Dry Year Reliability

A single dry year is defined as a single year of minimal to no rainfall within a period where average precipitation is expected to occur. MWDOC's water demand projection model (described in Section 4.3.1), isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather conditions are reflected as a percentage increase in water demands from the normal year condition (average of FY 2017-18 and FY 2018-19). For a single dry year condition (FY 2013-14), the model projects a seven percent increase in demand for Mesa Water District's service area (MWDOC, 2025). Detailed information of the model is included in Appendix H.

Mesa Water has documented that it is 100 percent reliable for single dry year demands from 2025 through 2050. As shown in Table 7.5, projected single dry year supplies and demands are equal from 2030 to 2050, resulting in no anticipated shortages. This assessment incorporates a seven percent increase in demand above normal-year levels and shows the significant reserves and conservation measures available within MET.

Table 7.5 Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison

Submittal Table 7-3 Retail: Single Dry Year Supply and Use Comparison
Water Code Section 10635(a)

	2030	2035	2040	2045	2050 (Opt)
	(AF)	(AF)	(AF)	(AF)	(AF)
Supply totals	19,202	19,802	18,955	19,068	19,048
Use totals	19,202	19,802	18,955	19,068	19,048
Surplus/(shortfall)	0	0	0	0	0
OPTIONAL Planned WSCP Actions					
WSCP - supply augmentation benefit					
WSCP - use reduction savings benefit					
Revised Surplus/(shortfall)					

NOTES: It is conservatively assumed that a single dry year demand is 7% greater than each respective year's normally projected total water demand.
Groundwater is sustainably managed through the BPP and robust management measures (Section 6.3.4 and Appendix E); surface water (Section 6.4) and contribution to indirect recycled water production (Section 6.6) provide additional local supply; and based on MET's and MWDOC's UWMPs, imported water is available to close any local water supply gap (Section 7.5.1).

7.3.3 Multiple Dry Years Reliability

Multiple dry years are defined as five or more consecutive dry years with minimal rainfall within a period of average precipitation. MWDOC's water demand projection model (described in Section 4.3.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather conditions are reflected as a percentage increase in water demands from the normal year condition (average of FY 2017-18 and FY 2018-19). During multiple dry years, the UWMP applies dry-year adjustment factors to reflect future climate conditions and retail level water demand. These increase seven percent in single-dry and first multiple-dry year, going up to twelve, thirteen, fifteen, and seventeen percent in subsequent drought years, relative to average-year demand (see Table 7.1) (MWDOC, 2025). It is conservatively assumed that a five-year multi dry year scenario is a repeat of the single dry year over five consecutive years.

Mesa Water District has demonstrated that its water supplies remain fully reliable throughout a five-consecutive-year dry period from 2025 through 2050. Even assuming a conservative demand increase of seven percent each year for five consecutive years, Mesa Water District is capable of meeting all customers' demands from 2025 through 2050 (Table 7.6), with significant reserves held by MET and conservation.

The table includes treated and untreated water from MET for M&I and non-M&I demands. The multiple dry-year projections estimate a seven percent increase on imported M&I demand. Non-M&I demand (Irvine Lake and groundwater storage and replenishment) remain constant at 55,617 AFY because these demands are not affected by changes in hydrological conditions. The 2030 column assesses supply and demand for FY 2025-26 through FY 2029-30; the 2035 column assesses FY 2030-31 through FY 2034-35 and so forth, to end the water service reliability assessment in FY 2045-50.

Table 7.6 Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Use Comparison
Water Code Section 10635(a)

		2030	2035	2040	2045	2050 (Opt)
		(AF)	(AF)	(AF)	(AF)	(AF)
First year	Supply totals	19,202	19,802	18,955	19,068	19,048
	Use totals	19,202	19,802	18,955	19,068	19,048
	Surplus/(shortfall)	0	0	0	0	0
Second year	Supply totals	20,052	20,678	19,793	19,912	19,890
	Use totals	20,052	20,678	19,793	19,912	19,890
	Surplus/(shortfall)	0	0	0	0	0
Third year	Supply totals	20,177	20,807	19,917	20,036	20,014
	Use totals	20,177	20,807	19,917	20,036	20,014
	Surplus/(shortfall)	0	0	0	0	0
Fourth year	Supply totals	20,558	21,201	20,294	20,415	20,393
	Use totals	20,558	21,201	20,294	20,415	20,393
	Surplus/(shortfall)	0	0	0	0	0
Fifth year	Supply totals	20,907	21,561	20,638	20,762	20,739
	Use totals	20,907	21,561	20,638	20,762	20,739
	Surplus/(shortfall)	0	0	0	0	0

NOTES: It is conservatively assumed that a five consecutive dry year scenario is a repeat of the single dry year over five consecutive years. The 2030 column assesses supply and demand for FY 2025-26 through FY 2029-30; the 2035 column assesses FY 2030-31 through FY 2034-35 and so forth, in order to end the water service reliability assessment in FY 2049-50. Groundwater is sustainably managed through the BPP and robust management measures (Section 6.3.4 and Appendix I), direct and indirect recycled water uses provide additional local supply (Section 6.6), and based on MET's and MWDOC's UWMP, imported water is available to close any local water supply gap (Section 7.5.1)

7.4 Management Tools and Options

Existing and planned water management tools and options that seek to maximize local resources are described below:

- **Reduced Delta Reliance:** Both MWDOC and MET have demonstrated consistency with Reduced Reliance on the Delta Through Improved Regional Water Self-Reliance (Delta Plan policy WR P1) by reporting the expected outcomes for measurable reductions in supplies from the Delta. MET has improved its self-reliance through methods including water use efficiency, water recycling, stormwater capture and reuse, advanced water technologies, conjunctive use projects, local and regional water supply and storage programs, and other programs and projects. Similarly, MWDOC and its member agencies have further invested in water use efficiency, local water supply projects, and advanced water technologies to increase regional self-reliance. In the near term (2030), regional self-reliance during a normal water year is projected to increase by approximately 601 TAF compared to the 2010 baseline, an improvement equal to nearly 20 percent of projected 2030 retail demands. Looking ahead to 2050, normal year regional self reliance is expected to grow by more than 1.0 MAF above the 2010 baseline, representing an increase of roughly 20 percent of projected 2050 retail demands (MET, 2025).-reliance during a normal water year is projected to increase by approximately 601 TAF compared to the 2010 baseline-year regional self-reliance is expected to grow by more than 1.0 MAF above the 2010 baseline, representing an increase of roughly 20 percent of projected 2050 retail demands (MET, 2025).
- **The continued and planned use of groundwater:** The water supply resources within Mesa Water District's service area provided by the groundwater basins that account for 100% of local supplies available and are used as reservoirs to store water during wet years and draw from storage during dry years,. Groundwater basins are managed within a safe basin operating range so that groundwater wells are only pumped as needed to meet water use. Although Mesa Water District does not manage any of the service area's groundwater basins, Mesa Water District supports and partners in efforts to maintain the health of the local basins through local groundwater recharge efforts such OCWD's Groundwater Replenishment System (GWRS) program.
- **Groundwater storage and transfer programs:** Mesa Water District and OCWD's involvement in Santa Ana River Conservation and Conjunctive Use Program (SARCCUP) includes participation in a conjunctive use program that improves water supply resiliency and increases available dry-year yield from local groundwater basins. The groundwater bank has 137,000 AF of storage (Inland Empire Utilities Agency, 2021). MET has numerous groundwater storage and transfer programs in which MET endeavors to increase the reliability of water supplies, including the Antelope Valley-East Kern Water Agency (AVEK) Waster Agency Exchange and Storage Program and the High Desert Water Bank Program. The IRWD Strand Ranch Water Banking Program has approximately 23,000 AF stored for IRWD's benefit, and by agreement, the water is defined to be an "Extraordinary Supply" by MET and counts essentially 1:1 during a drought/water shortage condition under MET's and MWDOC's Water Savings Action Plan (WSAP). In addition, MET has encouraged storage through its cyclic and conjunctive use programs that allow MET to deliver water into a groundwater basin in advance of agency demands, such as the Cyclic Storage Agreements under the Main San Gabriel Basin Judgement.
- **Increased use of recycled water:** Mesa Water District partners with local agencies in recycled water efforts, including OCWD to identify opportunities for the use of recycled water for irrigation purposes,

groundwater recharge and some non-irrigation applications. OCWD's GWRS and Green Acres Project (GAP) allow southern California to decrease its dependency on imported water and create a local and reliable source of water that meet or exceed all federal and state drinking level standards. Expansion of the GWRS is currently underway to increase the plant's production to 130 MGD and further reduce reliance on imported water.

- **Implementation of demand management measures during dry periods:** During dry periods, water reduction methods to be applied to the public through the retail agencies, will in turn reduce Mesa Water District's overall demands. MWDOC assisted its retail agencies by leading the coordination of the 20 percent by 2020 Orange County Regional Alliance for all of the retail agencies in Orange County. MWDOC assisted each retail water supplier in Orange County in analyzing the requirements of and establishing their baseline and target water use, as guided by DWR.

7.5 Drought Risk Assessment (DRA)

California Water Code (CWC) Section 10635(b) requires every urban water supplier to include, as part of its UWMP, a DRA for its water service as part of information considered in developing its demand management measures and water supply projects and programs. The DRA is a specific planning action that assumes Mesa Water District is experiencing a drought over the next five years and addresses water supply reliability in the context of presumed drought conditions. Together, the water service reliability assessment, DRA, and Water Shortage Contingency Plan (WSCP) allow Mesa Water District to have a comprehensive picture of its short-term and long-term water service reliability and to identify the tools to address any perceived or actual shortage conditions.

CWC Section 10612 requires the DRA to be based on the driest five-year historical sequence for Mesa Water District's water supply. However, CWC Section 10635 also requires that the analysis consider plausible changes on projected supplies and demands due to climate change, anticipated regulatory changes, and other locally applicable criteria.

The following sections describe the methodology and results from Mesa Water District's DRA.

7.5.1 Methodology

As described in more detail in Section 4.3.1, the water demand forecasting model prepared for MWDOC and OCWD isolated the impacts that weather and future climate can have on water demand through the use of an econometric model. In addition to weather related factors, the model incorporates explanatory variables that influence both historical and projected water use, including water price, gross domestic product, median household income, housing density, persons per household, households per account, sectoral employment mix, seasonal patterns, historical conservation trends, drought restrictions, and Coronavirus Disease 2019 (COVID-19) behavioral effects. These variables allow the model to separately quantify how economic conditions, demographic shifts, land use characteristics, and institutional constraints affect demand across residential, commercial, industrial, institutional, and irrigation sectors (MWDOC, 2025).

The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition (average of FY 2017-18 and FY 2018-19). For a single dry year condition (FY 2013-14), the model projects a seven percent increase in demand for Mesa Water District's service area (MWDOC, 2025).

For Mesa Water District, the five consecutive years of FY 2011-12 to FY 2015-16 represent the driest five consecutive year historical sequence for Mesa Water District's service area water supply. This period that spanned water years 2012 through 2016 included the driest four-year statewide precipitation on record (2012-2015) and the smallest Sierra-Cascades snowpack on record (2015, with five percent of average). It was marked by extraordinary heat: 2014, 2015, and 2016 were California's first, second and third warmest year in terms of statewide average temperatures. Locally, Orange County rainfall for the five-year period totaled 36 inches, the driest on record.

7.5.1.1 Water Demand Characterization

Mesa Water supplies all of its demands using locally pumped groundwater. Mesa Water has access to MET imported water as an emergency backup supply. As described in Section 6.2.1, MET's supplies are from the Colorado River, SWP, and in-region storage. In MET's 2025 UWMP, the DRA concluded that even without activating WSCP actions, MET can reliably provide water to all of their member agencies, including MWDOC, through 2050, assuming a five-year drought from FY 2025-26 through FY 2029-30. Beyond this, MET's DRA indicated a surplus of supplies that would be available to all of its member agencies, including MWDOC, should the need arise. Therefore, any increase in demand that is experienced in MWDOC's service area will be met by MET's water supplies.

Based on MWDOC's water demand projection model, in a single dry year, demand is expected to increase by seven percent above a normal year. MWDOC's DRA conservatively assumes that a drought from FY 2025-26 through FY 2029-30 is a repeat of the single dry year over five consecutive years (MWDOC, 2025).

MWDOC developed its water demand forecast model in a number of steps. First, MWDOC estimated total retail demands for its service area. This was based on estimated future demands using historical water use trends, future expected water use efficiency measures, additional projected land-use development, and changes in population. Next, MWDOC estimated the projections of local supplies derived from current and expected local supply programs from MWDOC member agencies. Finally, MWDOC used its demand model to calculate the difference between total forecasted demands and local supply projections. The resulting difference between total demands net of savings from conservation and local supplies is the expected regional demands on MWDOC. The sum of the 1) M&I demand estimated from the model and the 2) non-M&I water for surface water storage and groundwater replenishment, equate MWDOC's demand, which is supplied by MET.

7.5.1.2 Water Supply Characterization

Mesa Water District's assumptions for its supply capabilities are discussed and presented in 5-year increments under its water reliability assessment in Section 7.3. For MWDOC's DRA, these supply capabilities are further refined and presented annually for the years 2026 to 2030, which MWDOC (2025) applied a historical dry-year sequence from within 199-2024 dataset as an analog for five consecutive dry years. For its DRA, MWDOC assessed the reliability of supplies available to MWDOC through MET using historical supply availability under dry-year conditions. MET's supply sources under the CR, SWP, and in-region supply categories are individually listed and discussed in detail in MET's UWMP. Future supply capabilities for each of these supply sources are also individually tabulated in Appendix 3 of MET's UWMP, with consideration for plausible changes on projected supplies under climate change conditions, anticipated regulatory changes, and other factors. MWDOC's supplies are used to meet consumptive use, surface water and groundwater recharge needs that are in excess of locally available supplies. In addition, MWDOC has access to supply augmentation actions through MET. MET may exercise these actions based on regional need, and in accordance with their WSCP, and may include the use of supplies and storage programs within the Colorado River, SWP, and in-region storage.

7.5.2 Total Water Supply and Use Comparison

Mesa Water District's anticipated total water use and supply under a five-year drought from FY 2025-26 through FY 2029-30, are compared in Table 7.7. Mesa Water District's assessment reveals that its supply capabilities are expected to balance with its projected water use for the next five years, from 2026 to 2030, under a repeat of a five-consecutive-year drought.

Table 7.7 Submittal Table 7-5 Retail: Five-Year Drought Risk Assessment

Submittal Table 7-5 Retail: Five-Year Drought Risk Assessment Water Code Section 10635(b)(3)		
2026		**Total**
Total Water Use	(AF)	17,705
Total Supplies	(AF)	17,705
Surplus/Shortfall w/o WSCP Action		0
2027		**Total**
Total Water Use	(AF)	18,488
Total Supplies	(AF)	18,488
Surplus/Shortfall w/o WSCP Action		0
2028		**Total**
Total Water Use	(AF)	18,603
Total Supplies	(AF)	18,603
Surplus/Shortfall w/o WSCP Action		0
2029		**Total**
Total Water Use	(AF)	18,955
Total Supplies	(AF)	18,955
Surplus/Shortfall w/o WSCP Action		0
2030		**Total**
Total Water Use	(AF)	19,277
Total Supplies	(AF)	19,277
Surplus/Shortfall w/o WSCP Action		0
NOTES: Groundwater is sustainably managed through the BPP and robust management measures (Section 6.3.4 and Appendix I); recycled water provides additional local supply (Section 6.6); and based on MET's and MWDOC's UWMPs, imported water is available to close any water supply gap, should the need arise (Section 7.5.1).		

7.5.3 Water Source Reliability

Mesa Water District's potable water supply portfolio is from the Orange County Groundwater Basin, which provides 100 percent of Mesa Water's supply and is expected to remain a reliable source through

FY 2029–30. OCWD’s active basin management, such as adjusting the BPP and securing supplemental recharge supplies, helps maintain long-term groundwater reliability. Local supply is further strengthened by OCWD’s use of indirect potable reuse water from OCWD’s Groundwater Replenishment System, which enhances drought resilience. While emergency interconnections with neighboring agencies are not part of the normal supply mix, they offer additional backup capacity if ever needed. Mesa Water District’s DRA concludes that available supplies meet projected demands during a modeled five-year drought, with the ability to implement MET purchases if necessary.

As detailed in Section 8, Mesa Water District has in place a robust WSCP and comprehensive shortage response planning efforts that include demand reduction measures and supply augmentation actions. However, since Mesa Water District’s DRA shows a balance, no water service reliability concern is anticipated, and no shortfall mitigation measures are expected to be exercised over the next five years. Mesa Water District and its wholesale, MWDOC, will periodically revisit its representation of the supply sources and of the gross water use estimated for each year, and will revise the DRA if needed.

CHAPTER 8 WATER SHORTAGE CONTINGENCY PLANNING

8.1 Background

Water shortage contingency planning is a strategic planning process that Mesa Water District (Mesa Water) engages to prepare for and respond to water shortages. A water shortage is defined when water supply available is insufficient to meet the customer demand at a given point in time. This may occur due to water supply availability changes, water quality changes, and/or catastrophic events (e.g., earthquake). The Water Shortage Contingency Plan (WSCP), included in Appendix F and summarized in this chapter, provides a water supply availability assessment and structured steps designed to respond to actual conditions. This level of detailed planning and preparation is intended to help maintain reliable supplies and reduce the impacts of supply interruptions.

The Water Code Section 10632 requires that every urban water supplier that serves more than 3,000 acre-feet per year (AFY) or has more than 3,000 connections prepare and adopt a standalone WSCP as part of its Urban Water Management Plan (UWMP). The WSCP is required to plan for a greater than 50 percent supply shortage. The WSCP may require updating based on new Department of Water Resources (DWR) requirements every five years and will be adopted as a current update for submission to DWR by July 1, 2026.

8.2 Overview of the Water Shortage Contingency Plan

The WSCP serves as the operating manual that Mesa Water will use to prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages. The WSCP defines the processes and procedures that would be deployed when shortage conditions arise so that Mesa Water's governing body, its staff, and the public can easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate for the degree of water shortfall anticipated. The relationship between the three procedural documents related to planning for and responding to water shortages is graphically depicted in Figure 8.1.

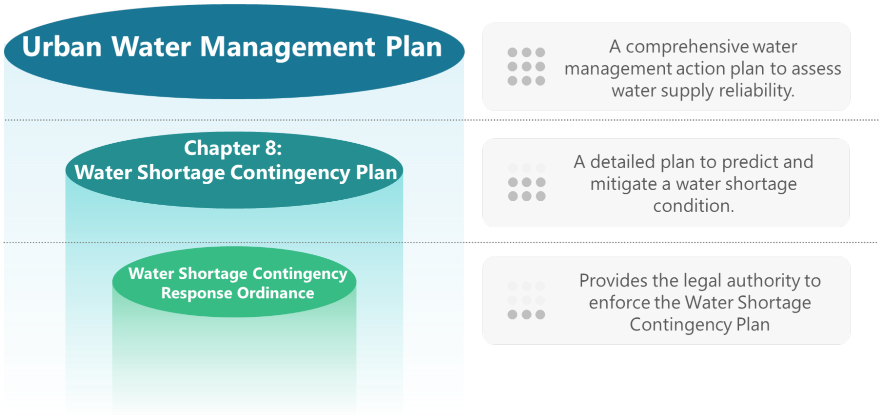


Figure 8.1 Purpose and Relationships of the UWMP, WSCP, and Water Shortage Response Ordinance

A complete version of Mesa Water's WSCP is provided in Appendix F and includes the steps to assess if a water shortage is occurring, and what level of demand reduction actions to trigger the most appropriate response to the water shortage conditions. The WSCP has prescriptive elements, including an analysis of water supply reliability; the drought shortage actions that align with water shortage levels that correspond to water shortage percentages ranging from 10 percent to greater than 50 percent; an estimate of potential to close supply gap for each measure; protocols and procedures to communicate identified actions for any current or predicted water shortage conditions; procedures for an annual water supply and demand assessment; monitoring and reporting requirements to determine customer compliance; and reevaluation and improvement procedures for evaluating the WSCP.

8.3 Summary of Water Shortage Response Strategy and Required DWR Tables

The WSCP is organized into the following three main sections with Section 3 aligned with the California Water Code Section 16032 requirements:

- **Section 1 Introduction and WSCP Overview** gives an overview of the WSCP fundamentals.
- **Section 2 Background Information** provides a background on Mesa Water's water service area.
- **Section 3 Water Shortage Contingency Preparedness and Response Planning.**
    - **Section 3.1 Water Supply Reliability Analysis** provides a summary of the water supply analysis and water reliability findings from the 2025 UWMP.
    - **Section 3.2 Annual Water Supply and Demand Assessment Procedures** provides a description of procedures to conduct and approve the Annual Assessment.
    - **Section 3.3 Six Standard Water Shortage Stages** explains the WSCP's six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50 percent shortages.
    - **Section 3.4 Shortage Response Actions** describes the WSCP's shortage response actions that align with the defined shortage levels.
    - **Section 3.5 Communication Protocols** addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding any current or predicted shortages and any resulting shortage response actions.
    - **Section 3.6 Compliance and Enforcement** describes customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions.
    - **Section 3.7 Legal Authorities** describes the legal authorities that enable Mesa Water to implement and enforce its shortage response actions.
    - **Section 3.8 Financial Consequences of the WSCP** provides a description of the financial consequences of and responses for drought conditions.
    - **Section 3.9 Monitoring and Reporting** describes 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.
    - **Section 3.10 WSCP Refinement Procedures** addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP.

- **Section 3.11 Special Water Feature Distinction** provides a required definition for inclusion in a WSCP per the Water Code.
- **Section 3.12 Plan Adoption, Submittal, and Availability** describes the process Mesa Water followed to adopt its WSCP.

The WSCP is based on adequate details of demand reduction and supply augmentation measures that are structured to match varying degrees of shortage will aim to make the relevant stakeholders understand what to expect during a water shortage situation. Mesa Water adopted water shortage levels consistent with the requirements identified in Water Code Section 10632 (a)(3)(A) (Table 8.1).

The six shortage levels that Mesa Water uses in their water shortage planning and documented in their WSCP are the same as DWR's six standard shortage levels in terms of percentage shortage range for each of the six levels, as indicated in Table 8.1. The water supply augmentation measures that align with each agency shortage level are described in Table 8.2. This table also estimates the extent to which that action will augment supplies to reduce the gap between supplies and demands. The demand reduction action measures that align with each shortage level and how each measure will reduce the shortage gap between expected supplies and the shortage level is summarized in Table 8.3. The purpose of Table 8.2 and Table 8.3 are to demonstrate the results that Mesa Water can expect once shortage level actions are implemented to deliver the expected outcomes necessary to meet the requirements of a given shortage level.

Table 8.1 Cross-Reference for Standard vs Supplier Shortage Levels

<table>
<tr><th colspan="4">Submittal Table 8-1: Cross-reference for Standard vs Supplier Shortage Levels
Water Code Section 10632(a)(3)(B)</th></tr>
<tr><td>☑</td><td colspan="3">Check the box if the Supplier uses the Standard six levels of water shortage.
Proceed to the next table.</td></tr>
<tr><th>Standard Shortage Levels</th><th>Percent Shortage Range</th><th>Suppliers Shortage Levels</th><th>Percent Shortage Range</th></tr>
<tr><td>1</td><td>Up to 10%</td><td></td><td></td></tr>
<tr><td>2</td><td>Up to 20%</td><td></td><td></td></tr>
<tr><td>3</td><td>Up to 30%</td><td></td><td></td></tr>
<tr><td>4</td><td>Up to 40%</td><td></td><td></td></tr>
<tr><td>5</td><td>Up to 50%</td><td></td><td></td></tr>
<tr><td>6</td><td>>50%</td><td></td><td></td></tr>
<tr><td colspan="4">NOTES:</td></tr>
</table>

Table 8.2 Supply Augmentation and Other Actions

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 through 6	Other Purchases	Percentage	0 - 100%	Additional groundwater pumping in the Orange County Groundwater Basin
1 through 6	Other Purchases	Percentage	0 - 100%	Additional imported water purchases through MWDOC
1 through 6	Other Purchases	Percentage	0 - 100%	Interties with City of Santa Ana, City of Newport Beach, and IRWD
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.				
NOTES:				

Table 8.3 Demand Reduction Actions

Submittal Table 8-3 Retail: Demand Reduction Actions
Water Code Section 10632(a)(4)(B) 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					
0	Landscape - Prohibit certain types of landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Watering or irrigation of nonfunctional turf (NFT) on State and local government properties, commercial, industrial and institutional owned landscapes, homeowners' associations common area landscapes, and local government facilities in disadvantaged communities (DAC) is prohibited. See Note 1 below.	No
0	Landscape - Other landscape restriction or prohibition		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Irrigation During Rain Events:** The application of potable water to outdoor landscapes during and up to forty-eight (48) hours after measurable rainfall is prohibited.	Yes
0	Landscape - Prohibit certain types of landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Irrigated Medians:** The use of potable water to irrigate ornamental turf on public street medians is prohibited.	Yes
0	Landscape - Restrict or prohibit runoff from landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Excessive Water Flow or Runoff:** No person shall cause or allow watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive runoff from the property. Additionally, to the extent prohibited by any Statewide statute, or regulation adopted by any State agency with jurisdiction to adopt such regulations, including, but no limited to, the State Water Resources Control Board, no person shall cause or allow water to flow or runoff their property onto adjacent property, non-irrigated areas, private and public walkways, driveways, roadways, gutters or ditches, parking lots, or structures.	Yes
0	Other - Prohibit use of potable water for washing hard surfaces		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.	Yes
0	Water Features - Restrict water use for decorative water features, such as fountains		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Re-circulating Water Required for Water Fountains and Decorative Water Features:** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.	Yes
0	Other - Require automatic shut of hoses		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device that causes it to cease dispensing water immediately when not in use. This subsection does not apply to any commercial car washing facility.	Yes
0	Other		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Installation of Single Pass Cooling Systems:** Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water District.	Yes
0	CII - Other CII restriction or prohibition		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	Yes
0	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Commercial Car Wash Systems:** All commercial conveyor car wash systems must utilize re-circulating water systems or must secure a waiver of this requirement from Mesa Water District.	Yes

Submittal Table 8-3 Retail: Demand Reduction Actions **Water Code Section 10632(a)(4)(B) 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? Volume or Percentage Drop down	Shortage Gap Reduction Value (May be a range) (AF)	Additional Explanation or Reference (OPTIONAL)	Penalty, Charge, or Other Enforcement? **For Retail Suppliers Only** Drop Down List
1	Landscape - Limit landscape irrigation to specific times	Percentage	5%	**Limits on Watering Hours:** Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.	Yes
1	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of five (5) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within ninety-six (96) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
2	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of four (4) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within seventy-two (72) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
3	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within forty-eight (48) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
3	Water Features - Restrict water use for decorative water features, such as fountains	Percentage	2%	**Limits on Filling Ornamental Fountains, Lakes, and Ponds**: Filling or re-filling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level under this Conservation Program.	Yes

Submittal Table 8-3 Retail: Demand Reduction Actions
Water Code Section 10632(a)(4)(B) 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)		
4	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within twenty-four (24) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
5	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of one (1) day per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
5	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Percentage	3%	**Car Washing at Commercial Facilities Only:** Washing of motor vehicles, trailers, boats, aircraft and other types of mobile equipment shall be done only at a commercial car wash with water recycling facilities. No restrictions apply where the health, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables.	Yes
5	Other water feature or swimming pool restriction	Percentage	2%	**No Initial Filling or Re-Filling of Swimming Pools & Spas:** Filling and Re-Filling of residential swimming pools or outdoor spas with water is prohibited.	Yes
6	Landscape - Prohibit all landscape irrigation	Percentage	10%	**No Watering or Irrigating:** Watering or irrigating of lawn, landscape, or other vegetated area is prohibited. This restriction does not apply to the following categories of use: Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self–closing water shut-off nozzle or device; Maintenance of existing landscape necessary for fire protection; Maintenance of existing landscape for soil erosion control; Maintenance of plant materials identified to be rare or essential to the well-being of protected species. Maintenance of landscape within active public parks and playing fields, day care centers, golf course greens, and school grounds, provided that such irrigation does not exceed a maximum of two (2) days per week according to the schedule established in Section 8(b)(1) and time restrictions in Section 6(a); Actively irrigated environmental mitigation projects.	Yes

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.

NOTES: Note 1: NFT irrigation requirements begin January 1, 2027 for State and local government properties, January 1, 2028 for commercial, industrial and institutional owned landscapes, January 1, 2029 for homeowners' associations common area landscapes, and January 1, 2031 for local government properties in disadvantaged communities (DAC).

CHAPTER 9 DEMAND MANAGEMENT MEASURES

Over the past several decades, water use efficiency and conservation have evolved from voluntary best practices into core regulatory requirements shaping urban water management throughout California and Orange County. In response to recurring droughts, growing urban demand, and increasing competition for limited water supplies, the California Urban Water Conservation Council (CUWCC) was formed in 1991 to promote statewide cooperation on urban water conservation. Through the development and implementation of the CUWCC Best Management Practices, water agencies established a consistent, voluntary framework for improving efficiency through locally tailored programs. This early foundation was later strengthened by legislative actions, most notably Senate Bill (SB) X7-7, the Water Conservation Act of 2009, which set enforceable urban water use reduction targets to cut per capita use by 20 percent by 2020 and required retail water suppliers to actively manage demand as part of long-term water planning. All Orange County water agencies came together to create the Orange County 20x2020 Regional Alliance and met compliance as a region. Mesa Water District (Mesa Water) also met compliance individually. These efforts reflected a growing recognition that efficient water use is essential to ensuring reliability amid population growth, limited supplies, and increasing climate variability.

Recurring drought conditions have further accelerated the pace and scale of conservation efforts in the last decade. The 2013–2014 drought prompted a statewide emergency response, culminating in an executive order mandating a 25 percent reduction in urban water use across California. All Orange County Water Agencies, including Mesa Water, met this reduction target as reported in Chapter 5 of this 2025 Urban Water Management Plan (UWMP). More recently, the 2021-2022 drought reinforced the need for sustained efficiency gains and durable demand management strategies beyond temporary emergency actions. These regulatory and hydrologic drivers ultimately led to the passing and adoption of SB 606 and Assembly Bill (AB) 1668, the “Making Conservation a California Way of Life” legislation (passed in 2018 and adopted in 2024). The legislation establishes long-term water use objectives for individual water suppliers and reinforces conservation as a permanent element of water management. Together, these milestones underscore the necessity for the Municipal Water District of Orange County (MWDOC) and Mesa Water to implement comprehensive demand management measures and meet established urban water use reduction targets to ensure regional water supply resilience.

The goal of the Demand Management Measures (DMM) chapter is to provide a comprehensive description of the water use efficiency programs that Mesa Water has implemented in the most recent five years, is currently implementing, and plans to implement to meet its urban water use reduction targets. Per the “Making California a Conservation Way of Life” Framework (Conservation Framework), each Urban Water Supplier is required to calculate and report their Urban Water Use Objective (UWUO) and to stay within their calculated annual water budget. The UWUO is an aggregate efficient water use of:

- Indoor Residential Use (population x gallons per capita per day (GPCD) standard);
- Outdoor Residential Use (measurements of irrigated/irrigable area, local weather data, and a landscape efficiency factor);
- Outdoor Use with Dedicated Irrigation Meters (measurements of irrigated area, local weather data, and a landscape efficiency factor);
- Distribution System Water Losses;

- Approved Variances; and
- Potable Reuse Bonus.

Additionally, the Conservation Framework includes commercial, industrial, and institutional (CII) non-volumetric Performance Measures, including CII customer account classifications, thresholds for converting mixed-use CII meters (MUM) irrigating over half an acre of landscape to dedicated irrigation meters (DIM) or in lieu technologies, CII best management practices (BMP), and identification of and information sharing with disclosable buildings.

One of Mesa Water's top priorities since the adoption of the "Making Conservation a California Way of Life" Framework has been to make progress toward compliance with the Conservation Framework. This chapter will describe Mesa Water's Demand Management Measure (DMM) activities, including those administered by its wholesaler and supplemental programs administered locally at the retail level.

9.1 Mesa Water District Demand Management Measures

This section describes the specific DMMs performed by Mesa Water, including DMMs offered in partnership with MWDOC, its wholesale supplier, to encourage water conservation within their service area. Table 9.1 summarizes DMM implementation by Mesa Water as well as responsibilities of MWDOC.

Table 9.1 DMM Implementation Responsibility and Regional Programs in Orange County

Efficiency Measure	Responsibility of:		MWDOC Regional Program and Activities
	Retailer	MWDOC as a Wholesaler	
Operations Practices			
Wholesale Agency Assistance Programs	-	✓	✓
Conservation Pricing	✓	✓	✓
Conservation Coordinator	✓	✓	✓
Water Waste Prevention	✓	-	✓
Water Loss Control (System Water Audits, Leak Detection and Repair)	✓	(1)	✓
Metering with Commodity Rates	✓	(1)	(1)
Education and Outreach			
Public Outreach Programs	✓	✓	✓
K-20 Water Education Initiatives and K-12 School Programs	✓	✓	✓
OC Scouts Boy Scouts of America (BSA) and OC Girl Scouts Programs	✓	✓	✓
Water Awareness Poster Contest	✓	✓	✓
Water Energy Education Alliance	✓	✓	✓
Qualified Water Efficient Landscaper (QWEL) Training Program	✓	✓	✓
Residential Indoor Implementation			
Residential Indoor Rebates	✓	-	✓
Flow Monitor Device Rebates	✓	-	✓

Efficiency Measure	Responsibility of:		MWDOC Regional Program and Activities
	Retailer	MWDOC as a Wholesaler	
Commercial, Industrial, and Institutional Implementation			
Water Savings Incentive Program	✓	-	✓
On-site Retrofit Program	✓	-	✓
CII Indoor Rebates (High Efficiency Toilets and Urinals, Plumbing Flow Control Valves, Connectionless Food Steamers, Air-cooled Ice Machines, Food Defrosters, Cooling Tower Conductivity Controllers and pH Controllers, Dry Vacuum Pumps, Laminar Flow Restrictors)	✓	-	✓
Landscape Programs			
Turf Replacement Program (including Tree Rebate)	✓	-	✓
Spray-to-Drip Irrigation Rebate Program	✓	-	✓
Landscape Rebates (Smart Timers, High Efficiency Sprinkler Nozzles, Large Rotary Nozzles, In-stem Flow Regulators)	✓	-	✓
Residential Landscape Design Assistance Program	✓	-	✓

Notes:
(1) MWDOC does not own or operate a distribution system; water wholesaled by MWDOC is delivered through the Metropolitan Water District of Southern California (MET) distribution system and meters.

9.1.1 Operations Practices

9.1.1.1 Wholesale Agency Assistance Programs

MWDOC's Assistance Programs are described in Section 9.3.

9.1.1.2 Conservation Pricing

Mesa Water's water rate schedule is based on a uniform rate structure for commodity charges. Mesa Water's water rates effective as of January 1, 2025 are shown below (Table 9.2).

Table 9.2 Mesa Water District Water Rates

Type of Water	Water Rate (per 100 cubic feet)
Potable Water	$6.83
Recycled Water	$4.38
Construction Water	$6.83
Fireline Water	$6.83

9.1.1.3 Water Conservation Staffing Support

Mesa Water has established a position titled Water Use Efficiency Specialist within their Public Affairs Department who is responsible for the development, implementation, and management of Mesa Water's comprehensive Water Use Efficiency Program including promotion and evaluation of water use efficiency measures. The following list highlights areas of responsibility of the Water Use Efficiency Specialist position:

- Develops and implements cost-effective water use efficiency programs; tracks customer contact and program progress; reports on progress.
- Plans and presents landscape workshops; promotes water use efficiency and runoff reduction through public relations, educational speeches, and private contact; monitors and maintains Mesa Water's demonstration gardens and various site landscapes.
- Schedules and conducts audits/inspections for Mesa Water's rebate program, which includes verifying water use efficiency devices, conducting pre-turf & post-turf inspections, and other related tasks.
- Administers, updates, and enforces Mesa Water's Water Conservation Ordinance as necessary; answers questions related to compliance; issues notices of violation and letters to customers not in compliance with current requirements.
- Creates, updates and implements Mesa Water's Water Use Efficiency Plan; participates in the development of Mesa Water's Urban Water Management Plan.
- Gathers, analyzes, and interprets data and information related to water use; captures relevant data in system database; creates tables, queries, forms, and reports utilizing the database; prepares a variety of written reports, correspondence, records, and proposed regulations and procedures; use data to evaluate program effectiveness and develop recommendations for program modifications.
- Identifies and evaluates water use efficiency measures and practices for commercial, industrial, institutional, and residential customers; recommends incentives to alter water use practices including fixture and appliance retrofit programs; calculates cost/benefit analysis; evaluates and purchases devices for implementation.
- Conducts water surveys, investigations, and evaluations of residential, commercial, industrial, and institutional customers; assesses the efficiency of water use, particularly for landscape irrigation; provides recommendations on water usage and efficiency techniques, fixture and appliance retrofit, equipment improvements, and other methods of achieving more efficient water use.
- Calculates water budgets for commercial irrigation customers in accordance with District guidelines and legal requirements.
- Identifies, targets, and measures commercial irrigation accounts; interprets irrigation site plans; measures sites; calculates and updates site budget.
- Utilizes database to determine account usage patterns; installs data loggers on water meters; downloads and evaluates data logger data; recommends changes based on data logger data.
- Interacts with the public, property manager, landscape manager, staff, and outside agencies.
- Assists with the implementation, monitoring, and reporting of water use efficiency research projects and grants; assists in identifying and securing local, state and federal grant funding for water use efficiency programs.
- Participates in representing Mesa Water on water use efficiency issues to committees, meetings, community groups, and the public.
- Provides current program information for Mesa Water's website, newsletters, social media content and collateral materials.

9.1.1.4 Water Waste Prevention Ordinances

Mesa Water's Board of Directors adopted the Water Conservation and Water Supply Emergency Program, Ordinance No. 26, on May 14, 2015. The Conservation Program established an updated and consolidated water supply and water conservation emergency program to conform to additional State Water Resources Control Board Regulations, and the Ordinance established provision for prohibitions against waste as follows:

- Limits on watering hours.
- No excessive water flow or runoff.
- No washing down hard or paved surfaces.
- Obligations to fix leaks, breaks, and malfunctions.
- Re-circulating water required for water fountains and decorative water features.
- Limits on washing vehicles.
- Drinking water served upon requests only.
- Commercial lodging establishments must provide guests option to decline daily linen service.
- No installation of single pass cooling systems.
- No installation of non-re-circulating in commercial car wash and laundry systems.
- Restaurants required to use water conserving dish wash spray valves.
- Commercial car wash systems must use recirculating system.
- Recycled water use is required if available.
- Use recycled water at new service where available, cost-effective, and safe.
- Prohibition to irrigate turf with potable water on medians – replaced with California friendly plants.

The Conservation Program has a permanent water conservation clause and is not dependent upon a water shortage for implementation. In the event of a water supply shortage, the Conservation Program established provisions for three levels of water supply shortage response actions associated with increasingly restrictive prohibitions to be implemented during a declared shortage. Level 1 corresponds to a water supply shortage alert; Level 2 corresponds to a water supply shortage warning; and Level 3 corresponds to a water supply shortage emergency. The provisions and water conservation measures to be implemented in response to each shortage level are described in Mesa Water's Water Shortage Contingency Plan (WSCP).

In June 2021, Ordinance No. 26 was rescinded in favor of Ordinance number 32 – the Water Shortage Response Ordinance – which aligned Mesa Water's code with recent updates to the California Water Code (Water Code) and the recently adopted 2020 UWMP and WSCP. Then, in February 2022, Ordinance No. 32 was rescinded in favor of Ordinance 33- a revised Water Shortage Response Ordinance created to reflect updates to Mesa Water's water shortage policies.

9.1.1.5 Water Loss Control

SB 555 signed into law in 2015 requires urban water suppliers to submit annual, validated water loss audit reports to the California Department of Water Resources (DWR). Water auditing is the basis for effective water loss control. DWR's UWMP Guidebook includes a water audit manual intended to help water utilities complete the American Water Works Association (AWWA) Water Audit on an annual basis. Audits must be validated by a certified water auditor to ensure accuracy.

Mesa Water consistently monitors water production with supervisory control and data acquisition (SCADA) and performs a formal water loss audit each year. Additionally, when a leak is discovered, Mesa Water staff typically respond as soon as it is practical to make repairs. Mesa Water's prescreening audit has determined that typically 94-95 percent of total supply into the system is typically captured in sales.

Meas Water performs the AWWA Water Audit each year and routine maintenance is tracked in a Computerized Maintenance Management System (CMMS). The CMMS plans, schedules, and values all mainline, hydrant, meter, valve, and other infrastructure replacement and maintenance. Mesa Water also allocates a budget and systematic workplan for the replacement and maintenance of the infrastructure, and by following this workplan has spent over $1 million each year replacing routine capital infrastructure including hydrants, valves, and service lines. Mesa Water is currently running a pipeline integrity program to determine the strength, quality, and remaining useful service life of pipelines in the distribution system. This will also direct Mesa Water where leak detection should be increased.

All water service connections supplied by Mesa Water are fully metered, and customers are billed by volume of water used. Mesa Water requires individual metering for all new connections. Mesa Water has a program to replace meters every 15 year as well as replacement of any meters that fail due to malfunctions and under-registration. Calibration testing is performed along with the water loss audit every year. All three inch and larger meters are tested every year to AWWA calibration standards. Mesa Water evaluates the property's water usage versus the meter's efficiency to determine whether meters should be rebuilt and/or replaced. Mesa Water does not have statutory authority to mandate submeters but requires dedicated irrigation meters that are read and billed by Mesa Water for all CII and Multi-Family developments with irrigated landscape over 1,000 square feet. Mesa Water has implemented an Automatic Meter Reading (AMR) pilot project for the meters on its "large customer" route (Route 600) and is currently reviewing its progress and effectiveness and may implement a permanent program in a cost-effective manner.

9.1.2 Public Education and Outreach

Mesa Water implements several public education and outreach measures, including the programs administered by MWDOC, its wholesale supplier. Mesa Water develops, coordinates, and delivers a substantial amount of public information, education, and outreach programs aimed at elevating water agency and consumer awareness and understanding of current water issues as well as efficient water use and water-saving practices, sound policy, and water reliability investments that are in the best interest of the region. These efforts encourage good water stewardship that benefits all of Mesa Water's residents, businesses, and industries across all demographics. An outline of Mesa Water's public education initiatives is below.

9.1.2.1 K-20 Water Education Initiatives and K-12 School Programs

Over the past several years, MWDOC's investment in K-20 water education has significantly grown, evolving to include programs and activities that support environmental literacy for all Orange County students. The effort has expanded beyond K-12 water education programs to include career and workforce development initiatives in higher education through the Water Energy Education Alliance (WEEA) described in more detail in Section 9.1.2.4.

MWDOC's K-12 Water Education School Programs bring standards-aligned, engaging water lessons directly into classrooms and connect water to every part of students' lives. All elementary, middle, and high school programs meet California State Standards and Next Generation Science Standards, providing students with high-quality, relevant learning experiences that build both academic and real-world understanding. This includes a Grab-and-Go Water Activities program, developed in partnership with the Orange County Department of Education, that provides free, self-guided water activities for K-12 teachers, parents and students.

9.1.2.2 OC Scouts Boy Scouts of America (BSA) and OC Girl Scouts Programs

Mesa Water, in partnership with MWDOC, hosts multiple water education workshops each year to help Scouts BSA earn the *Soil & Water Conservation Merit Badge* and Girl Scouts earn the *MWDOC Water Resources & Conservation Patch*. These hands-on science, technology, engineering, and mathematics (STEM) clinics teach children of all ages where their water comes from, how to use water more efficiently, and how all life depends on the health and security of our natural resources, fostering water awareness and responsibility through fun, activity-based learning.

9.1.2.3 Water Awareness Poster Contest

Mesa Water participates in MWDOC's annual Water Awareness Poster Contest, offered for students in grades K-12. The Poster Contest presents children with an opportunity to use their artistic talents to express the importance and value of water through artwork. Each year, hundreds of entries are collected from students and classrooms across the county, and from these entries, 40 winners are selected.

9.1.2.4 Water Energy Education Alliance (WEEA)

The WEEA unites over 260 water, energy, and education leaders across the state to build and strengthen career pathways for all California students. Administered and led by the MWDOC, WEEA is comprised of a powerful statewide coalition of education leaders, workforce advocates, and industry experts to raise student awareness, forge strong partnerships, and cultivate a diverse, highly skilled talent pipeline. By connecting students with high-impact opportunities, WEEA is shaping a workforce that fuels industry success, enhances worker well-being, and ensures a resilient, thriving California.

9.1.2.5 Qualified Water Efficient Landscaper (QWEL) Training Program

Since 2018, MWDOC along with Mesa Water, has offered free QWEL certification classes designed for landscape professionals. Classes are open to any city staff, professional landscaper, water district employee, or maintenance personnel that would like to become a Qualified Water Efficient Landscaper. The QWEL certification program provides 20 hours of instruction on water efficient areas of expertise such as local water supply, sustainable landscaping, soil types, irrigation systems and maintenance, as well as irrigation controller scheduling and programing. QWEL has received recognition from EPA WaterSense for continued promotion of water use efficiency. To earn the QWEL certification, class participants must demonstrate their ability to perform an irrigation audit as well as pass the QWEL exam. Successful graduates will be listed as a Certified Professional on the WaterSense website as well as on MWDOC's landscape resources page, to encourage Turf Removal participants or those making any landscape improvements to hire a QWEL certified professional.

Started in December 2020, a hybrid version of QWEL is available in conjunction with the California Landscape Contractors Association's Water Management Certification Program. This joint effort allows landscape industry an opportunity to obtain two nationally recognized EPA WaterSense Professional Certifications with one course and one written test. This option is offered through MET.

9.1.3 Residential Indoor Rebate Programs

Mesa Water partners with MWDOC to implement residential measures that target indoor water use efficiency for single family and multifamily residential customers.

9.1.3.1 High Efficiency Clothes Washer and Toilet Rebate Programs

The High Efficiency Clothes Washer (HECW) Rebate Program provides residential customers with rebates starting at $85 for purchasing and installing HECWs that use 35-50 percent less water than standard washer models. Devices must meet or exceed the Consortium for Energy Efficiency (CEE) Tier 1 Standard, and a listing of qualified products can be found at ocwatersmart.com. There is a maximum of one rebate per home.

The Premium High Efficiency Toilet (HET) Rebate Program offers residential customers rebates starting at $40 for replacing their toilets using 1.6 gallons per flush (gpf) with Premium HETs. Premium HETs use just 1.1 gallons of water or less per flush, which is 20 percent less water than WaterSense standard toilets

9.1.3.2 Flow Monitor Device Pilot

This pilot program provides rebates starting at $100, or more in select areas, per flow monitor device installed. These devices monitor a home's water use and can help detect leaks, making them a proactive tool for preventing expensive water bills and water damage due to unforeseen leaks. A list of residential rebate-eligible flow monitoring devices is provided.

9.1.4 CII Programs

Mesa Water provides a variety of financial incentives, in partnership with MWDOC, to help businesses, restaurants, institutions, hotels, hospitals, industrial facilities, and public sector sites achieve their efficiency goals. Water users in these sectors have options to choose from a standardized list of water efficient equipment/devices or may complete customized projects through a pay-for-performance where the incentive is proportional to the amount of water saved. Such projects include high efficiency commercial equipment installation and manufacturing process improvements.

9.1.4.1 Water Savings Incentive Program

The Water Savings Incentive Program (WSIP) is designed for non-residential customers to improve their water efficiency through upgraded equipment or services that do not qualify for standard rebates. WSIP is unique because it provides an incentive based on the actual amount of water saved by the customers. This "pay-for-performance" design lets customers implement custom projects for their sites. Mesa Water partners with MWDOC and MET to offer this program.

Projects must save at least 10 million gallons (MG) of water to qualify for the Program, and incentives are paid by MET based on the amount of water saved. Payment amount is up to $0.60 per 1,000 gallons saved per year over the project life, up to a maximum of 10 years. Payments are limited to 50 percent of the eligible project costs while funding is available. Additional funding may be available through MWDOC, but it is limited. Examples of successful projects include but are not limited to: changing industrial process system water to capture and reuse process wastewater, capturing condensation and using it to supplement cooling tower water supply, and replacing water-using equipment with more efficient products.

9.1.4.2 Recycled Water On-site Retrofit Program

Through the Recycled Water On-site Retrofit Program, MWDOC and MET offers incentives for CII properties to convert potable water irrigation or industrial systems to recycled water. Financial incentives of up to $1,950 per acre-foot of potable water saved are available for the customer-side on the meter retrofits. Projects may also be eligible for up to an additional $325 per acre-foot of annual water savings from MWDOC. Recycled water conversion projects can help to ensure a more reliable water future for Orange County.

9.1.4.3 CII Rebates

Mesa Water offers additional financial incentives under the SoCal Water$mart Rebate Program which offers rebates for various water efficient devices to CII customers. Core funding is provided by MET and supplemental funding is sourced from MWDOC via grant funds and/or retail water agencies. Devices include: High Efficiency Toilets and Urinals, Plumbing Flow Control Valves, Connectionless Food Steamers, Air-cooled Ice Machines, Food Defrosters, Cooling Tower Conductivity Controllers and pH Controllers, Dry Vacuum Pumps, and Laminar Flow Restrictors.

9.1.5 Landscape Programs

Some of the most active and effective water use efficiency programs Mesa Water provides are those that target the reduction of outdoor water use. With a large proportion of water consumed outdoors via landscape demands, this sector has been and will continue to be a focus for MWDOC and Mesa Water.

9.1.5.1 Turf Replacement Program

The Orange County Turf Replacement Program offers incentives to replace existing turf grass with California-native, drought-tolerant plants and landscaping. Residential, commercial, and public properties in Mesa Water’s service area are all eligible for this program. The goals of this program are to increase water use efficiency through sustainable landscaping practices that result in multi-benefit projects across Orange County. Participants are encouraged to utilize smart irrigation timers and furthermore, projects are required to include a stormwater capture feature, such as a rain garden or dry stream bed, and have a minimum of three plants per 100 square feet to increase plant density and promote healthy soils. These projects save water and reduce dry and wet weather runoff, increase urban biomass, and sequester more carbon than turf landscapes.

Additionally, MWDOC is piloting a tree program that allows eligible trees to qualify as a sustainability feature in Turf Replacement projects. Beginning March 4, 2024, Turf Replacement Program participants became eligible for an additional incentive for planting trees as part of their Turf Replacement project. Participants can receive up to $100 per tree, for up to 5 trees ($500), in addition to the Turf Replacement rebate. The pilot goals include increasing the presence of trees in Turf Replacement projects and breaking down barriers to participation. It is anticipated that the pilot will be evaluated in 2026.

9.1.5.2 Spray-to-Drip Rebate Program

The Spray to Drip Rebate Program offers residential, commercial, and public agency customers rebates for converting areas irrigated by traditional high-precipitation rate spray heads to low-precipitation rate drip irrigation. Drip irrigation systems are extremely water efficient. Rather than spraying wide areas subject to wind drift, overspray and runoff, drip systems use point emitters to deliver water to specific locations at or near plant root zones. Water drips slowly from the emitters either onto the soil surface or below ground. As a result, less water is lost to wind, evaporation, and overspray, saving water, and reducing irrigation runoff and non-point source pollution. Mesa Water partners with MWDOC to provide $1 per square foot of conversion area when replaced with eligible drip irrigation products.

9.1.5.3 SoCal Water$mart Rebate Program for Landscape

Mesa Water also offers financial incentives under the SoCal Water$mart Rebate Program for a variety of water efficient landscape devices, such as Smart Irrigation Timers and Central Computer Irrigation Controllers, large rotary nozzles and rotating sprinkler nozzles, soil moisture sensors, irrigation master valves, and in-stem flow regulators.

9.1.5.4 Landscape Design Assistance Rebate

This program is offered for residential customers who are participating in the turf replacement program and are seeking professional design services. Participants must hire a landscape design professional to provide a design that meets the rebate eligible design requirements. Participants will receive up to $1,000 upon completion of their turf replacement project if they have used a professional designer.

9.2 Mesa Water District DMM Implementation (2020-2025)

During the past five years, Fiscal Year (FY) 2020-21 to 2024-25, Mesa Water, with the assistance of MWDOC, has continued water use efficiency programs for its residential, CII, and landscape customers with the participation shown below (Table 9.3). Mesa Water will continue to implement all applicable programs in the next five years.

Table 9.3 Mesa Water District Water Use Efficiency Program Participation

Program	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25
High Efficiency Clothes Washer (HECW)	99	31	30	32	40
High Efficiency Toilets (HETs)	4	0	0	0	2
Flow Monitoring Devices (FMD)	--	0	1	1	5
Commercial Plumbing Fixtures (CII)	2	0	251	18	161
Water Savings Incentives Projects (WSIP)	0	0	0	0	0
Turf Replacement (Res.)	18,700	29,375	34,191	21,321	11,922
Turf Replacement (Comm.)	1,620	0	55,661	97,512	86,176

Program	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25
Landscape Design Rebate Program (LDAP)	15	14	18	4	0
Landscape Design Rebate Program (LMAP)	5	6	11	6	0
Spray-to-Drip (Res.)	11,062	13,073	22,386	15,877	5,050
Spray-to-Drip (Comm.)	0	7,972	49,775	32,313	17,021
Rotating Nozzles (Small Res.)	0	0	21	0	0
Rotating Nozzles (Small Comm.)	0	0	0	0	0
Rotating Nozzles (Large Comm.)	0	0	0	0	0
Smart Timers (Res.)	30	18	25	28	11
Smart Timers (Comm.)	2	4	14	8	0
Rain Barrels	2	4	6	3	3
Recycled Water Onsite Retrofits	0	0	0	0	0

9.3 MWDOC Demand Management Implementation Assistance Programs

To help facilitate implementation of DMMs throughout Orange County, MWDOC's wholesale efforts focus on the following three areas: 1) State Water Conservation Compliance Assistance (e.g., Conservation Framework and Non-Functional Turf), 2) Regional Rebate Programs and Local Program Assistance, and 3) Research and Evaluation. This both complies with and goes beyond the Foundational BMPs of Utility Operations Programs requirements.

9.3.1 State Water Conservation Compliance Assistance

To support Orange County retailers with compliance of SB 606 and AB 1668, MWDOC is providing multi-level support to assist agencies in meeting the primary goals of the legislation, including to use water more wisely and to eliminate water waste. Beginning in 2023, urban water suppliers were required to calculate and report their annual UWUO, submit validated water audits annually, and implement and report BMP CII performance measures.

MWDOC offers Orange County water suppliers a "Conservation Framework Technical Assistance Program (TAP)" and "Meter Area Measurements Program" to assist them with compliance with the Conservation Framework.

9.3.1.1 Conservation Framework Technical Assistance Program (TAP)

This program provides Orange County water suppliers with support on tasks that are required as part of the Conservation Framework. An agency may opt in to receive support with any of the following:

- Readiness Assessment - perform a retailer-specific readiness assessment, including task recommendations and pricing to help retail agencies understand what areas need to be addressed.
- Conservation Framework Compliance Plan - create a customized Framework Compliance Plan that outlines (1) what the retailer needs to do to prepare for compliance and (2) what needs to be implemented to achieve the water savings necessary to comply with the Urban Water Use Objective

- Annual Report Compilation and Data Management - support the retailer with Annual Report preparation and assistance; and organize and manage data needed to comply with the reporting requirements of the Regulation.
- CII Account Classification - classify CII customer accounts according to the Regulation requirements and create a guidance plan to keep classifications at 95 percent (or higher)
- CII Best Management Practices (BMPs) and In-Lieu Technologies Implementation Plan - create a customized implementation plan mapping compliance with the Conservation Framework regulation, including the CII BMP requirements of § 974, the in-lieu technologies and accompanying BMP requirements in § 973, and disclosable buildings requirements in § 974a.
- Miscellaneous Framework Technical Assistance – various activities such as:
    - Development of Development of metrics and annual targets to demonstrate progress.
    - Additional training or technical support.
    - Workshop or webinar facilitation to spur cross-team collaborations.
    - Develop outreach and engagement plans and implement meetings to support engagement of internal and external collaborators.

9.3.1.2 Meter Area Measurements Program

The Program assists Orange County water supplier in providing (1) landscape area measurements (LAM) associated with dedicated irrigation meters (DIMs), which may include the creation of water efficiency budgets for dedicated landscape meter customers; (2) identification of MUMs irrigating landscapes greater than half acre and subject to the regulation; and (3) reconciliation of DIM and residential LAMs where areas may overlap.

9.3.2 Regional Rebate Programs and Local Program Assistance

MWDOC develops, obtains funding for, and implements regional water savings rebate programs on behalf of all retail water agencies in Orange County, such as the Turf Replacement Program. This approach minimizes confusion for consumers by providing the same programs with the same participation guidelines, maintains a consistent message to the public to use water efficiently, and provides support to retail water agencies by acting as program administrators for the region. As a leader of water efficiency in Orange County, MWDOC provides a holistic suite of programs that are accessible to all consumer groups in the region. When requested, MWDOC also assists retail agencies in developing and implementing local programs within their service areas. This assistance includes collaboration with each retail agency to design a program that fits that agency’s local needs, including providing staffing, targeting customer classes, acquiring grant funding from a variety of sources, and implementing, marketing, reporting, and evaluating the program.

On behalf of its member agencies, MWDOC also organizes and provides the following:

- Monthly coordinator meetings.
- Marketing materials.
- Public speaking.
- Community events.

9.3.3 Research and Evaluation

An essential part of MWDOC's regional water use efficiency program is the ongoing research and evaluation of both existing and potential initiatives. Research allows an agency to measure the water savings benefits of a specific program and compare those benefits to the costs of implementing the program. This allows the agency to evaluate the economic feasibility of the program when compared to other efficiency projects or existing or potential sources of supply, before investing in new initiatives or continuing to implement existing programs. MWDOC routinely conducts statistical water savings (impact) evaluations and process evaluations to guide strategic investment and ensure the effective management of its regional water use efficiency programs.

From 2021 to 2025, MWDOC conducted several research initiatives to support informed decision-making. In partnership with Flume Data Labs, MWDOC completed its Residential End Use Study in 2021, with subsequent updates in 2022 and 2024. This study provided detailed insights into disaggregated residential indoor and outdoor water use, significantly enhancing the understanding of water use patterns across Orange County. In 2023, MWDOC released its Potential and Opportunities study, which quantified the remaining water savings potential in the Orange County residential market, identified the most promising and cost-effective methods for reducing residential demand, and made recommendations on how best to direct financial and technical assistance to Retail Agencies and consumers for implementing residential water efficiency upgrades.

To assess the economic impact of the Conservation Framework, MWDOC worked with M.Cubed and in 2023 published the Draft Water Use Efficiency Standards Economic Analysis: Impact Assessment of State-Mandated Urban Water Use Objectives. MWDOC continues to evaluate the impact of the regulation and Orange County retailer compliance.

Additionally, MWDOC is piloting a tree program that allows eligible trees to qualify as a sustainability feature in Turf Replacement projects. Pilot goals include increasing the presence of trees in Turf Replacement projects and breaking down barriers to participation. It is anticipated that the pilot will be evaluated in 2026. A pilot research program investigating water savings associated with the replacement of broken pressure regulating valves at residential homes wrapped up in 2025. The results of this study are expected in 2027.

9.4 Urban Water Use Objective and CII Performance Measure Compliance

A large focus for Mesa Water is to implement DMMs that will help them to meet the requirements of the Conservation Framework. DMMs described in this chapter may help to support member agencies with meeting their required UWUO and achieving CII Performance Measure Compliance. In addition, MWDOC provides support to agencies to assist with the calculation of UWUOs and compliance with CII Performance measures via the Meter Area Measurement and TAP Programs, as described in Section 9.3.

9.4.1 UWUO Components

Table 9.4 describes MWDOC's programs that will assist agencies in meeting their UWUO, through both direct measures (programs/activities that result in directly quantifiable water savings) and indirect measures (programs that provide resources promoting water efficiencies to the public that are impactful but not directly measurable). Additionally, MWDOC provides technical assistance to support water suppliers with compliance.

Table 9.4 MWDOC Programs to Help OC Retail Agencies Meet Their Urban Water Use Objectives

UWUO Component	Calculation	Program	Impact
Indoor Residential	Population and GPCD standard	<u>Direct Impact:</u> ▪ High efficiency indoor fixtures and appliance rebates	<u>Direct Impact:</u> ▪ Increased indoor residential efficiencies and reductions of GPCD use
Outdoor Residential	Irrigated/irrigable area measurement and a landscape efficiency factor of local ETo and effective precipitation	<u>Direct Impact:</u> ▪ Turf Replacement ▪ High efficiency irrigation rebates <u>Indirect Impact:</u> ▪ Online resources such as OC Friendly Gardens Webpage ▪ Educational classes	<u>Direct Impact:</u> ▪ Increase outdoor residential efficiencies and reductions of gallons per ft^2 of irrigated/ irrigable area used <u>Indirect Impact:</u> ▪ Provide information, resources, and education to promote efficiencies in the landscape
Outdoor Dedicated Irrigation Meters	Irrigated area measurement and a landscape efficiency factor of local ETo and effective precipitation	<u>Technical Assistance:</u> ▪ DIM landscape classification and measurement <u>Direct Impact:</u> ▪ Turf Replacement ▪ High efficiency irrigation rebates <u>Indirect Impact:</u> ▪ OC Friendly Gardens Webpage ▪ Educational training and resources	<u>Technical Assistance:</u> ▪ Classification and measurement of landscapes associated with DIMs are required to complete the calculation. <u>Direct Impact:</u> ▪ Increase outdoor residential efficiencies and reductions of gallons per ft^2 of irrigated/ irrigable area used. <u>Indirect Impact:</u> ▪ Provide information, resources, and education to promote landscape efficiencies.
Water Loss	Agency-specific loss factor and number of connections	<u>Technical Assistance:</u> ▪ Water Balance Validation ▪ Customer Meter Accuracy Testing ▪ Distribution System Pressure Surveys <u>Direct Impact:</u> ▪ Distribution System Leak Detection	<u>Technical Assistance:</u> ▪ The accuracy of the water loss audit is validated for submission to the State. <u>Direct Impact:</u> ▪ Identify areas of the distribution system that need repair, replacement, or other actions to limit water loss.
Bonus Incentives	Volume of indirect potable reuse water applied to residential and DIM irrigation uses; not to exceed 15% of UWUO	<u>Direct Impact:</u> ▪ Groundwater replenishment system (GWRS)	<u>Direct Impact:</u> ▪ The GWRS (run by Orange County Water District [OCWD]) recharges the groundwater basin with purified, highly treated wastewater, allowing OCWD-member agencies to access indirect potable reuse.

9.4.2 CII Performance Measures

Urban water supplies are required to report BMPs for CII customers. Mesa Water, in partnership with MWDOC, offers a broad variety of programs and incentives to help CII customers implement BMPs and increase their water efficiencies (Table 9.5).

Table 9.5 Mesa Water District CII BMP and Water Efficiency Programs and Incentives

Component	Requirement	Program Offered	Impact
CII Customer Account Classifications	Classify each CII water user, based on the end-use of water for the water user, in accordance with Energy Star Portfolio Manager's 18 broad categories, in addition to 4 other categories.	Technical Assistance: ▪ CII Customer Account Classification	Technical Assistance: ▪ Classify customer accounts according to the specified categories to comply with the regulation.
Large Landscape Identification	Identify all CII water users associated with large landscapes – landscapes irrigated with a mixed-use meter greater than half an acre	Technical Assistance: ▪ Large Landscape identification	Technical Assistance: ▪ Identify and map landscapes associated with MUM landscapes that are greater than half an acre to comply with the regulation.
Best Management Practices (BMPs)	Offer CII BMPs for customers that exceed the recommended size, volume of water use, or another threshold	Technical Assistance: ▪ BMP Implementation Plan	Technical Assistance: ▪ Provide a BMP Implementation Plan to guide water suppliers with a roadmap to compliance with the regulation.
Disclosable Buildings	Identify disclosable buildings in service area according to the list provided by the California Energy Commission	Technical Assistance: ▪ Disclosable buildings list	Technical Assistance: ▪ Provide the California Energy Commission list of disclosable buildings by water supplier to comply with the regulation.

CHAPTER 10 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

The Water Code requires the Urban Water Management Plan (UWMP) to be adopted by Mesa Water District's (District) governing body. Before the adoption, Mesa Water must hold a public hearing allowing members of the public to provide input on the UWMP. Prior to the public hearing, Mesa Water must notify the public and surrounding cities, counties and water agencies within its service area of the scheduled public hearing. Upon completion of the public hearing, Mesa Water's governing body shall vote to adopt the UWMP. Post adoption, Mesa Water submits the UWMP to the Department of Water Resources (DWR) while also making it available for public access. This section provides a record of the process Mesa Water followed to adopt and implement its UWMP.

10.1 Overview

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, Mesa Water worked closely with other entities to develop and update this planning document. Mesa Water also encouraged public involvement through its public review and hearing process, which provided residents with an opportunity to learn and ask questions about their water supply management and reliability. Through the public hearing, the public has an opportunity to comment and put forward any suggestions for revisions of the Plan.

Table 10.1 summarizes external coordination and outreach activities carried out by Mesa Water and their corresponding dates. The UWMP checklist to confirm compliance with the Water Code is provided in Appendix A.

Table 10.1 External Coordination and Outreach

External Coordination and Outreach	Date	Reference
Notified city or county within supplier's service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing)	4/24/2026	Appendix I
Public Hearing Notice	06/08/2026 06/15/2026	
Held Public Hearing	6/24/2026	Appendix I
Adopted UWMP and WSCP	6/24/2026	Appendix J
Submitted UWMP to DWR (no later than 30 days after adoption)	07/01/2026	-
Submitted UWMP to the California State Library (no later than 30 days after adoption)	07/01/2026	-
Submitted UWMP to the cities and county within the supplier's service area (no later than 30 days after adoption)	07/01/2026	-

Notes:
WSCP – Water Shortage Contingency Plan

This UWMP was adopted by the Board of Directors on June 24, 2026. A copy of the adopted resolution is provided in Appendix J.

10.2 Agency Coordination

The Water Code requires the Suppliers preparing UWMPs to notify any city or county within their service area at least 60 days prior to the public hearing. As shown in Table 10.2, Mesa Water sent a Letter of Notification to the County of Orange and the cities within its service area on April 24, 2026, to state that it was in the process of preparing an updated UWMP. This notice of preparation is included in Appendix I.

Table 10.2 Submittal Table 10-1 Retail: Notification to Cities and Counties

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)**
Costa Mesa	Yes	Yes
Newport Beach	Yes	Yes
County Name **Drop Down List**	60 Day Notice **Drop Down (yes/no)**	Notice of Public Hearing **Drop Down (yes/no)**
Orange County	Yes	Yes
NOTES:		

Mesa Water's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. Mesa Water relies on its local groundwater supply from Orange County Water District (OCWD), the agency that manages the Orange County Basin and recycled water from OCWD's Green Acres Project (GAP) and has the ability to import water from MWDOC as an emergency supply source, if needed. As such, Mesa Water involved the relevant agencies in this 2025 UWMP at various levels of contribution as described below.

Mesa Water's 2025 UWMP leveraged data and regionally consistent analyses supplied by MWDOC, such as population projections from the Center for Demographic Research at California State University, Fullerton (CDR) and the information quantifying water availability to meet Mesa Water's projected demands for the next 25 years, in five-year increments. This 2025 UWMP was developed in collaboration with MWDOC's 2025 UWMP to ensure consistency between the two documents.

As a groundwater producer who relies on supplies from the OCWD-managed Orange County Basin, Mesa Water coordinated the preparation of this 2025 UWMP with OCWD. Several OCWD documents, such as the Groundwater Reliability Plan, Engineer's Report, and Basin 8-1 Alternative were used to retrieve the required relevant information, including the projections of the amount of groundwater Mesa Water is allowed to extract in the 25-year planning horizon.

The various planning documents of the key agencies that were used to develop this UWMP are listed in Chapter 2.

10.3 Public Participation

Mesa Water encouraged community and public interest involvement in the Plan update through a public hearing and inspection of the draft document on June 24, 2026. As part of the public hearing, Mesa Water discussed adoption of the UWMP, key components of the UWMP and the conclusions that served as the basis of the UWMP. Copies of the draft 2025 UWMP were placed for public review at the Mesa Water office.

Public hearing notifications were sent to retail agencies and other interested parties. A copy of the Notice of Public Hearing is included in Appendix I.

The hearing was conducted during a regularly scheduled meeting of the Board of Directors.

10.4 UWMP Submittal

The Board of Directors reviewed and approved the 2025 UWMP at its June 24, 2026 meeting, after the public hearing. See Appendix J for the resolution approving the Plan.

By July 1, 2026 Mesa Water's adopted 2025 UWMP was filed with DWR and sent directly to California State Library, County of Orange, and cities within Mesa Water's service area. The submission to DWR was done electronically through the online submittal tool – WUE Data Portal. Mesa Water will make the Plan available for public review on its website no later than 30 days after filing with DWR.

10.5 Amending the Adopted UWMP or WSCP

Based on DWR's review of the UWMP, Mesa Water will make any amendments in its adopted UWMP, as required and directed by DWR and will follow each of the steps for notification, public hearing, adoption, and submittal for the amending the adopted UWMP.

If Mesa Water revises its Water Shortage Contingency Plan (WSCP) after UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

CHAPTER 11 REFERENCES

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APPENDIX A

UWMP WATER CODE CHECKLIST

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	Section 1.2
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, Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
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	Chapter 1 and Section 2.1
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 2.1
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	Section 2.1
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	Section 2.1
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	Sections 2.2.3, 10.1 and 10.3, Appendix I
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	Sections 2.2.1 and 10.2
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	Sections 2.2.2 and 4.2
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 for Retailers
x	x	3	Chapter 3.0	10631(a)	Describe the Supplier service area.	System description	n/a	Section 3.2
x	x	3.3	Section 3.3	10631(a)	Describe the climate of the Supplier's service area.	System description	n/a	Section 3.3
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 3.4
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	Section 3.4.2
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 3.5
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 4.1 and 4.2
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	Section 4.4 and Appendix D
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	Section 4.4

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	Section 4.3
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	Section 4.2
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	Section 4.3 and Appendix H
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	Section 4.3.1
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	Section 4.3.2 and Appendix H
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 for Retailers
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	Section 5.1
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	Sections 6.1, 6.2, 6.3, 6.6, 6.7, and 6.8
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 7.1, 7.2, 7.3, and 7.5
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	Section 6.3
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	Section 6.3.1.2 and Appendix E
x	x	6.2	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System supplies	n/a	Section 6.3.1.1
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	Sections 6.3.1.2 and 6.3.1.3

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	Section 6.3.1.2
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	Sections 6.3.1.2, 6.3.1.3, 6.3.1.4, and 6.3.1.5
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 6.3 and 6.3.1
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 6.1, 6.3.1.1, 6.3.2
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 6.1, 6.2, 6.3, 6.6, 6.7, and 6.8
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 6.8
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 6.6.2
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 6.6.2
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 6.6.3
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 6.6.5
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 6.6.4
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 6.6.4
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 6.6.6
x	x	6.2	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System supplies	6-7	Section 6.7
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 6.2.5, 6.3.2, 6.6.4, 6.7.2, 6.8.2, and 6.9
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	Section 6.10
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 7.2.3

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	Section 7.3
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	Section 7.4
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 7.5
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	Section 7.5.1
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	Sections 7.3, 7.5.2, 7.5.3
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 7.5.2
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 7.2 and 7.5.1
x	x	8	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water shortage contingency planning	n/a	2025 UWMP Appendix F - WSCP
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	2025 UWMP Appendix F - WSCP (Section 3.1)
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	2025 UWMP Appendix F - WSCP (Section 3.2.1)
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	2025 UWMP Appendix F - WSCP (Section 3.2.2)
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	2025 UWMP Appendix F - WSCP (Section 3.3)
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	2025 UWMP Appendix F - WSCP (Section 3.3)
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	2025 UWMP Appendix F - WSCP (Section 3.4)
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	2025 UWMP Appendix F - WSCP (Section 3.4.2)
x	x	8.4	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water shortage contingency planning	8-2	2025 UWMP Appendix F - WSCP (Section 3.4.3)
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	2025 UWMP Appendix F - WSCP (Section 3.4.4)

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	2025 UWMP Appendix F - WSCP (Appendix A)
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	2025 UWMP Appendix F - WSCP (Section 3.4.6)
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	2025 UWMP Appendix F - WSCP (Section 3.5)
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	2025 UWMP Appendix F - WSCP (Section 3.6)
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	2025 UWMP Appendix F - WSCP (Section 3.6)
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	2025 UWMP Appendix F - WSCP (Section 3.7)
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	2025 UWMP Appendix F - WSCP (Section 3.7)
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	2025 UWMP Appendix F - WSCP (Section 3.7)
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	2025 UWMP Appendix F - WSCP (Section 3.8)
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	2025 UWMP Appendix F - WSCP (Section 3.8)
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	2025 UWMP Appendix F - WSCP (Section 3.8)
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	2025 UWMP Appendix F - WSCP (Section 3.9)
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	2025 UWMP Appendix F - WSCP (Section 3.10)
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	2025 UWMP Appendix F - WSCP (Section 3.11)
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	2025 UWMP Appendix F - WSCP (Section 3.12)
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 9.2
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 for Retailers
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 2.2.3, 10.1, and 10.3

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	Sections 10.1 and 10.2, Appendix I
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, 202 6.	Plan adoption, submittal, and implementation	n/a	Sections 10.1 and 10.4
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 2.2.3, 10.1 and 10.3, Appendix I
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	Appendix I
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	Appendix J of UWMP and Appendix D of WSCP
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 10.1 and 10.4
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 10.1 and 10.4
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	Section 10.5
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	Section 10.5 of UWMP and Section 3.12 of WSCP
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 10.1 and 10.4
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 10.1 and 10.4, Appendix F
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 - Supplier is not regulated by the Public Utilities Commission

APPENDIX B

DWR STANDARDIZED TABLES

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			
CA3010004	Mesa Water District	24,425	16,515
	Total	24,425	16,515

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.	Orange County 20x2020 Regional Alliance
☐	**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)	
7/1	
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
Municipal Water District of Orange County
Orange County 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)
	110,432	114,184	119,811	120,548	122,460	120,958

NOTES:
Source (up to 2035): Transportation Analysis Zone level data provided by Southern California Association of Governments as used in 2024 Connect SoCal.
Source (from 2040 onwards): Center for Demographic Research at California State University, Fullerton, 2025.

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	4,247
Multi-Family		Potable	4,931
Institutional/Governmental		Potable	1,667
Commercial		Potable	3,414
Industrial		Potable	235
Landscape		Potable	54
Other (optional)	Hydrant Meters/Construction	Potable	27
Landscape	Title 22 tertiary treated recycled	Non-Potable	847
Distribution System Water Loss		Potable	1,093
		Subtotal Potable	15,667
		Subtotal Non-Potable	847
		Total	16,515

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: Distribution System Water Loss is calculated as the difference between total potable production and use for FY 2025.

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	5,130	5,383	4,490	4,464	4,464
Multi-Family		Potable	5,673	5,953	5,947	6,087	6,063
Commercial	Includes Instutional and Industrial uses	Potable	5,139	5,139	3,711	3,707	3,713
Landscape	Includes Agriculture use	Potable	14	14	1,606	1,598	1,598
Landscape	Includes Agriculture use	Non-Potable	1,084	1,084	1,084	1,084	1,084
Distribution System Water Loss	Includes Other uses	Potable	871	898	842	847	846
		Subtotal Potable	16,827	17,387	16,597	16,703	16,683
		Subtotal Non-Potable	1,084	1,084	1,084	1,084	1,084
		Total	17,911	18,471	17,681	17,787	17,767

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:
Source (up to 2035): Mesa Water District CIP Update
Source (from 2040 onwards): 2025 Orange County Water Demand Projection Model Forecast for Mesa Water District

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.	Chapter 4.3
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.	Chapter 4.3

DWR NOTES: Additional guidance is provided in Appendix K.

NOTES: Future water savings include passive conservation (defined as water savings that occur without incentives). Active conservation (defined as water savings that occur with incentives) is not included in the projections.

The demand projection methodology accounted for the entire population of the service area (i.e. all income levels).

Optional Submittal Table 4-4 Retail: Passive Water Savings Projections
Water Code Section 10631(d)(4)(A)

Description (Codes, Standards, Ordinances, or Plans)	Passive savings				
	2030 (AF)	**2035 (AF)**	**2040 (AF)**	**2045 (AF)**	**2050 opt (AF)**
Add additional rows as needed					
Passive Water Savings	187	194	199	201	201

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: Passive conservation here is defined as water savings that occur without incentives. Based on the 2025 Orange County Water Demand Projection Model, passive conservation is assumed to equal a 1.9 percent decrease in residential demand due to conservation by 2030 (linearly extrapolated), then remains constant in subsequent years.

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		
CA3010004	**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: Water Loss Audits reported in Fiscal Years (CY).

Submittal Table 4-6 Retail: Progress Towards 2028 Water Loss Standard
Water Code Section 10631(d)(3)(C)

		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		
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.	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.											
CA3010004	Yes	16.7	Gallons per Service Connection per Day (GPSCD)	22,529	382.89	15.2	11.4	Gallons per Service Connection per Day (GPSCD)	22,529	270.54	10.7

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:
Uses the Water Board’s calculated water loss standards updated as of 01/30/2026 and AWWA Water Loss Audit for FY 2025. Connection count may differ from what is reported in Table 2-1 R for FY 2025.

<table>
<tr><th colspan="7">Submittal Table 5-1 Retail: SB X7-7 2020 Target Progress
Water Code Section 10608.40</th></tr>
<tr><td>☐</td><td colspan="6">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.</td></tr>
<tr><td rowspan="2">Was Supplier part of a merger or consolidation since 2020?</td><td rowspan="2">Regional Alliance Target or Individual Target?
Drop down list</td><td rowspan="2">2020 Target</td><td rowspan="2">Actual 2020 GPCD</td><td rowspan="2">Did Supplier Achieve Targeted Reduction for 2020?</td><td colspan="2">Only for suppliers that did not meet the Target in 2020
See DWR NOTES below.</td></tr>
<tr><td>Actual 2025 GPCD (From SB X7-7 Compliance Form)</td><td>Did Supplier meet the 2020 Target in 2025?</td></tr>
<tr><td>No</td><td>Individual Target</td><td>143</td><td>85</td><td>Yes</td><td></td><td>NA</td></tr>
<tr><td colspan="7">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.
NA=Not Applicable</td></tr>
<tr><td colspan="7">NOTES: Supplier met the 2020 target, actual 2025 GPCD not required.</td></tr>
</table>

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		Orange County Groundwater Basin	16,551	16,326	14,778	14,860	15,667
		Total	16,551	16,326	14,778	14,860	15,667

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: Source - MWDOC, 2025. These values include groundwater pumped from both clear wells and MWRF amber wells.

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				
Costa Mesa Sanitary District (CMSD)	Estimated	9,248	OCSD Plant 1, Place ID 758392	No
			OCSD Plant 2, Place ID 259158	No
Total Wastewater Received from UWMP Service Area in 2025:		9,248		

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: Based on a return rate of 56% (based on 2013 return rate study).

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:

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										
Landscape irrigation (exc golf courses)	Non-Potable	OCWD	847	1084	1084	1084	1084	1084		
Golf course irrigation	Non-Potable	OCWD								
		Subtotal Potable	0	0	0	0	0	0	0	
		Subtotal Non-Potable	847	1,084	1,084	1,084	1,084	1,084	0	
		Total	847	1,084	1,084	1,084	1,084	1,084	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: Table does not include groundwater recharge (IPR) numbers as they are not sepeare from OCWD's supply.

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		
Landscape irrigation (exc golf courses)	500	847
Golf course irrigation	600	
Total	1,100	847

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: Source - Mesa Water District

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:

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.
	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							
Replacement of Clear Groundwater Well 5	No	N/A					580
Brackish Groundwater Desalination (Local Supply Improvement Project)	Yes	OCWD, City of Huntington Beach, and City of Newport Beach			2035-2040		1,000
Increase in Local Supply Improvement Project Capacity	Yes	City of Huntington Beach and City of Newport Beach					2,000

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: The additional annual yield of clear Well 5 considers a BPP of 85 percent. All values are rounded to nearest 10 AFY.

Submittal Table 6-8 Retail: Water Supplies — Actual
Water Code Section 10631(b)

Water Supply		**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	Additional Description (as needed)	**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				
Groundwater (not desalinated)	Orange County Groundwater Basin	Potable	15,667	
Recycled Water	OCWD	Non-Potable	847	
		Subtotal Potable	15,667	0
		Subtotal Non-Potable	847	0
		Total	16,515	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.

Total Entitlement: e.g. Water Right, Groundwater Allocation, Contracted Amount.

NOTES: Sources - MWDOC, 2025 for groundwater, Mesa Water District for recycled water.

Submittal Table 6-9 Retail: Water Supplies — Projected
Water Code Section 10631 (b)

Water Supply	Additional Detail on Water Supply	**Potable or Non-Potable** (after treatment if treated) (OPTIONAL) Drop Down list	**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			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												
Groundwater (not desalinated)	Orange County Groundwater Basin	Potable	16,827		17,387		16,597		16,703		16,683	
Recycled Water	OCWD	Non-Potable	1,084		1,084		1,084		1,084		1,084	
Subtotal Potable			16,827	0	17,387	0	16,597	0	16,703	0	16,683	0
Subtotal Non-Potable			1,084	0	1,084	0	1,084	0	1,084	0	1,084	0
Total			17,911	0	18,471	0	17,681	0	17,787	0	17,767	0

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: Sources - MWDOC, 2025 for groundwater, Mesa Water District for recycled water.

Optional Submittal Table O-1A: Recommended Energy Reporting - SINGLE DELIVERY PRODUCT - WATER SUPPLY PROCESS APPROACH

Water Delivery Product drop down list (If delivering more than one type of product recommend using Table O-1C)	Retail Potable Deliveries
Start Date of Reporting Period	7/1/2024
End Date of Reporting Period	6/30/2025
Is upstream embedded energy included in the values reported?	No

	Only for Water Delivery Products Under the Urban Water Supplier's Operational Control								
	Water Management Process							Non-Consequential Hydropower (if applicable)	
	Units for Water Volume	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	**Total Utility** See DWR NOTES	Hydropower	Net Utility
Volume of Water Entering Process	AF	15,624			3,123	14,875	14,875		14,875
Energy Consumed (kWh)	N/A	13,435,338			640,247	2,506,937	16,582,522		16,582,522
Energy Intensity (kWh/vol. converted to MG)	N/A	2,639	0	0	629	517	3,421	0	3,421

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)

Data Quality Narrative:

Volume of Water Entering Process: Extraction data based on MWDOC Compiled Water Audits “Volume From Own Sources” and Distribution data based on MWDOC Compiled Water Audits “Authorized Consumption.” Non-Revenue Wate
is not considered in this calculation – the energy efficiency is based on water delivered to customers.

Energy Consumed: Based on metered data.

Narrative:

Mesa Water relies on local groundwater, and recycled water to meet its customers' water needs. Operational control is limited to groundwater wells, a treatment facility, and potable water booster stations.

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:** [insert location from UWMP]
		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	1991-2024		100%
Single-Dry Year	2014		107%
Consecutive Dry Years 1st Year	1991-2024		107%
Consecutive Dry Years 2nd Year	1991-2024		112%
Consecutive Dry Years 3rd Year	1991-2024		113%
Consecutive Dry Years 4th Year	1991-2024		115%
Consecutive Dry Years 5th Year	1991-2024		117%

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:

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)	17,911	18,471	17,681	17,787	17,767
Use totals (autofill from Submittal Table 4-2 R)	17,911	18,471	17,681	17,787	17,767
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: This table compares the projected demand and supply volumes determined in Sections 4.3.2 and 6.1, respectively.

If you choose to fill these optional tables, please paste the combined information in the submittal table to the left.

OPTIONAL Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison - POTABLE

	2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)	2050 (AF)
Supply totals (autofill from Submittal Table 6-9 R)	16,827	17,387	16,597	16,703	16,683
Use totals (autofill from Submittal Table 4-2 R)	16,827	17,387	16,597	16,703	16,683
Surplus/(shortfall)	0	0	0	0	0
OPTIONAL Planned WSCP Actions					
WSCP - supply augmentation benefit					
WSCP - use reduction savings benefit					
Revised Surplus/(shortfall)					

NOTES: This table compares the projected demand and supply volumes determined in Sections 4.3.2 and 6.1, respectively.

OPTIONAL Submittal Table 7-2 Retail: Normal Year Supply and Use Comparison - NON-POTABLE

	2030 (AF)	2035 (AF)	2040 (AF)	2045 (AF)	2050 (AF)
Supply totals (autofill from Submittal Table 6-9 R)	1,084	1,084	1,084	1,084	1,084
Use totals (autofill from Submittal Table 4-2 R)	1,084	1,084	1,084	1,084	1,084
Surplus/(shortfall)	0	0	0	0	0
OPTIONAL Planned WSCP Actions					
WSCP - supply augmentation benefit					
WSCP - use reduction savings benefit					
Revised Surplus/(shortfall)					

NOTES: This table compares the projected demand and supply volumes determined in Sections 4.3.2 and 6.1, respectively.

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	19202	19802	18955	19068	19048
Use totals	19202	19802	18955	19068	19048
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

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	19202	19802	18955	19068	19048
	Use totals	19202	19802	18955	19068	19048
	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	20052	20678	19793	19912	19890
	Use totals	20052	20678	19793	19912	19890
	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	20177	20807	19917	20036	20014
	Use totals	20177	20807	19917	20036	20014
	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	20558	21201	20294	20415	20393
	Use totals	20558	21201	20294	20415	20393
	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	20907	21561	20638	20762	20739
	Use totals	20907	21561	20638	20762	20739
	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:

Submittal Table 7-5 Retail: Five-Year Drought Risk Assessment Water Code Section 10635(b)(3)	
2026	**Total**
Total Water Use (AF)	17,705
Total Supplies (AF)	17,705
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)	18,488
Total Supplies (AF)	18,488
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)	18,603
Total Supplies (AF)	18,603
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)	18,955
Total Supplies (AF)	18,955
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)	19,277
Total Supplies (AF)	19,277
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:	

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:

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 through 6	Other Purchases	Percentage	0 - 100%	Additional groundwater pumping in the Orange County Groundwater Basin
1 through 6	Other Purchases	Percentage	0 - 100%	Additional imported water purchases through MWDOC
1 through 6	Other Purchases	Percentage	0 - 100%	Interties with City of Santa Ana, City of Newport Beach, and IRWD
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.				
NOTES:				

Submittal Table 8-3 Retail: Demand Reduction Actions
Water Code Section 10632(a)(4)(B) 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					
0	Landscape - Prohibit certain types of landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Watering or irrigation of nonfunctional turf (NFT) on State and local government properties, commercial, industrial and institutional owned landscapes, homeowners' associations common area landscapes, and local government facilities in disadvantaged communities (DAC) is prohibited. See Note 1 below.	No
0	Landscape - Other landscape restriction or prohibition		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Irrigation During Rain Events:** The application of potable water to outdoor landscapes during and up to forty-eight (48) hours after measurable rainfall is prohibited.	Yes

0	Landscape - Prohibit certain types of landscape irrigation		On-going Long Term- Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Irrigated Medians:** The use of potable water to irrigate ornamental turf on public street medians is prohibited.	Yes
0	Landscape - Restrict or prohibit runoff from landscape irrigation		On-going Long Term- Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Excessive Water Flow or Runoff:** No person shall cause or allow watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive runoff from the property. Additionally, to the extent prohibited by any Statewide statute, or regulation adopted by any State agency with jurisdiction to adopt such regulations, including, but no limited to, the State Water Resources Control Board, no person shall cause or allow water to flow or runoff their property onto adjacent property, non-irrigated areas, private and public walkways, driveways, roadways, gutters or ditches, parking lots, or structures.	Yes
0	Other - Prohibit use of potable water for washing hard surfaces		On-going Long Term- Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.	Yes
0	Water Features - Restrict water use for decorative water features, such as fountains		On-going Long Term- Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Re-circulating Water Required for Water Fountains and Decorative Water Features:** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.	Yes

0	Other - Require automatic shut of hoses		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device that causes it to cease dispensing water immediately when not in use. This subsection does not apply to any commercial car washing facility.	Yes
0	Other		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Installation of Single Pass Cooling Systems:** Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water District.	Yes
0	CII - Other CII restriction or prohibition		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	Yes
0	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Commercial Car Wash Systems:** All commercial conveyor car wash systems must utilize re-circulating water systems, or must secure a waiver of this requirement from Mesa Water Distirct.	Yes

1	Landscape - Limit landscape irrigation to specific times	Percentage	5%	**Limits on Watering Hours:** Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.	Yes
1	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of five (5) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user’s plumbing or distribution system must be repaired within ninty-six (96) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.	Yes

2	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of four (4) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within seventy-two (72) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.	Yes
3	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within forty-eight (48) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.	Yes

3	Water Features - Restrict water use for decorative water features, such as fountains	Percentage	2%	**Limits on Filling Ornamental Fountains, Lakes, and Ponds**: Filling or re-filling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level under this Conservation Program.	Yes
4	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within twenty four (24) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.	Yes
5	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of one (1) day per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes

5	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Percentage	3%	**Car Washing at Commercial Facilities Only:** Washing of motor vehicles, trailers, boats, aircraft and other types of mobile equipment shall be done only at a commercial car wash with water recycling facilities. No restrictions apply where the healthy, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables.	Yes
5	Other water feature or swimming pool restriction	Percentage	2%	**No Initial Filling or Re-Filling of Swimming Pools & Spas:** Filling and Re-Filling of residential swimming pools or outdoor spas with water is prohibited.	Yes
6	Landscape - Prohibit all landscape irrigation	Percentage	10%	**No Watering or Irrigating:** Watering or irrigating of lawn, landscape, or other vegetated area is prohibited. This restriction does not apply to the following categories of use: Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self–closing water shut-off nozzle or device; Maintenance of existing landscape necessary for fire protection; Maintenance of existing landscape for soil erosion control; Maintenance of plant materials identified to be rare or essential to the well-being of protected species. Maintenance of landscape within active public parks and playing fields, day care centers, golf course greens, and school grounds, provided that such irrigation does not exceed a maximum of two (2) days per week according to the schedule established in Section 8(b)(1) and time restrictions in Section 6(a); Actively irrigated environmental mitigation projects.	Yes

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.

NOTES: Note 1: NFT irrigation requirements begin January 1, 2027 for State and local government properties, January 1, 2028 for commercial, industrial and institutional owned landscapes, January 1, 2029 for homeowners' associations common area landscapes, and January 1, 2031 for local government properties in disadvantaged communities (DAC).

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		
Costa Mesa	Yes	Yes
Newport Beach	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		
Orange County	Yes	Yes
NOTES:		

APPENDIX C

REDUCED DELTA RELIANCE

Appendix C
REDUCED DELTA RELIANCE REPORTING

C.1 Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action in the Delta, prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council. Anyone may appeal a certification of consistency, and if the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency, and either no appeal is filed, or the Delta Stewardship Council denies the subsequent appeal.

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and beyond Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed inparagraph of subsection (c);

(2) That failure has significantly caused the need for the export, transfer, or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self- reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

The analysis and documentation provided below include all of the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

C.2 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1 (c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

The expected outcomes for the Municipal Water District of Orange County's (MWDOC) regional self-reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2025 – Final Draft (Guidebook Appendix C) issued in January 2026. The data used in this analysis represent the total regional efforts of Metropolitan, MWDOC, and its member agencies and were developed in conjunction with Metropolitan as part of the UWMP coordination process.

The following provides a summary of the near-term (2030) and long-term (2050) expected outcomes for Mesa Water District's (Mesa Water) Delta reliance and regional self-reliance. The results show that as a region, MWDOC, Metropolitan, and its member agencies are measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance for Mesa Water

- Near-term (2030) – Normal water year regional self-reliance is expected to increase by 2.8 TAF from the 2010 baseline; this represents an increase of about 6.6 percent of 2030 normal water year retail demands (Table C-3).
- Long-term (2050) – Normal water year regional self-reliance is expected to increase by nearly 4.2 TAF from the 2010 baseline; this represents an increase of about 6.6 percent of 2050 normal water year retail demands (Table C-3).

C.3 Demonstration of Reduced Reliance on the Delta

The methodology used to determine Mesa Water's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying Mesa Water's demonstration of reduced reliance include:

- All data were obtained from the current 2025 UWMP or previously adopted UWMPs and represent average or normal water year conditions.
- All analyses were conducted at the service area level, and all data reflect the total contributions of Mesa Water and MWDOC in conjunction with information provided by Metropolitan.
- No projects or programs that are described in the UWMPs as "Projects Under Development" were included in the accounting of supplies.

Baseline and Expected Outcomes

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from MWDOC's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on).

Consistent with the 2010 baseline data approach, the expected outcomes for reduced Delta reliance and improved regional self-reliance for 2015, 2020, and 2025 were taken from Mesa Water's 2010, 2015, and 2020 UWMPs, respectively. Expected outcomes for 2030-2050 are from the current 2025 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

Service Area Demands without Water Use Efficiency

In alignment with the Guidebook Appendix C, this analysis uses normal water year demands, rather than normal water year supplies to calculate expected outcomes in terms of the percentage of water used. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the UWMP Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

Because WR P1 considers water use efficiency savings as a source of water supply, water suppliers such as Mesa Water needs to explicitly calculate and report water use efficiency savings separate from service area demands to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. Tables C-1 and C-2 show the results of this adjustment for Mesa Water. Supporting narratives and documentation for the data shown in Tables C-1 and C-2 are provided below.

Table C-1: Calculation of Water Use Efficiency

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	21,982	19,700	20,610	17,454	17,911	18,471	17,681	17,787	17,767
Non-Potable Water Demands	1,231	1,100	1,100	1,100	1,084	1,084	1,084	1,084	1,084
Potable Service Area Demands with Water Use Efficiency Accounted For	20,751	18,600	19,510	16,354	16,827	17,387	16,597	16,703	16,683

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Population	106,327	108,552	107,356	110,432	114,184	119,811	120,548	122,460	120,958

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Per Capita Water Use (GPCD)	174	153	162	132	132	130	123	122	123
Change in Per Capita Water Use from Baseline (GPCD)		(21)	(12)	(42)	(43)	(45)	(51)	(52)	(51)
Estimated Water Use Efficiency Since Baseline		2,585	1,442	5,198	5,457	5,995	6,930	7,197	6,923

Table C -2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	21,982	19,700	20,610	17,454	17,911	18,471	17,681	17,787	17,767
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline		2,585	1,442	5,198	5,457	5,995	6,930	7,197	6,923
Service Area Water Demands without Water Use Efficiency Accounted For	21,982	22,285	22,052	22,652	23,368	24,467	24,610	24,984	24,690

Service Area Demands with Water Use Efficiency

The service area demands shown in Table C-1 represent the total retail water demands for Mesa Water's service area and may include municipal and industrial demands, agricultural demands, recycled, seawater barrier demands, and storage replenishment demands. These demand types and the modeling methodologies used to calculate them are described in Section 4.3 of Mesa Water's 2025 UWMP.

Non-Potable Water Demands

The non-potable water demands shown in Table C-1 represent demands for non-potable recycled water, replenishment water for groundwater basin recharge, and sea water barrier demands. In accordance with section C.3.6 of the UWMP Guidebook, MWDOC characterizes demands for groundwater basin recharge and seawater barrier demands as indirect uses of water. In order to avoid double counting of water use these supplies are generally excluded from demand projections, since they are already captured as part of Mesa Water's retail water demand. Additionally, non-potable supplies have a demand hardening effect due to the inability to shift non-potable supplies to meet potable water demands. When water use efficiency or conservation measures are implemented, they fall solely on the potable water users. This is consistent with the approach for water conservation reporting used by the State Water Resources Control Board.

Total Service Area Population

Mesa Water's total service area population as shown in Table C-1 comes from the Center for Demographic Research, with actuals and projections further described in Section 3.4 of Mesa Water's 2025 UWMP.

Water Use Efficiency Since Baseline

The water use efficiency numbers shown in Table C-1 and C-2 represent the formulation that Mesa Water utilized, consistent with Appendix C of the UWMP Guidebook approach.

Service area demands, excluding non-potable demands, are divided by the service area population to get per capita water use in the service area in gallons per capita per day (GPCD) for each five-year period. The change in per capita water use from the baseline is the comparative GPCD from that five-year period compared to the 2010 baseline. Changes in per capita water use over time are then applied back to Mesa Water's service area population to calculate the estimated WUE Supply. This estimated WUE Supply is considered an additional supply that may be used to show reduced reliance on Delta water supplies.

The demand and water use efficiency data shown in Table C-1 were collected from Mesa Water's following sources:

- Baseline (2010) values – 2005 UWMP
- 2015 values – 2010 UWMP
- 2020 values – 2015 UWMP
- 2025 values – 2020 UWMP
- 2030-2050 values – 2025 UWMP

It should be noted that the results of this calculation differ from what Mesa Water calculated under Chapter 5 pertaining to the Water Conservation Act of 2009 (SB X7-7) due to differing formulas.

C.4 Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table C-3 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table C-3 represent efforts to improve regional self-reliance for Mesa Water's entire service area and include the total contributions of Mesa Water. Supporting narratives and documentation for the data shown in Table C-3 are provided below.

The results shown in Table C-3 demonstrate that Mesa Water's service area is measurably improving its regional self-reliance. In the near-term (2030), the expected outcome for normal water year regional self-reliance increases by 2.8 TAF from the 2010 baseline; this represents an increase of about 6.6 percent of 2030 normal water year retail demands. In the long-term (2050), normal water year regional self-reliance is expected to increase by more than 4.2 TAF from the 2010 baseline; this represents an increase of about 6.6 percent of 2050 normal water year retail demands.

Table C-3: Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Water Use Efficiency	-	2,585	1,442	5,198	5,457	5,995	6,930	7,197	6,923
Water Recycling	1,231	1,100	1,100	1,100	1,084	1,084	1,084	1,084	1,084
Stormwater Capture and Use									
Advanced Water Technologies									
Conjunctive Use Projects									
Local and Regional Water Supply and Storage Projects	19,298	18,600	19,510	16,354	16,827	17,387	16,597	16,703	16,683
Other Programs and Projects that Contribute to Regional Self-Reliance									
Water Supplies Contributing to Regional Self-Reliance	20,529	22,285	22,052	22,652	23,368	24,467	24,610	24,984	24,690

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	21,982	22,285	22,052	22,652	23,368	24,467	24,610	24,984	24,690

Change in Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Water Supplies Contributing to Regional Self-Reliance	20,529	22,285	22,052	22,652	23,368	24,467	24,610	24,984	24,690
Change in Water Supplies Contributing to Regional Self-Reliance		1,756	1,523	2,123	2,839	3,938	4,081	4,455	4,161

Percent Change in Regional Self-Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	93.4%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%

Water Use Efficiency

The water use efficiency information shown in Table C-3 is taken directly from Tables C-1 and C-2 above.

Water Recycling

The water recycling values shown in Table C-3 reflect the total recycled water production in the service area as described in Section 6.6 of Mesa Water's 2025 UWMP.

Local and Regional Water Supply and Storage Projects

The values shown in Table C-3 reflect groundwater production from the Orange County Groundwater Basin (OC Basin) as described in Section 6.3 of Mesa Water's 2025 UWMP.

Advanced Water Technologies

The OC Basin is augmented by advanced treated recycled water from the Orange County Water District's Groundwater Replenishment System (GWRS). The amount of indirect potable reuse in the OC Basin has increased over time to account for about 35 percent of total OC Basin production. Mesa Water's total groundwater production is captured as "Local Water Supply Project". Supplies contributed from indirect potable reuse are not reported to avoid double-counting.

C.5 Reliance on Water Supplies from the Delta Watershed

Metropolitan's service area as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies and demand management measures. Quantifying Mesa Water's investments in self-reliance, locally, regionally, and throughout Southern California is infeasible for the reasons as noted in Section C.6. Due to the regional nature of these investments, Mesa Water is relying on Metropolitan's regional accounting of measurable reductions in supplies from the Delta Watershed.

The results shown in Table C-4 (from Metropolitan's Table A.10-3) demonstrate that Metropolitan's service area, which includes Mesa Water, is measurably reducing its Delta reliance. In the near-term (2030), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 466 TAF or 6.5 percent from the 2010 baseline. In the long-term (2050), normal water year reliance on supplies from the Delta watershed is expected to decrease by 537 TAF or 9.4 percent from the 2010 baseline.

Table C-4: Metropolitan's Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	949,000	924,000	901,000	877,000	877,000
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-	-
Transfers and Exchanges of Supplies from the Delta Watershed	20,000	44,000	91,000	58,000	77,000	77,000	78,000	78,000	78,000
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	**1,492,000**	**1,073,000**	**1,075,000**	**1,191,000**	**1,026,000**	**1,001,000**	**979,000**	**955,000**	**955,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	4,969,000	5,102,000	5,209,000	5,302,000	5,391,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,026,000	1,001,000	979,000	955,000	955,000
Change in Supplies from the Delta Watershed	**NA**	**(419,000)**	**(417,000)**	**(301,000)**	**(466,000)**	**(491,000)**	**(513,000)**	**(537,000)**	**(537,000)**
Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Percent of Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	20.6%	19.6%	18.8%	18.0%	17.7%
Change in Percent of Supplies from the Delta Watershed	**NA**	**-7.6%**	**-6.6%**	**-3.0%**	**-6.5%**	**-7.5%**	**-8.4%**	**-9.1%**	**-9.4%**

C.6 Metropolitan Member and Sub-Member Agency Infeasibility of Accounting Supplies from the Delta Watershed

Metropolitan's member agencies and retail subagencies individually contribute to reduced reliance on the Delta in two ways. First, through the development of local projects and demand management measures in their own service areas, and second, through their investments in regional projects and programs through Metropolitan. Regional investments are funded through revenues from water purchases from Metropolitan or one or more of its member agencies. Metropolitan uses a portion of revenues from those purchases to fund projects and programs that contribute to the region's reduced reliance on Delta water supplies. Because some or all of these regional investments may not be constructed or implemented directly in a particular water supplier's service area, a water supplier's demands on Metropolitan or one or more of its member agencies will not accurately reflect that water supplier's total contributions to reduced reliance on supplies from the Delta watershed. It is infeasible for a water supplier that makes investments in regional projects and programs to quantify its individual contributions to reduced reliance and reflect them properly in its demands on Metropolitan or one or more of Metropolitan's member agencies.

The following discussions outline how regional funding is provided through Metropolitan's local resources and conservation incentive programs and how funding for those programs is collected through Metropolitan's water rates. The history and participation of Metropolitan's member agencies and the local agencies that purchase water from Metropolitan's members in local resource and demand management in the region have spanned more than four decades, and thus make accounting of these contributions at the individual agency level infeasible for those agencies to calculate.

Local Resources Programs

In 1982, Metropolitan began providing financial incentives to its member agencies to develop new local supplies to assist in meeting the region's water needs. Because of Metropolitan's regional distribution system, these programs benefit all member agencies regardless of project location because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs, and free up conveyance capacity to the benefit of all the agencies that rely on water from Metropolitan. For example, the Groundwater Replenishment System (GWRS) operated by the Orange County Water District, is the world's largest water purification system for indirect potable reuse and was funded, in part, by Metropolitan's local resource program and its Member Agencies. With the latest expansion, GWRS is capable of producing approximately 130,000 acre-feet of reliable, locally controlled, drought-proof supply of high-quality water to recharge the Orange County Groundwater Basin and protect it from seawater intrusion. GWRS is a premier example of a regional project that significantly reduced the need to utilize imported water for groundwater replenishment in the Metropolitan Service area, increasing regional and local supply reliability and reducing the region's reliance on imported supplies, including supplies from the State Water Project. Today, nearly one-half of the total recycled water and groundwater recovery production in the region is developed with an LRP incentive by Metropolitan.

Metropolitan's local resource incentive programs have evolved since 1982 to encourage member agencies to develop local supplies – including recycled water, groundwater recovery, seawater desalination, and stormwater capture to reduce reliance on imported water. Over the decades, programs have evolved to meet regional water needs. Key current program elements include:

- **Local Resources Program (LRP):** Sliding scale or fixed incentives for recycled water, recovered groundwater, and seawater desalination projects.
- **On-Site Retrofit Program (ORP):** Funding for small-scale infrastructure upgrades to connect end-users to existing recycled water systems.
- **Stormwater Pilot Programs:** Financial incentives to study and develop stormwater capture projects for direct use or groundwater recharge.

Water Use Efficiency Programs

Metropolitan’s Water Use Efficiency programs reflect a longstanding recognition that managing demands is as important as securing supply. By reducing retail water consumption across the service area, these programs help decrease reliance on imported water, lower infrastructure costs, and free up conveyance capacity – benefits that extend to all member agencies regardless of where savings occur.

Metropolitan’s incentive-based conservation efforts operate through several complementary programs. The Conservation Credits Program provides member agencies with financial assistance for conservation projects that reduce imported water demand. The Member Agency Administered Program allows agencies to implement locally tailored rebate programs with Metropolitan funding, provided they supplement rather than duplicate regional offerings. The Water Savings Incentive Program (WSIP) targets commercial and industrial users with custom efficiency projects that fall outside the standard rebate structures.

Beyond rebates, Metropolitan also pursues non-incentive conservation efforts, including landscape training, large-scale water audits, technology research, public outreach and education, and advocacy for water-efficient building codes and legislation. Together, these programs have driven significant cumulative water savings, representing a major long-term investment in regional water supply reliability. Chapter 9 of this UWMP provides details on the array of water use efficiency programs Mesa Water has implemented in its service area, which have contributed to the region's overall success in reducing reliance on imported water.

Infeasibility of Accounting

The accounting of the regional investments that contribute to reducing Metropolitan’s reliance on the Delta is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible at the individual member or sub-member agency level. As described above, the region (through Metropolitan) makes significant investments in resources and programs that reduce reliance on the Delta. In fact, all of Metropolitan’s investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies (and their subagencies) through rates and charges. The relative contributions for a member agency may be able to be approximately quantified or estimated by proxy through relative water purchases, however making an estimate of any quantifiable savings in gallons or acre-feet is not feasible. Water purchases cannot, with any accuracy or precision, be tied to the actual projects or programs that deliver water to the collective member agencies and their subagencies. Additionally, using water purchases as a proxy for member agencies and subagencies would result in projects and programs done outside of the Metropolitan incentive programs to be omitted and discounted. Accounting at the regional level allows for the incorporation of these local supplies and water use efficiency programs implemented by member agencies and subagencies in both the regional programs and their own specific local programs. Projects and programs each have different online dates, useful lives, production, incentive rates and contributions that cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within Metropolitan’s service area. As shown above, despite that infeasibility, Metropolitan’s members and their subagencies have together made substantial contributions to the region’s reduced reliance.

APPENDIX D

AWWA WATER LOSS AUDITS

Complete AWWA Water Loss audit Reports can be downloaded here: WUEdata - Water Audit Plans

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Karyn Igar
Email Address: karyni@mesawater.org
Telephone (incl Ext.): 949.207.5452
Name of City / Utility: Mesa Water District
City/Town/Municipality: Costa Mesa
State / Province: California (CA)
Country: USA
Year: 2020 Financial Year
Start Date: 07/2020 Enter MM/YYYY numeric format
End Date: 06/2021 Enter MM/YYYY numeric format
Audit Preparation Date: 11/16/2020
Volume Reporting Units: Acre-feet
PWSID / Other ID: CA3010004

The following guidance will help you complete the Audit

All audit data are entered on the **Reporting Worksheet**

☐	Value can be entered by user
🟨	Value calculated based on input data
🟪	These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% ● ○ Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0
American Water Works Association.

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Mesa Water District (CA3010004)
Reporting Year: 2020 | 7/2020 - 6/2021

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

			Grade	Value	Unit			Grade	Pcnt:		Value:	
Volume from own sources:	+	?	9	16,264.500	acre-ft/yr	+	?	10	0.58%	● ○		acre-ft/yr
Water imported:	+	?	7	66.500	acre-ft/yr	+	?	7	0	● ○		acre-ft/yr
Water exported:	+	?	n/a		acre-ft/yr	+	?			● ○		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 16,237.210 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Grade	Value	Unit	Pcnt:		Value:	
Billed metered:	+	?	9	15,386.140	acre-ft/yr				
Billed unmetered:	+	?	n/a		acre-ft/yr				
Unbilled metered:	+	?	n/a		acre-ft/yr				
Unbilled unmetered:	+	?	5	202.965	acre-ft/yr	1.25%	● ○		acre-ft/yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 15,589.105 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 648.105 acre-ft/yr

Apparent Losses

			Grade	Value	Unit	Pcnt:		Value:	
Unauthorized consumption:	+	?		40.593	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

			Grade	Value	Unit	Pcnt:		Value:	
Customer metering inaccuracies:	+	?	7	304.396	acre-ft/yr	1.94%	● ○		acre-ft/yr
Systematic data handling errors:	+	?	5	38.465	acre-ft/yr	0.25%	● ○		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 383.455 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 264.650 acre-ft/yr

WATER LOSSES: 648.105 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 851.070 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

			Grade	Value	Unit
Length of mains:	+	?	9	328.4	miles
Number of active AND inactive service connections:	+	?	7	22,315	
Service connection density:		?		68	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

			Grade	Value	Unit
Average operating pressure:	+	?	7	78.9	psi

COST DATA

			Grade	Value	Unit
Total annual cost of operating water system:	+	?	10	$33,981,193	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	$4.49	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	7	$662.96	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 82 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Unauthorized consumption
3: Systematic data handling errors

AWWA Free Water Audit Software:

System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.

Water Audit Report for: Mesa Water District (CA3010004)
Reporting Year: 2020 | 7/2020 - 6/2021

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 82 out of 100 *****

System Attributes:

	Apparent Losses:	*383.455*	*acre-ft/yr*
+	*Real Losses:*	*264.650*	*acre-ft/yr*
=	**Water Losses:**	**648.105**	*acre-ft/yr*
?	*Unavoidable Annual Real Losses (UARL):*	*452.85*	*acre-ft/yr*
	Annual cost of Apparent Losses:	*$749,978*	
	Annual cost of Real Losses:	*$175,452*	*Valued at* **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	*Non-revenue water as percent by volume of Water Supplied:*	*5.2%*	
	Non-revenue water as percent by cost of operating system:	*3.1%*	*Real Losses valued at Variable Production Cost*
Operational Efficiency:	*Apparent Losses per service connection per day:*	*15.34*	*gallons/connection/day*
	Real Losses per service connection per day:	*10.59*	*gallons/connection/day*
	Real Losses per length of main per day:*	*N/A*	
	Real Losses per service connection per day per psi pressure:	*0.13*	*gallons/connection/day/psi*

	From Above, Real Losses = Current Annual Real Losses (CARL):	*264.65*	*acre-feet/year*
?	*Infrastructure Leakage Index (ILI) [CARL/UARL]:*	*0.58*	

** This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline*

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

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for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person: Karyn Igar
Email Address: karyni@mesawater.org
Telephone (incl Ext.): 949.207.5452
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City/Town/Municipality: Costa Mesa
State / Province: California (CA)
Country: USA
Year: 2022 Financial Year
Start Date: 07/2021 Enter MM/YYYY numeric format
End Date: 06/2022 Enter MM/YYYY numeric format
Audit Preparation Date: 9/9/2022
Volume Reporting Units: Acre-feet
PWSID / Other ID: CA3010004

The following guidance will help you complete the Audit

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☐	Value can be entered by user
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🟪	These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% ● ○ Value: ☐

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

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If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Mesa Water District (CA3010004)
Reporting Year: 2022 7/2021 - 6/2022

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

									Pcnt:		Value:	
Volume from own sources:	+	?	8	16,136.791	acre-ft/yr	+	?	10	1.40%	● ○		acre-ft/yr
Water imported:	+	?	7	2.800	acre-ft/yr	+	?	7	0	● ○		acre-ft/yr
Water exported:	+	?	n/a		acre-ft/yr	+	?			● ○		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **15,916.795** acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option buttons below

						Pcnt:		Value:	
Billed metered:	+	?	9	15,273.930	acre-ft/yr				
Billed unmetered:	+	?	n/a		acre-ft/yr				
Unbilled metered:	+	?	n/a		acre-ft/yr				
Unbilled unmetered:	+	?	8	109.859	acre-ft/yr		○ ●	109.859	acre-ft/yr

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? **15,383.789** acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) **533.006** acre-ft/yr

Apparent Losses

						Pcnt:		Value:	
Unauthorized consumption:	+	?	5	10.900	acre-ft/yr		○ ●	10.900	acre-ft/yr
Customer metering inaccuracies:	+	?	7	308.533	acre-ft/yr	1.98%	● ○		acre-ft/yr
Systematic data handling errors:	+	?	5	15.274	acre-ft/yr		○ ●	15.274	acre-ft/yr

Apparent Losses: ? **334.707** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **198.299** acre-ft/yr

WATER LOSSES: **533.006** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **642.865** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	317.0	miles
Number of active AND inactive service connections:	+	?	7	22,332	
Service connection density:		?		70	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+	?	7	78.9	psi

COST DATA

Total annual cost of operating water system:	+	?	10	$41,375,971	$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	$4.72	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+	?	7	$708.79	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 79 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Unauthorized consumption
3: Systematic data handling errors

AWWA Free Water Audit Software:

System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: Mesa Water District (CA3010004)
Reporting Year: 2022 | 7/2021 - 6/2022

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 79 out of 100 *****

System Attributes:

	Apparent Losses:	*334.707*	*acre-ft/yr*
+	*Real Losses:*	*198.299*	*acre-ft/yr*
=	**Water Losses:**	**533.006**	*acre-ft/yr*
?	*Unavoidable Annual Real Losses (UARL):*	*447.62*	*acre-ft/yr*
	Annual cost of Apparent Losses:	*$688,168*	
	Annual cost of Real Losses:	*$140,553*	*Valued at* **Variable Production Cost** *Return to Reporting Worksheet to change this assumpiton*

Performance Indicators:

Financial:	*Non-revenue water as percent by volume of Water Supplied:*	*4.0%*	
	Non-revenue water as percent by cost of operating system:	*2.2%*	*Real Losses valued at Variable Production Cost*
Operational Efficiency:	*Apparent Losses per service connection per day:*	*13.38*	*gallons/connection/day*
	Real Losses per service connection per day:	*7.93*	*gallons/connection/day*
	Real Losses per length of main per day:*	*N/A*	
	Real Losses per service connection per day per psi pressure:	*0.10*	*gallons/connection/day/psi*
	From Above, Real Losses = Current Annual Real Losses (CARL):	*198.30*	*acre-feet/year*
	? *Infrastructure Leakage Index (ILI) [CARL/UARL]:*	*0.44*	

** This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline*

AWWA Free Water Audit Software v6.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format and is not meant to take the place of a full-scale, comprehensive water audit format. Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targeting loss reduction levels. This tool contains several separate worksheets. Sheets can be accessed using the tabs at the bottom of the screen, or by clicking the TOC links below.

Table of Contents (TOC)

Start Page	The current sheet. Enter contact information and basic audit details.
Worksheet	Enter the required data on this worksheet to calculate the water balance and data grading.
Interactive Data Grading	Answer questions about operational practices for each audit input, and the data validity grades will automatically populate.
Dashboard	Review NRW components, performance indicators and graphical outputs to evaluate the results of the audit.
Notes	Enter notes to explain how values were calculated, document data sources, and related information about data management practices.
Blank Sheet	By popular demand! A blank sheet. The world is your canvas.
Water Balance	The values entered in the Worksheet automatically populate the Water Balance.
Loss Control Planning	Use this sheet to interpret the results of the audit validity score and performance indicators.
Definitions	Use this sheet to understand the terms used in the audit process.
Service Connection Diagram	Diagrams depicting possible customer service connection line configurations.
Acknowledgements	Acknowledgements for development of the AWWA Free Water Audit Software v6.0.

AWWA Web Resources for Water Loss Control

https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control

Items referenced in the Free Water Audit Software v6.0 on the web:
- Data Grading Matrix v6.0
- Example Water Audit v6.0
- Water Audit Compiler v6.0
- AWWA Reports on Performance Indicators
- M36 Manual

Enter Basic Information

Name of Utility: Mesa Water District
Name of Contact Person: Karyn Igar
Email: karyni@mesawater.org
Telephone | Ext.: 949-207-5452
City/Town/Municipality: Costa Mesa
State / Province: California (CA)

Country: USA
Audit Preparation Date: Oct 24 2023
Audit Year: 2023
Audit Year Label: Fiscal (Fiscal, Calendar, etc)
Audit Period Start Date: Jul 01 2022
Audit Period End Date: Jun 30 2023
Volume Reporting Units: Acre-feet
Water System Structure: Retail
Water Type: Potable Water
System ID Number: CA3010004
Validator Name/ID: Rachel Davis
Validator Email: rdavis@mwdoc.com
Estimated Total Population Served by Water Utility: 115,000

Key of Input Acronyms

In order of appearance in the Worksheet

VOS	Volume from Own Sources
VOSEA	VOS Error Adjustment
WI	Water Imported
WIEA	WI Error Adjustment
WE	Water Exported
WEEA	WE Error Adjustment
BMAC	Billed Metered Authorized Consumption
BUAC	Billed Unmetered Authorized Consumption
UMAC	Unbilled Metered Authorized Consumption
UUAC	Unbilled Unmetered Authorized Consumption
SDHE	Systematic Data Handling Errors
CMI	Customer Metering Inaccuracies
UC	Unauthorized Consumption
Lm	Length of mains
Nc	Number of service connections
Lp	Average length of (private) customer service line
AOP	Average Operating Pressure
CRUC	Customer Retail Unit Charge
VPC	Variable Production Cost

Color Key

User input 🟦 Calculated 🟧 Optional default ⬚

Guidance for the Worksheet

Choosing to enter unit of **percent** or **volume**
(applies to VOSEA, WIEA, WEEA, CMI)
choose entry option:

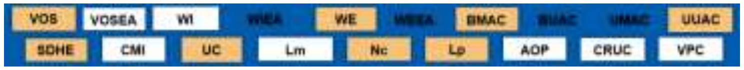
1.00%	percent	*or*
	volume	25.000

Choosing to enter **default** or **custom input**
(applies to UUAC, SDHE, UC)
choose entry option:

0.25%	default	*or*
	custom	75.000

Guidance for the Interactive Data Grading

Use acronym buttons in IDG header to navigate among inputs. Acronym Key above. White = needs answers, orange = complete, clear = not required. Example below.



After clicking an acronym button, answer all visible questions in the order they're presented, choosing best-fit answer 🟦

Grade will populate when all visible questions are complete for an input 7

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on *each* limiting criterion is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources) Limiting

If you have questions or comments regarding this software please contact us at: wlc@awwa.org

AWWA Free Water Audit Software:
Worksheet

FWAS v6.0

Water Audit Report for: **Mesa Water District**

Audit Year: **2023** | **Jul 01 2022 - Jun 30 2023** | **Fiscal**

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments

choose entry option:

VOS	Volume from Own Sources:	n	g	9	14,658.414	Acre-ft/Yr	n	g	10	1.00%	percent	over-registration	VOSEA
WI	Water Imported:	n	g	6	10.200	Acre-ft/Yr	n	g	3		percent		WIEA
WE	Water Exported:	n	g	n/a		Acre-ft/Yr							WEEA

WATER SUPPLIED: 14,523.337 Acre-ft/Yr

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n	g	8	13,897.300	Acre-ft/Yr		
BUAC	Billed Unmetered:	n	g	n/a	0.000	Acre-ft/Yr		
UMAC	Unbilled Metered:	n	g	n/a	0.000	Acre-ft/Yr	choose entry option:	
UUAC	Unbilled Unmetered:	n	g	6	20.856	Acre-ft/Yr	custom	20.856 acre-ft/yr

AUTHORIZED CONSUMPTION: 13,918.156 Acre-ft/Yr

WATER LOSSES

WATER LOSSES: 605.181 Acre-ft/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	3	34.743	Acre-ft/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n	g	7	251.855	Acre-ft/Yr	1.78%	percent	under-registration
UC	Unauthorized Consumption:	n	g	3	34.743	Acre-ft/Yr	0.25%	default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 321.341 Acre-ft/Yr

Real Losses

Real Losses: 283.840 Acre-ft/Yr

WATER LOSSES: 605.181 Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 626.037 Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	10	317.8	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	10	25,644		(active *and* inactive)
	Service connection density:				81	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp: n g 10

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n	g	8	79.0	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$4.87	$/100 cubic feet (ccf)
VPC	Variable Production Cost:	n	g	9	$775.65	$/acre-ft

Total Annual Operating Cost: $36,833,025 $/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *****

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Billed Metered (BMAC)
3: Unauthorized Consumption (UC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:	28.1	gal/conn/day
Unit Apparent Losses:	11.4	gal/conn/day
Unit Real Losses^A:	16.7	gal/conn/day
Unit Real Losses^B:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

AWWA Free Water Audit Software v6.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format and is not meant to take the place of a full-scale, comprehensive water audit format. Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targeting loss reduction levels. This tool contains several separate worksheets. Sheets can be accessed using the tabs at the bottom of the screen, or by clicking the TOC links below.

Table of Contents (TOC)

Start Page	The current sheet. Enter contact information and basic audit details.
Worksheet	Enter the required data on this worksheet to calculate the water balance and data grading.
Interactive Data Grading	Answer questions about operational practices for each audit input, and the data validity grades will automatically populate.
Dashboard	Review NRW components, performance indicators and graphical outputs to evaluate the results of the audit.
Notes	Enter notes to explain how values were calculated, document data sources, and related information about data management practices.
Blank Sheet	By popular demand! A blank sheet. The world is your canvas.
Water Balance	The values entered in the Worksheet automatically populate the Water Balance.
Loss Control Planning	Use this sheet to interpret the results of the audit validity score and performance indicators.
Definitions	Use this sheet to understand the terms used in the audit process.
Service Connection Diagram	Diagrams depicting possible customer service connection line configurations.
Acknowledgements	Acknowledgements for development of the AWWA Free Water Audit Software v6.0.

AWWA Web Resources for Water Loss Control

https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control

Items referenced in the Free Water Audit Software v6.0 on the web:

- Data Grading Matrix v6.0
- Example Water Audit v6.0
- Water Audit Compiler v6.0
- AWWA Reports on Performance Indicators
- M36 Manual

Enter Basic Information

Name of Utility: Mesa Water District
Name of Contact Person: Karyn Igar
Email: karyni@mesawater.org
Telephone | Ext.: 949-207-5452
City/Town/Municipality: Costa Mesa
State / Province: California (CA)

Country: USA
Audit Preparation Date: Sep 11 2024
Audit Year: 2024
Audit Year Label: Fiscal (Fiscal, Calendar, etc)
Audit Period Start Date: Jul 01 2023
Audit Period End Date: Jun 30 2024
Volume Reporting Units: Acre-feet
Water System Structure: Retail
Water Type: Potable Water
System ID Number: CA3010004
Validator Name/ID: Rachel Davis
Validator Email: rdavis@mwdoc.com
Estimated Total Population Served by Water Utility: 115,000

Key of Input Acronyms

In order of appearance in the Worksheet

VOS	Volume from Own Sources
VOSEA	VOS Error Adjustment
WI	Water Imported
WIEA	WI Error Adjustment
WE	Water Exported
WEEA	WE Error Adjustment
BMAC	Billed Metered Authorized Consumption
BUAC	Billed Unmetered Authorized Consumption
UMAC	Unbilled Metered Authorized Consumption
UUAC	Unbilled Unmetered Authorized Consumption
SDHE	Systematic Data Handling Errors
CMI	Customer Metering Inaccuracies
UC	Unauthorized Consumption
Lm	Length of mains
Nc	Number of service connections
Lp	Average length of (private) customer service line
AOP	Average Operating Pressure
CRUC	Customer Retail Unit Charge
VPC	Variable Production Cost

Color Key

User input 🟦 Calculated 🟧 Optional default ⬚

Guidance for the Worksheet

Choosing to enter unit of **percent** or **volume**
(applies to VOSEA, WIEA, WEEA, CMI)
choose entry option:

1.00%	percent	*or*
	volume	25.000

Choosing to enter **default** or **custom input**
(applies to UUAC, SDHE, UC)
choose entry option:

0.25%	default	*or*
	custom	75.000

Guidance for the Interactive Data Grading

Use acronym buttons in IDG header to navigate among inputs. Acronym Key above. White = needs answers, orange = complete, clear = not required. Example below.

After clicking an acronym button, answer all visible questions in the order they're presented, choosing best-fit answer 🟦

Grade will populate when all visible questions are complete for an input 7

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on *each* limiting criterion is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources) Limiting

If you have questions or comments regarding this software please contact us at: wlc@awwa.org

AWWA Free Water Audit Software:
Worksheet

FWAS v6.0

Water Audit Report for:	Mesa Water District		
Audit Year:	2024	Jul 01 2023 - Jun 30 2024	Fiscal

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments
choose entry option:

VOS	Volume from Own Sources:	n	g	9	14,669.850	Acre-ft/Yr	n	g	8	0.05%	percent	under-registration	VOSEA
WI	Water Imported:	n	g	n/a	0.000	Acre-ft/Yr							WIEA
WE	Water Exported:	n	g	n/a		Acre-ft/Yr							WEEA

WATER SUPPLIED: 14,677.189 Acre-ft/Yr

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n	g	8	13,903.540	Acre-ft/Yr		
BUAC	Billed Unmetered:	n	g	n/a	0.000	Acre-ft/Yr		
UMAC	Unbilled Metered:	n	g	n/a	0.000	Acre-ft/Yr	choose entry option:	
UUAC	Unbilled Unmetered:	n	g	6	136.540	Acre-ft/Yr	custom	136.540 acre-ft/yr

AUTHORIZED CONSUMPTION: 14,040.080 Acre-ft/Yr

WATER LOSSES

637.109 Acre-ft/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	3	34.759	Acre-ft/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n	g	7	203.136	Acre-ft/Yr	1.44%	percent	under-registration
UC	Unauthorized Consumption:	n	g	3	34.759	Acre-ft/Yr	0.25%	default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 272.654 Acre-ft/Yr

Real Losses

Real Losses: 364.455 Acre-ft/Yr

WATER LOSSES: 637.109 Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 773.649 Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	10	317.6	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	10	25,680		(active *and* inactive)
	Service connection density:				81	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp		n	g	10		

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n	g	8	78.8	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$5.42	$/100 cubic feet (ccf)
VPC	Variable Production Cost:	n	g	9	$854.48	$/acre-ft

Total Annual Operating Cost: $36,833,025 $/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *****

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Billed Metered (BMAC)
3: Unauthorized Consumption (UC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: *If targets exist for the operational performance indicators, they can be input below:*

Unit Total Losses:	28.1	gal/conn/day
Unit Apparent Losses:	11.4	gal/conn/day
Unit Real Losses^A:	16.7	gal/conn/day
Unit Real Losses^B:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

FWAS v6.0

AWWA Free Water Audit Software v6.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format and is not meant to take the place of a full-scale, comprehensive water audit format. Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targeting loss reduction levels. This tool contains several separate worksheets. Sheets can be accessed using the tabs at the bottom of the screen, or by clicking the TOC links below.

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Notes	Enter notes to explain how values were calculated, document data sources, and related information about data management practices.
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AWWA Web Resources for Water Loss Control

https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control

Items referenced in the Free Water Audit Software v6.0 on the web:

- Data Grading Matrix v6.0
- Example Water Audit v6.0
- Water Audit Compiler v6.0
- AWWA Reports on Performance Indicators
- M36 Manual

Enter Basic Information

Name of Utility:	Mesa Water District	
Name of Contact Person:	Karyn Igar	
Email:	karyni@mesawater.org	
Telephone | Ext.:	949-207-5452	
City/Town/Municipality:	Costa Mesa	
State / Province:	California (CA)	
Country:	USA	
Audit Preparation Date:	Dec 03 2025	
Audit Year:	2025	
Audit Year Label:	Fiscal	(Fiscal, Calendar, etc)
Audit Period Start Date:	Jul 01 2024	
Audit Period End Date:	Jun 30 2025	
Volume Reporting Units:	Acre-feet	
Water System Structure:	Retail	
Water Type:	Potable Water	
System ID Number:	CA3010004	
Validator Name/ID:	Rachel Davis	
Validator Email:	rdavis@mwdoc.com	
Estimated Total Population Served by Water Utility:	115,000	

Key of Input Acronyms

In order of appearance in the Worksheet

VOS	Volume from Own Sources
VOSEA	VOS Error Adjustment
WI	Water Imported
WIEA	WI Error Adjustment
WE	Water Exported
WEEA	WE Error Adjustment
BMAC	Billed Metered Authorized Consumption
BUAC	Billed Unmetered Authorized Consumption
UMAC	Unbilled Metered Authorized Consumption
UUAC	Unbilled Unmetered Authorized Consumption
SDHE	Systematic Data Handling Errors
CMI	Customer Metering Inaccuracies
UC	Unauthorized Consumption
Lm	Length of mains
Nc	Number of service connections
Lp	Average length of (private) customer service line
AOP	Average Operating Pressure
CRUC	Customer Retail Unit Charge
VPC	Variable Production Cost

Color Key

User input	▭	Calculated	▬	Optional default	⬚

Guidance for the Worksheet

Choosing to enter unit of **percent** or **volume**
(applies to VOSEA, WIEA, WEEA, CMI)
choose entry option:

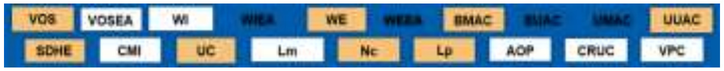
1.00%	percent	*or*
	volume	25.000

Choosing to enter **default** or **custom input**
(applies to UUAC, SDHE, UC)
choose entry option:

0.25%	default	*or*
	custom	75.000

Guidance for the Interactive Data Grading

Use acronym buttons in IDG header to navigate among inputs. Acronym Key above. White = needs answers, orange = complete, clear = not required. Example below.



After clicking an acronym button, answer all visible questions in the order they're presented, choosing best-fit answer ▭

Grade will populate when all visible questions are complete for an input **7**

The limiting criteria will be labeled along the right. If only 1 limiting criterion is shown, improving on that criterion will achieve a higher data grade. If multiple limiting criteria are shown, improving on *each* limiting criterion is necessary to achieve a higher data grade. A complete inventory of data grading criteria is available in the Data Grading Matrix v6.0 (see web resources) Limiting

If you have questions or comments regarding this software please contact us at: wlc@awwa.org

AWWA Free Water Audit Software:
Worksheet

FWAS v6.0

Water Audit Report for:	**Mesa Water District**		
Audit Year:	**2025**	**Jul 01 2024 - Jun 30 2025**	**Fiscal**

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments
choose entry option:

VOS	Volume from Own Sources:	n	g	9	15,624.350	Acre-ft/Yr	n	g	10	0.00%	percent	under-registration	VOSEA
WI	Water Imported:	n	g	6	1.117	Acre-ft/Yr	n	g	3	0.00%	percent		WIEA
WE	Water Exported:	n	g	n/a		Acre-ft/Yr							WEEA

WATER SUPPLIED: 15,625.936 Acre-ft/Yr

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n	g	8	14,875.290	Acre-ft/Yr			
BUAC	Billed Unmetered:	n	g	n/a	0.000	Acre-ft/Yr			
UMAC	Unbilled Metered:	n	g	n/a	0.000	Acre-ft/Yr	choose entry option:		
UUAC	Unbilled Unmetered:	n	g	6	97.220	Acre-ft/Yr	custom	97.220	acre-ft/yr

AUTHORIZED CONSUMPTION: 14,972.510 Acre-ft/Yr

WATER LOSSES

653.426 Acre-ft/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	3	37.188	Acre-ft/Yr	0.25%	default			
CMI	Customer Metering Inaccuracies:	n	g	7	196.164	Acre-ft/Yr		volume	196.164	acre-ft/yr	under-registration
UC	Unauthorized Consumption:	n	g	3	37.188	Acre-ft/Yr	0.25%	default			

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 270.540 Acre-ft/Yr

Real Losses

Real Losses: 382.885 Acre-ft/Yr

WATER LOSSES: 653.426 Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 750.646 Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	10	317.6	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	10	22,529		(active *and* inactive)
	Service connection density:				71	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp n g 10

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP Average Operating Pressure: n g 8 78.8 psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$5.96	$/100 cubic feet (ccf)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	9	$927.55	$/acre-ft	$38,301,000	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *****

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Billed Metered (BMAC)
3: Unauthorized Consumption (UC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:	28.1	gal/conn/day
Unit Apparent Losses:	11.4	gal/conn/day
Unit Real Losses^:	16.7	gal/conn/day
Unit Real Losses^D:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

APPENDIX E

2022 BASIN 8-1 ALTERNATIVE UPDATE

Basin 8-1 Alternative 2022 Update

Submitted by: Orange County Water District
City of La Habra
Irvine Ranch Water District

Submitted to: California Department of Water Resources

January 1, 2022

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BASIN 8-1 ALTERNATIVE

OVERVIEW

The Sustainable Groundwater Management Act (SGMA) requires all high- and medium-priority basins, as designated by the California Department of Water Resources (DWR), be sustainably managed. DWR designated the Coastal Plain of Orange County Groundwater Basin ("Basin 8-1" or "Basin") as a medium-priority basin, primarily due to heavy reliance on the Basin's groundwater as a source of water supply.

The agencies within Basin 8-1 collaborated to prepare and submit an Alternative to a Groundwater Sustainability Plan (GSP) on December 22, 2016. Within this document, this Alternative to a GSP will be referred to herein as the "Basin 8-1 Alternative" or "Alternative". In accordance with Water Code §10733.6(b)(3), the Alternative presented an analysis of basin conditions that demonstrated that Basin 8-1 had operated within its sustainable yield over a period of at least 10 years. On July 17, 2019, DWR determined that the Alternative satisfied SGMA objectives and was therefore approved.

Approved alternatives are required to submit annual reports to DWR on April 1 of each year, and to resubmit the alternative by January 1 every five years. Annual reports were submitted to DWR as follows:

- Water Year 2016-17 – March 29, 2018
- Water Year 2017-18 – March 29, 2019
- Water Year 2018-19 – March 30, 2020
- Water Year 2019-20 – March 30, 2021

This document represents the first five-year update, which is due January 1, 2022.

This update has been jointly prepared by the Orange County Water District (OCWD), Irvine Ranch Water District (IRWD); and the City of La Habra Groundwater Sustainability Agency (collectively the "Submitting Agencies"); pursuant to this Alternative, the Submitting Agencies will ensure the entire Basin 8-1 continues to be sustainably managed and data reported as required by SGMA. Pursuant to Water Code §10733.6(b)(3), the Basin 8-1 Alternative has been prepared by or under the direction of a professional geologist or professional engineer.

For purposes of this report, the Basin 8-1 Alternative approved by DWR on July 17, 2019, is referred to as the 2017 Alternative. The first five-year update will be referred to as the 2022 Update. The 2017 Alternative was a comprehensive document showing that Basin 8-1 had been managed sustainably for more than 10 years. For the 2022 Update, the focus is on documenting that the basin has continued to be operated sustainably during the five years since the 2017 Alternative was submitted and to present any new information. As such, background information, such as Basin Hydrogeology, and other sections with no new information are not repeated in the 2022 Update.

As described in the 2017 Alternative, Basin 8-1 was sub-divided into four management areas: La Habra-Brea, OCWD, South East, and Santa Ana Canyon Management Areas (Figure 1-1). The 2022 Update contains four chapters, one for each management area.

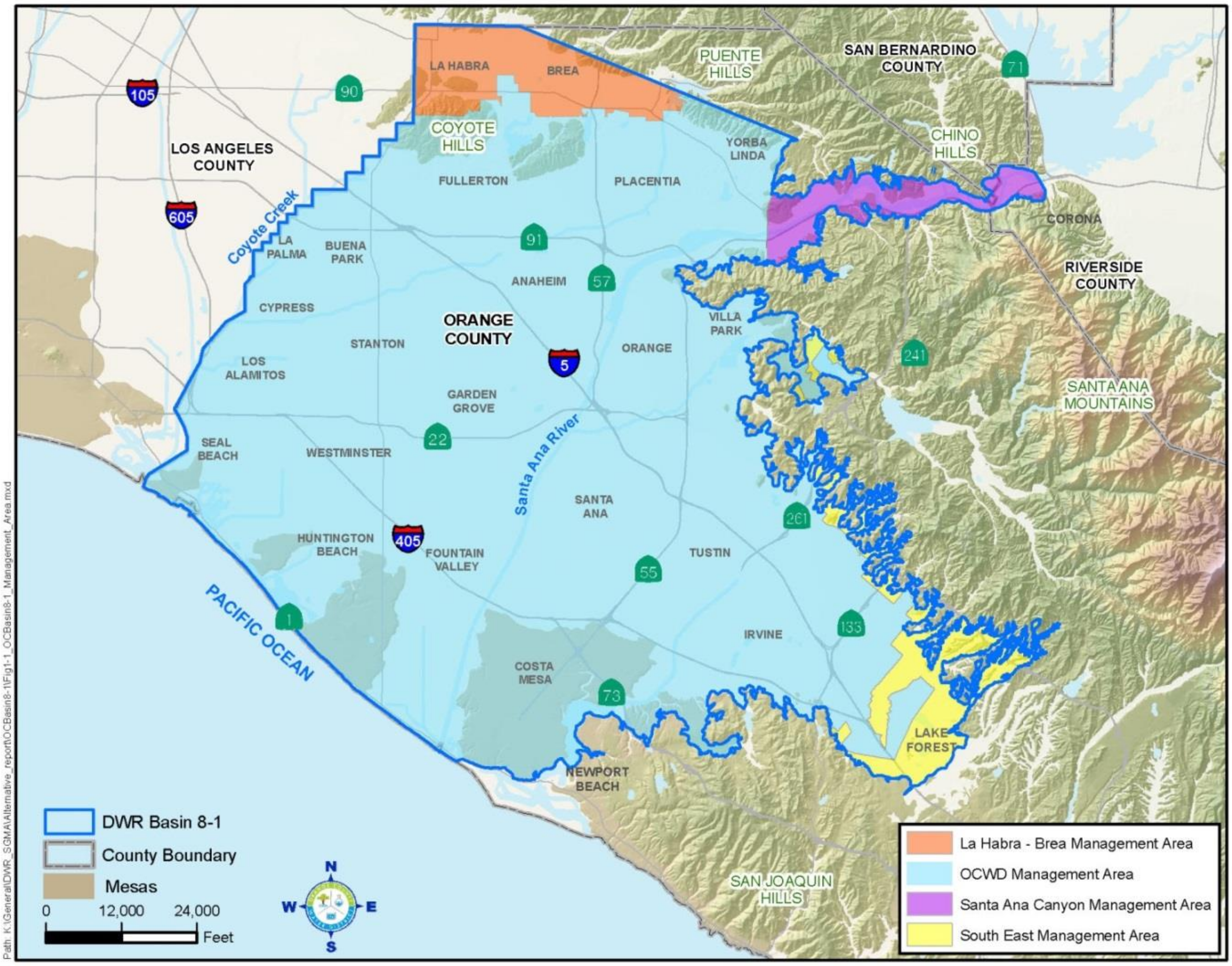

Figure 1-1: Basin 8-1 Management Area Boundaries

In its evaluation of the Basin 8-1 Alternative, DWR provided four recommendations that they encouraged "be given due consideration and suggest incorporating any resulting changes to the Alternative in future updates." The recommendations and responses to these recommendations are in Attachment 1 and incorporated into the 2022 Update where appropriate.

ABBREVIATIONS AND ACRONYMS

afy	acre-feet per year
AWPF	Advanced Water Purification Facility
basin	Orange County groundwater basin
Basin Model	OCWD groundwater model
BEA	Basin Equity Assessment
BPP	Basin Production Percentage
CDPH	California Department of Public Health
cfs	cubic feet per second
DATS	Deep Aquifer Treatment System
DOC	dissolved organic compound
DWR	Department of Water Resources
DWSAP	Drinking Water Source Assessment and Protection
EDCs	Endocrine Disrupting Compounds
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
FY	fiscal year
GAC	granular activated carbon
GIS	geographic information system
GWRS	Groundwater Replenishment System
IAP	Independent Advisory Panel
IRWD	Irvine Ranch Water District
LACPW	Los Angeles County Public Works
maf	million acre feet
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
MF	microfiltration
MODFLOW	Computer modeling program developed by USGS
mgd	million gallons per day
mg/L	milligrams per liter
MTBE	methyl tertiary-butyl ether
MWD	Metropolitan Water District of Southern California
MWDOC	Municipal Water District of Orange County
NDMA	n-Nitrosodimethylamine
NF	nanofiltration
ng/L	nanograms per liter
NBGPP	North Basin Groundwater Protection Program
NO_2	nitrite
NO_3^-	nitrate
NPDES	National Pollution Discharge Elimination System
NWRI	National Water Research Institute

ABBREVIATIONS AND ACRONYMS

O&M	operations and maintenance
OCHCA	Orange County Health Care Agency
OCSD	Orange County Sanitation District
OC Survey	Orange County Survey
OCWD	Orange County Water District
PCE	perchloroethylene
PFAS	Per- and polyfluoroalkyl substances
PPCPs	pharmaceuticals and personal care products
Producers	Orange County groundwater producers
RA	replenishment assessment
RO	reverse osmosis
Regional Water Board	Regional Water Quality Control Board
SARI	Santa Ana River Interceptor
SARMON	Santa Ana River Monitoring Program
SARWQH	Santa Ana River Water Quality and Health
SAWPA	Santa Ana Watershed Project Authority
SBGPP	South Basin Groundwater Protection Program
SDWA	Safe Drinking Water Act
SOCs	synthetic organic chemicals
SWP	State Water Project
SWRCB	State Water Resources Control Board
TCE	trichloroethylene
TDS	total dissolved solids
TIN	total inorganic nitrogen
µg/L	micrograms per liter
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
UV	ultraviolet light
VOCs	volatile organic compounds
WACO	Water Advisory Committee of Orange County
WEI	Wildermuth Environmental Inc.
WF-21	Water Factory 21
WLAM	Waste Load Allocation Model
WRD	Water Replenishment District of Southern California
WRMS	Water Resources Management System

Basin 8-1 Alternative

La Habra-Brea Management Area

2022 UPDATE

Submitted by: City of La Habra

On behalf of: City of La Habra
City of Brea

January 1, 2022

Basin 8-1 Alternative
La Habra-Brea Management Area

2022 UPDATE

No. 39599
Exp. 12-31-20[illegible]

Jeffrey D. Helsley, P.E.

Stetson Engineers, Inc.
861 S. Village Oaks Drive, Suite 100
Covina, CA 91724

Prepared for the Department of Water Resources, pursuant to Water Code §10733.6(b)(3)

January 1, 2022

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Figure

Table

LA HABRA-BREA
MANAGEMENT AREA

SECTION 1. EXECUTIVE SUMMARY

The agencies within Basin 8-1 collaborated to prepare and submit an Alternative to a Groundwater Sustainability Plan (GSP). In accordance with Water Code §10733.6(b)(3), the Alternative presented an analysis of basin conditions that demonstrated that the Basin had operated within its sustainable yield over a period of at least 10 years. The Alternative was submitted to DWR on December 22, 2016. On July 17, 2019, DWR determined that the Alternative satisfied SGMA objectives and was therefore approved.

Approved alternatives are required to submit annual reports to DWR on April 1 of each year. Annual reports for Basin 8-1 were submitted to DWR as follows:

- Water Year 2016-17, Submitted on March 29, 2018
- Water Year 2017-18, Submitted on March 29, 2019
- Water Year 2018-19, Submitted on March 30, 2020
- Water Year 2019-20, Submitted on March 30, 2021

According to Water Code §10733.8, "At least every five years after initial submission of a plan pursuant to Section 10733.4, the department shall review any available groundwater sustainability plan or alternative submitted in accordance with Section 10733.6, and the implementation of the corresponding groundwater sustainability program for consistency with this part, including achieving the sustainability goal. The department shall issue an assessment for each basin for which a plan or alternative has been submitted in accordance with this chapter, with an emphasis on assessing progress in achieving the sustainability goal within the basin. The assessment may include recommended corrective actions to address any deficiencies identified by the department."

The Basin 8-1 Alternative, submitted on December 22, 2016, will be referenced to as the 2017 Alternative. This document represents the first five-year update, herein referenced as the 2022 Update, which is due January 1, 2022. The 2017 Alternative was a comprehensive document showing that Basin 8-1 had been managed sustainably for more than 10 years. For the 2022 Update, the focus is on documenting that the basin has been continued to be sustainably management during the five years since the 2017 Alternative was submitted and to present any new information from the last five years. As such, the 2017 Alternative is considered a key reference document with background information that is not duplicated in the 2022 Update.

The La Habra-Brea Management Area overlies the extents of the La Habra Groundwater Basin, referenced herein. Figure 1-1 shows the extent of the La Habra Groundwater Basin and the cities (La Habra and Brea) with jurisdiction in the La Habra-Brea Management Area.

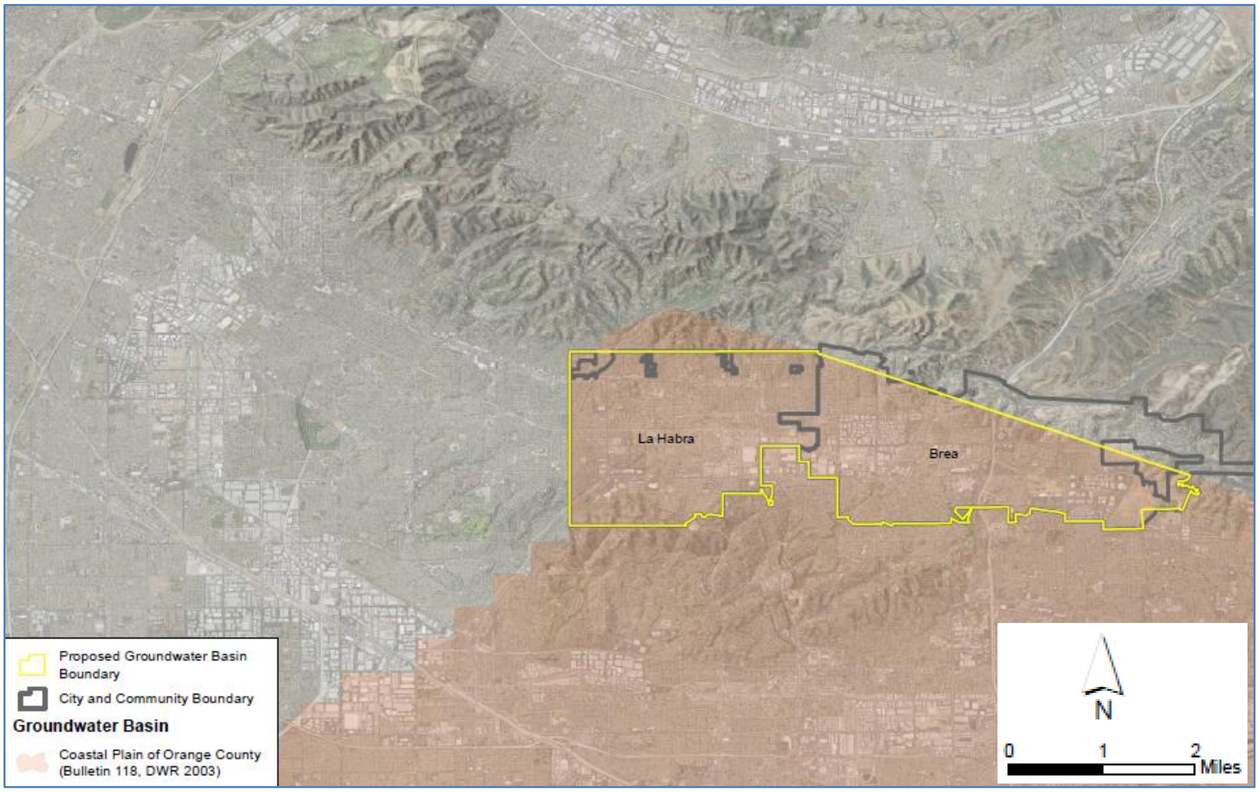


Figure 1-1. La Habra Groundwater Basin.

Groundwater resources protection is considered a critical component for safeguarding the long-term sustainability of the La Habra Groundwater Basin. The La Habra GSA has continued to sustainably manage groundwater resources within the La Habra Groundwater Basin. Groundwater production over the past five years has been within the safe yield of the basin. Accordingly, no undesirable effects have been observed within the La Habra-Brea Management Area.

As the City of La Habra (or City) currently depends on local groundwater to meet approximately 40 percent of its water consumption, preserving the sustainability of the La Habra Groundwater Basin is essential for the well-being of the City. Currently (and historically), the City of La Habra manages (and has managed) the La Habra Groundwater Basin through management plans and programs for groundwater levels, basin storage, and water quality.

SECTION 2. AGENCY INFORMATION

2.1 HISTORY OF AGENCIES IN LA HABRA GROUNDWATER BASIN

Historically, the Cities of La Habra and Brea have managed the groundwater resources in the La Habra Groundwater Basin. The history of the agencies can be found in the 2017 Alternative.

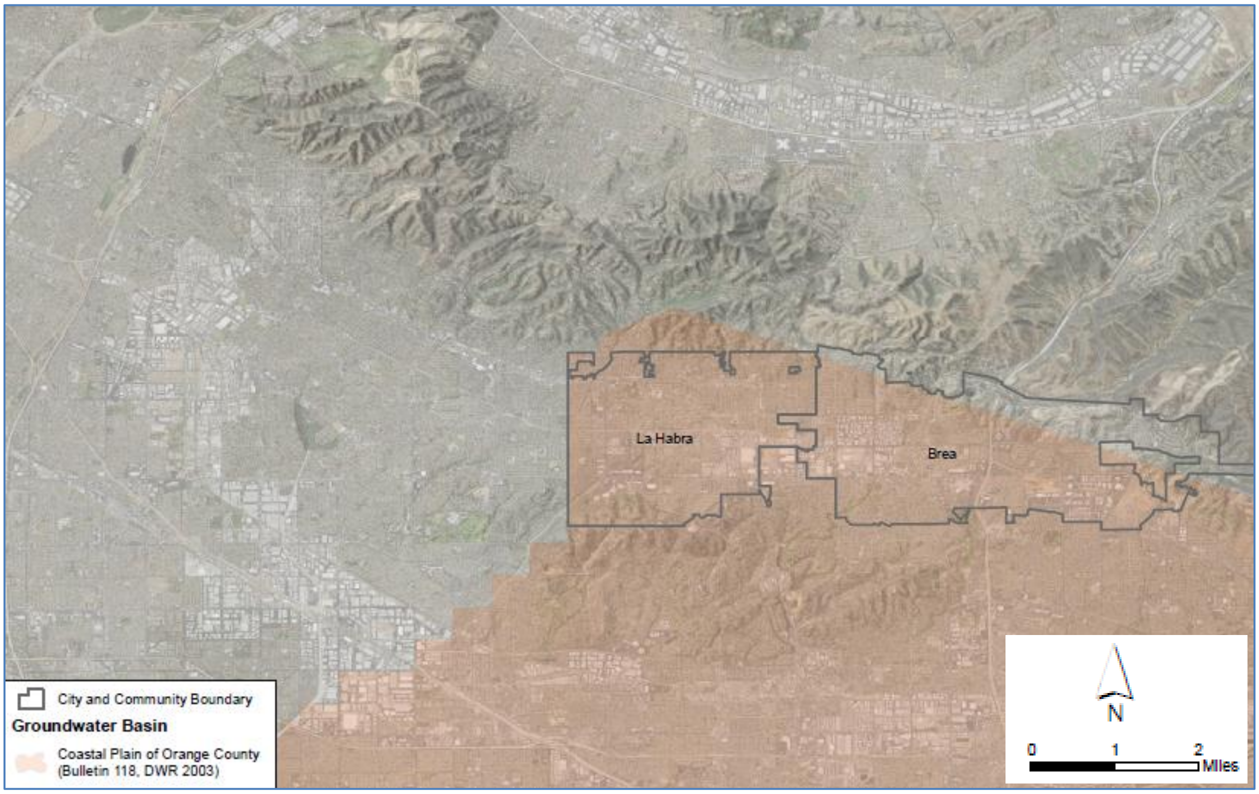


Figure 2-1: Cities of La Habra and Brea within Basin 8-1.

2.2 GOVERNANCE AND MANAGEMENT STRUCTURE

See the 2017 Alternative for a discussion on governance and management structure.

2.3 LEGAL AUTHORITY

See the 2017 Alternative for a discussion on legal authority.

2.4 BUDGET

See the 2017 Alternative for a discussion on the budget.

SECTION 3. MANAGEMENT AREA DESCRIPTION

3.1 LA HABRA GROUNDWATER BASIN SERVICE AREA

The La Habra-Brea Management Area refers to the northwestern portion of Basin 8-1, as defined by DWR Bulletin 118, overlying the La Habra Groundwater Basin. This management area is outside of the jurisdiction of OCWD. As discussed in Section 2.2, the City of La Habra adopted a resolution establishing it as a GSA, under a memorandum of agreement with the City of Brea, for management of the La Habra Groundwater Basin underlying the two cities. The City adopted a second resolution to establish the La Habra Basin as a separate basin from Basin 8-1. OCWD adopted a resolution to support the City's establishment of the La Habra Basin.

3.1.1 Jurisdictional Boundaries

The historical La Habra Groundwater Basin as described in DWR Bulletin 45 (1934) and Bulletin 53 (1947) is located in both Los Angeles (western basin) and Orange Counties (eastern basin) (see Figure 3-1). The majority of the historical La Habra Basin located in Los Angeles County is within Basin 4-11, the Coastal Plain of Los Angeles, as depicted in DWR Bulletin 118 (2003 update); the entirety of the La Habra Basin located in Los Angeles County is within the area subject to the terms of the Central Basin Adjudication. The majority of the historical La Habra Basin located in Orange County is within Basin 8-1, the Coastal Plain of Orange County as depicted in DWR Bulletin 118. Only a small portion of the historical La Habra Basin in Orange County is within the boundaries of the Orange County Water District.

The Cities of La Habra and Brea overlie a portion of the La Habra Groundwater Basin that is not within the area subject to the terms of the Central Basin Adjudication, nor within the boundaries of the Orange County Water District. The La Habra Groundwater Basin, referred to herein, includes all of the City of La Habra and the portion of the City of Brea within Basin 8-1 but not within the jurisdiction of Orange County Water District, overlying the historical La Habra Groundwater Basin (see Figure 3-2).

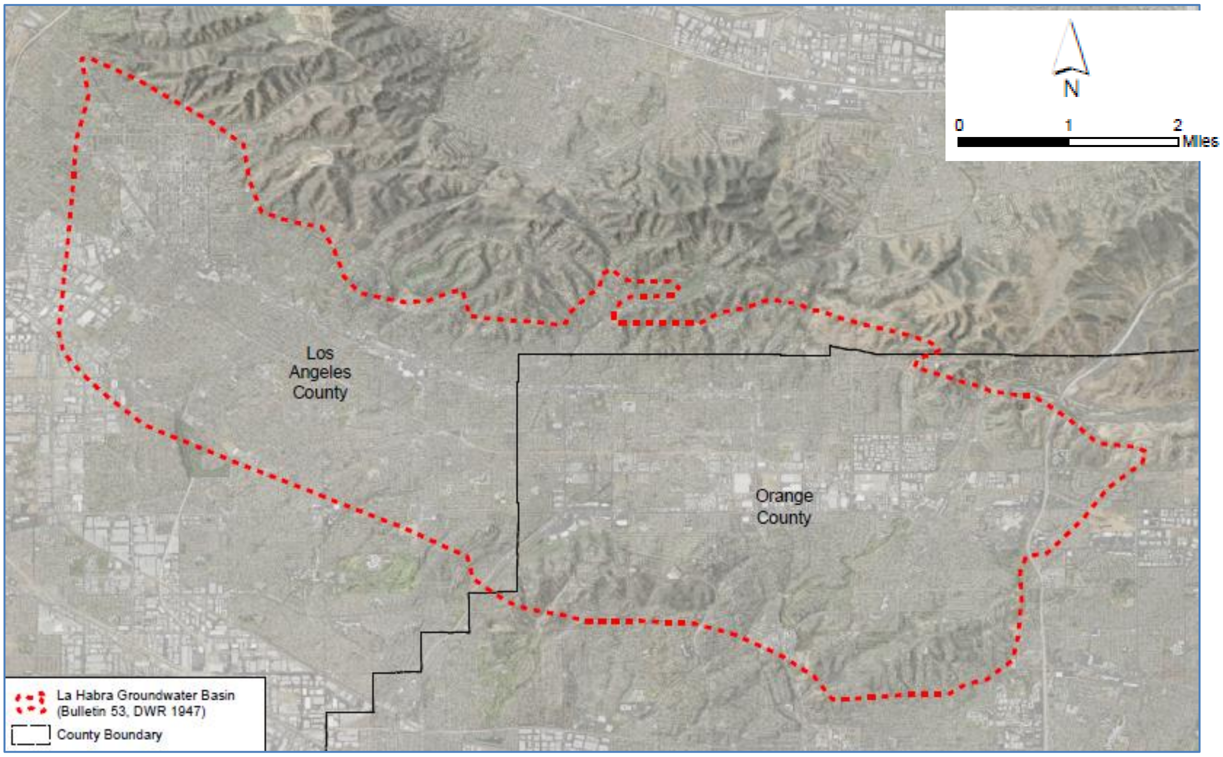


Figure 3-1: Historical La Habra Groundwater Basin (DWR, 1934. DWR, 1937).

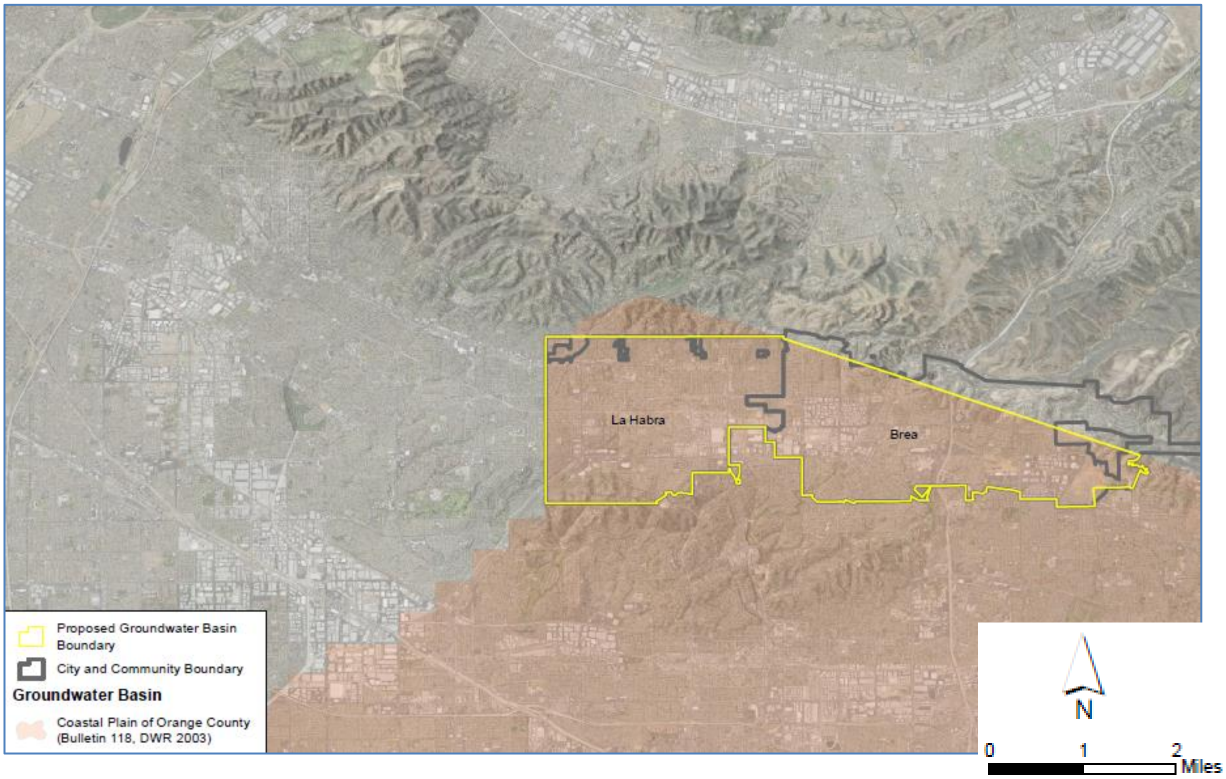


Figure 3-2. La Habra Groundwater Basin.

3.1.2 Existing Land Use Designations

The major land use within the City of La Habra is low-density residential with pockets of medium-density residential areas. Portions of La Habra consist of commercial and light industrial land uses. Likewise, land use within the City of Brea is primarily residential with sections of commercial and industrial facilities.

3.2 GROUNDWATER CONDITIONS

The geologic structure of the La Habra Groundwater Basin is dominated by the La Habra Syncline, a northwest trending, U-shaped down-fold. The syncline is deepest in the Brea area and becomes increasingly shallower to the west and is bounded by the Whittier Fault within the Puente Hills to the north and the Coyote Hills to the south (Montgomery, 1977). The La Habra Syncline produces the La Habra Valley, a naturally-occurring valley, where significant amounts of groundwater have accumulated over the past 150,000 years (Malcolm Pirnie, 2011a).

3.2.1 Groundwater Elevation

Groundwater within the La Habra Groundwater Basin generally flows from the Puente Hills in a south or southwesterly direction. Subsurface flow out of the basin occurs near Coyote and La Mirada Creeks into the Coastal Plain of Los Angeles and at the gap between the East and West Coyote Hills into the Coastal Plain of Orange County (Stetson, 2014).

A groundwater level hydrograph for a well completed in the Alluvium shows water levels declining to their lowest level in the 1950s, and recovering during the 1970s. More recent data from a nearby well shows a leveling off of water levels through the 1990s. Two other wells completed in the alluvium also show relatively flat water levels from the 1970s through the 1990s (Stetson, 2014).

Wells completed in the San Pedro Formation show rising groundwater levels. The lowest groundwater levels in this aquifer were observed during the 1930s and 1940s, with water levels recovering about 60 feet through 1972. This corresponds to DWR Bulletin No. 53 (1947) stating that the La Habra Groundwater Basin was in overdraft.   More recent data show an overall rising trend of 50 to 60 feet in groundwater levels from 1970 through 2007 and a slight decline during more recent years. There were no water levels available for the La Habra Formation. See Section 3.2.3 for more information.

3.2.2 Regional Pumping Patterns

The transmissivity of a groundwater basin is the rate at which groundwater flows horizontally through the aquifer. Based on Montgomery (1977), the following are the estimated transmissivities in gallons per day per foot (gpd/ft) for each of the water-bearing zones of the La Habra Groundwater Basin.

- Alluvium: 200 gpd/ft to 10,000 gpd/ft
- La Habra Formation: 25,000 gpd/ft
- San Pedro Formation: 60,000 gpd/ft

Historically, all three water-bearing zones of the La Habra Groundwater Basin were developed for domestic and irrigation purposes, with most wells drilled between 1916 and 1940. The City of La Habra originally drilled three production wells in the deeper aquifers. Groundwater production in these wells ceased in 1968 (Montgomery, 1977). Based on Montgomery (1979), the Alluvium and La Habra Formations are not considered to have groundwater development potential for the following reasons: the Alluvium is limited in thickness and extent, has low permeability characteristics, and is of poor water quality while the La Habra Formation's permeable sand and gravel zones are thin and discontinuous. Groundwater production in the San Pedro Formation continues to this day. Based on Montgomery (1977), the following are expected well yields for each of the water-bearing zones of the La Habra Groundwater Basin.

- Alluvium: 200 gpm
- La Habra Formation: 100 gpm to 400 gpm
- San Pedro Formation: 300 gpm to 800 gpm

The City of La Habra pumps local groundwater from the La Habra Groundwater Basin from three production wells: the Idaho Street Well, the La Bonita Well, and the Portola Well. The Idaho Street Well has a capacity of 2,000 gpm but is regulated at 1,500 gpm. Water pumped from the Idaho Street Well requires treatment before entering the distribution system. This treatment consists of chlorination, air-stripping to remove ammonia and hydrogen sulfide, and the addition of sodium hexametaphosphate to sequester iron and manganese (Malcolm Pirnie, 2011a). The capacities of the La Bonita Well and the Portola Well are 850 gpm and 1,200 gpm, respectively.

The City of Brea owns and operates one non-potable groundwater well used for irrigation at the Brea Creek Golf Course (Brea, Water Master Plan Update, November 2009). The maximum capacity of this well is 450 gpm.

Table 3-1: Groundwater Production in La Habra Groundwater Basin. Acre-Feet per Year.

Year	City of La Habra	City of Brea[1]	Total
2011	1,849	76	1,925
2012	1,865	86	1,951
2013	3,073	82	3,155
2014	4,094	121	4,215
2015	3,630	50	3,680
2016	3,547	86	3,633

Year	City of La Habra	City of Brea[1]	Total
2017	3,200	96	3,295
2018	2,653	111	2,763
2019	2,158	88	2,245
2020	2,493	108	2,600
AVERAGE	2,856	90	2,946

1 Does not include small additional pumping within the City of Brea by a privately owned groundwater production well.

Sources: 2015 Urban Water Management Plans (Arcadis, 2016). City of La Habra. City of Brea.

Table 3-2: La Habra Groundwater Basin Wells

Well Owner	Well Name	Well Use	Well Depth (ft)	Well Capacity (gpm)
City of La Habra	Idaho Street	Potable	970	2,000
City of La Habra	La Bonita	Potable	890	850
City of La Habra	Portola	Potable	1,010	1,200
City of Brea	Irrigation Well	Irrigation	Unknown	450
Memory Garden Memorial Park	--	Irrigation	Unknown	Unknown

3.2.3 Long-Term Groundwater Elevation Hydrograph

Groundwater level data were compiled from DWR's Water Data Library for eight wells with sufficient data to analyze trends within the La Habra Groundwater Basin. The DWR groundwater data were available for 1970 through 2010. Montgomery's hydrographs from 1922 through 1975 are also included to capture earlier groundwater trends when there was more agricultural groundwater pumping for crop irrigation. Five of the ten monitoring wells had accompanying well logs to determine which aquifer was represented by the data. Figure 3-3 shows the location of these wells and the inferred direction of groundwater flow based on the groundwater level data (Stetson, 2014).

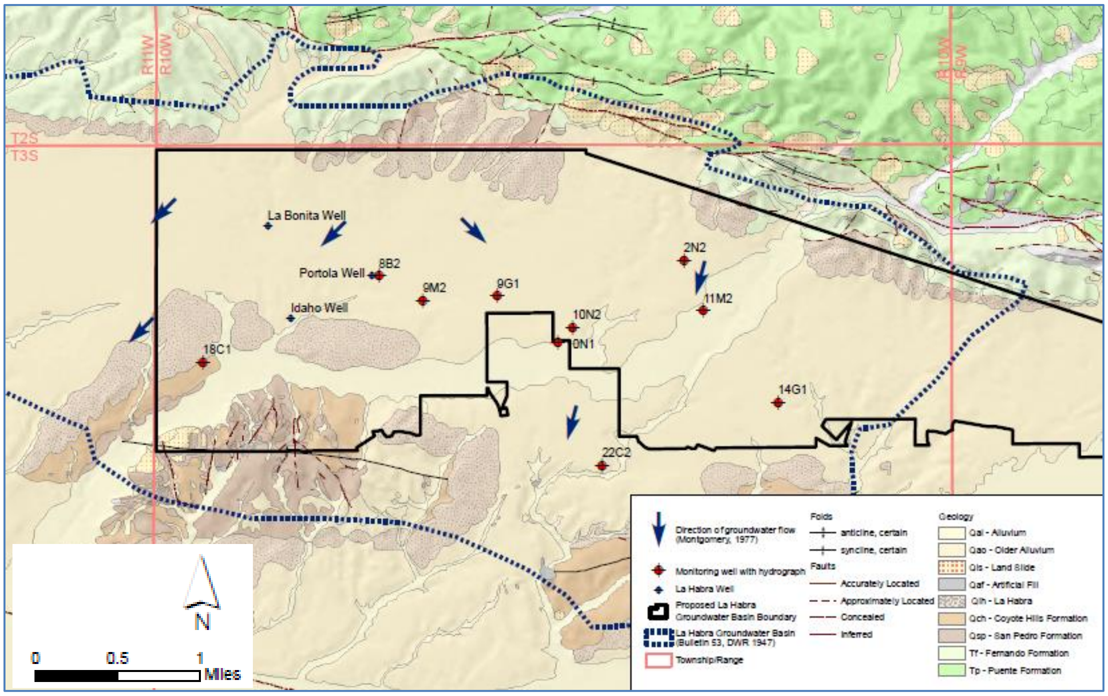
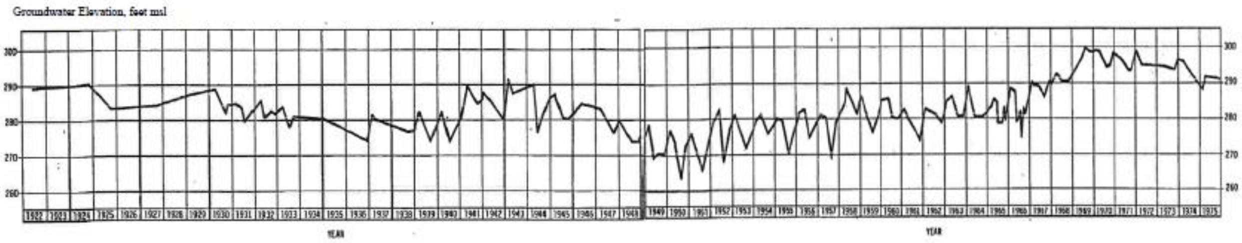


Figure 3-3: Groundwater Elevation Monitoring Wells.

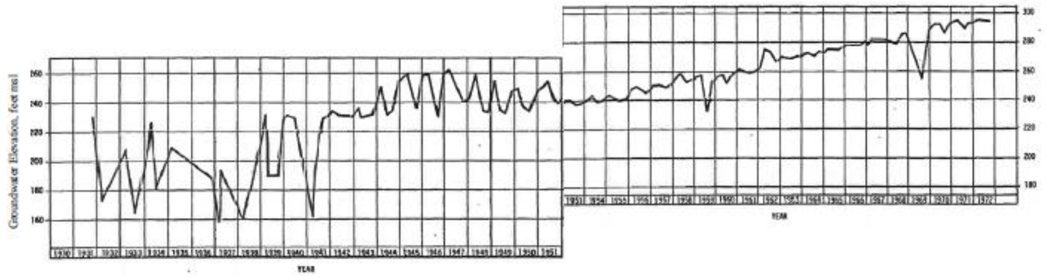
The groundwater level hydrograph for a well completed in the alluvial aquifer (Figure 3-4; T3/R10-10N1) shows water levels declining to their lowest level in the 1950s, and recovering during the 1970s. More recent data from a nearby well (Figure 3-5; T3/R10-10N2) shows a leveling off of water levels through the 1990s. Two other wells completed in the alluvium (T3/R10-2N2 and -9M2) also show relatively flat water levels from the 1970s through the 1990s, (Stetson, 2014).

Wells completed in the San Pedro aquifer show rising groundwater levels. The lowest groundwater levels in this aquifer were observed during the 1930s and 1940s. This corresponds to DWR Bulletin No. 53 (1947) stating that the La Habra Groundwater Basin was in overdraft. Groundwater levels recovered about 60 feet from the 1940s through 1972 at well T3/R10-14G1. More recent data from well T3/R10-18C1 show an overall rising trend of 50 to 60 feet in groundwater levels from 1970 through 2007 and a slight decline during the last three years of data. There were no water levels available for the La Habra aquifer (Stetson, 2014).

Recent data showing the depth to groundwater are presented in Figure 3-6. Wells T3/R10-9G1 and -8B2 show a similar pattern of rising groundwater levels through 2007 as seen at well T3/R10-18C1 completed in the San Pedro aquifer. The alluvial aquifer well data present a relatively flat groundwater level from 10 to 40 feet below land surface. The depth to groundwater graph shows groundwater levels in the San Pedro Aquifer recovering to levels observed in the alluvial aquifer (Stetson, 2014).



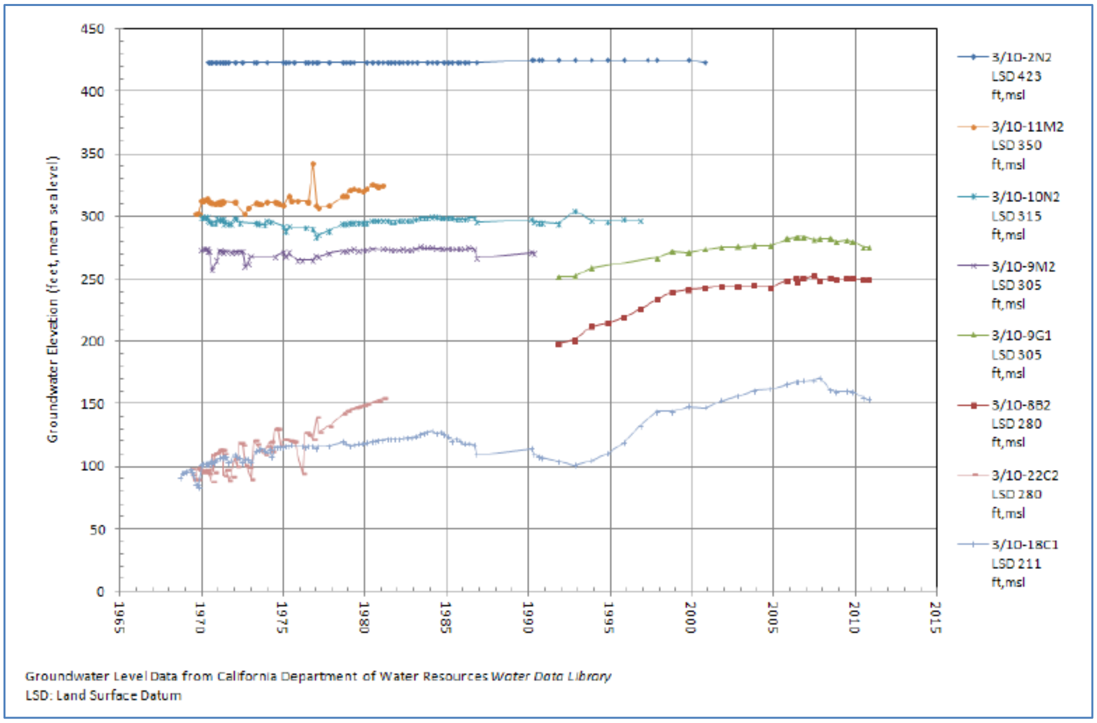
Well Hydrograph for 3/10-10N1
1922 through 1975



Well Hydrograph for 3/10-14G1
1931 through 1972

Figure 3-4: Early Well Hydrograph. 1922 Through 1975.

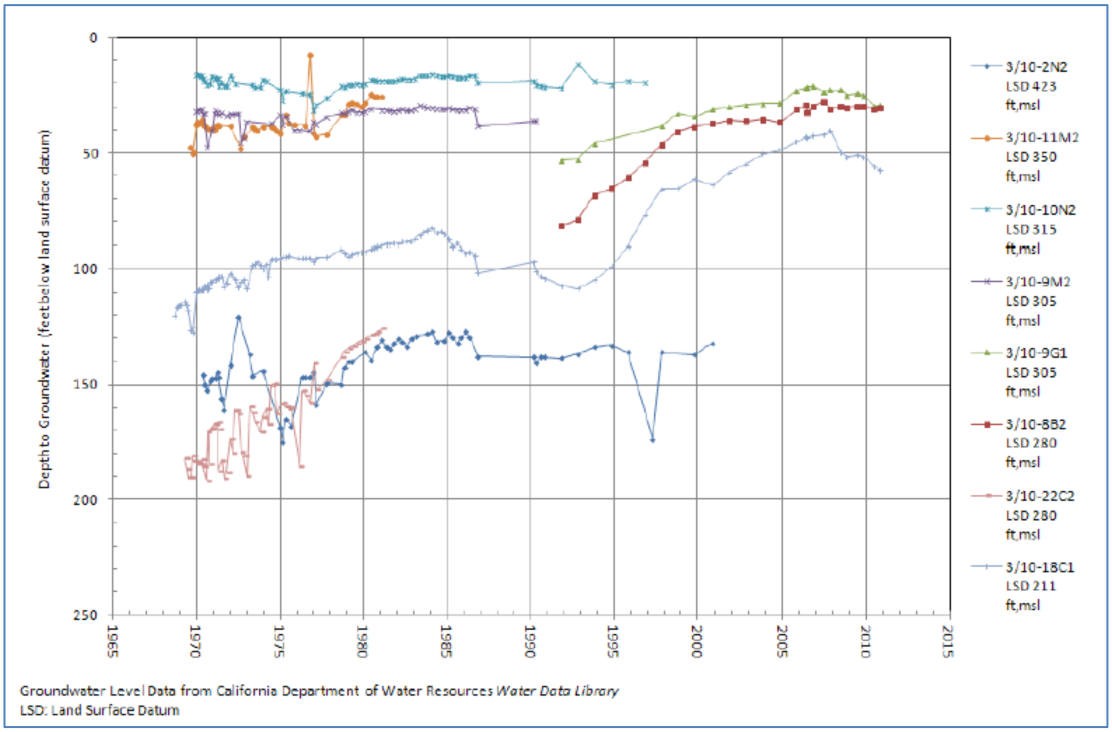
Source: Montgomery, 1977.



Groundwater Level Data from California Department of Water Resources *Water Data Library*
LSD: Land Surface Datum

Figure 3-5: Groundwater Level Hydrographs.

Source: Stetson, 2014.



Groundwater Level Data from California Department of Water Resources *Water Data Library*
LSD: Land Surface Datum

Figure 3-6: Depth to Groundwater.

Source: Stetson, 2014.

The hydrograph for the monitoring well with both recent data and a long period of record is shown in the figure below. Recent groundwater level data suggest that groundwater levels are stable and the basin is in balance.

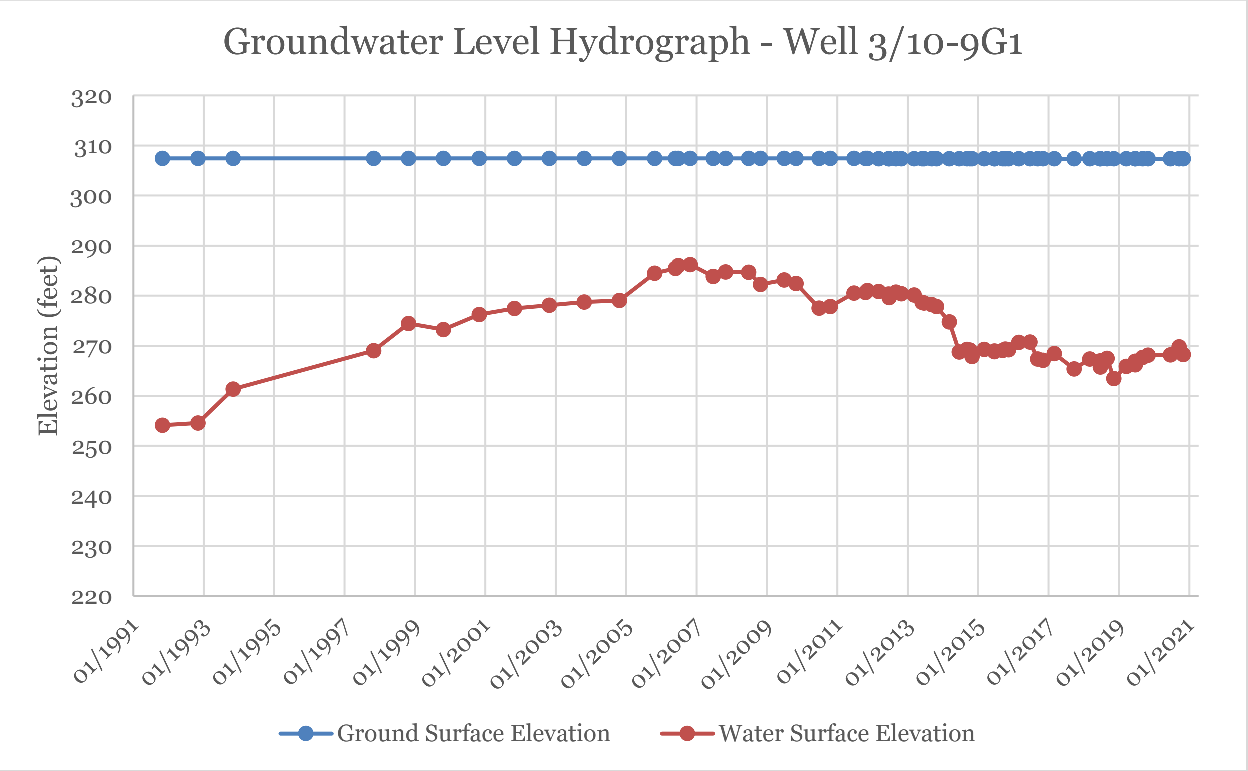


Figure 3-7: Recent Groundwater Level Hydrograph.

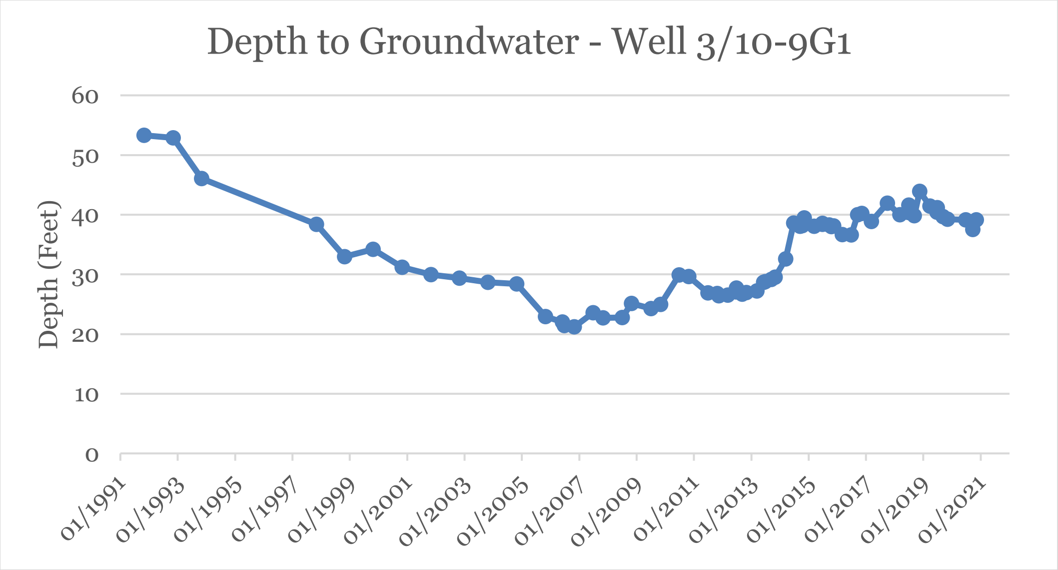


Figure 3-8: Recent Depth to Groundwater.

3.2.4 Groundwater Storage Data

According to the DWR Bulletin 45 (1934), the storage capacity of the historical La Habra Groundwater Basin is approximately 153,000 acre-feet. Approximately 57 percent of the historical La Habra Groundwater Basin is in the eastern portion of the basin which is now designated within Basin 8-1. The Cities of La Habra and Brea overlie approximately 60 percent of the eastern portion of the historical La Habra Groundwater Basin (Stetson, 2014). Accordingly, the storage capacity of the current La Habra Groundwater Basin is approximately 55,000 acre-feet.

3.2.5 Groundwater Quality Conditions

Previous investigations of water quality within the La Habra Basin determined that the quality is extremely variable. It was shown that shallow regions within the central portion of the basin as well as areas recharged by surface water along the basin boundary are of a bicarbonate and chloride character. Sulfate concentration increased with depth in the La Habra and San Pedro water-bearing zones. The historical data also shows that total dissolved solids (TDS) concentrations have remained relatively stable (Montgomery, 1977). The most recent 10-year average TDS concentrations in the La Bonita, Portola, and Idaho wells are 1,052 mg/l, 750 mg/l, and 802 mg/l, respectively.

Overall, groundwater from the San Pedro Aquifer is considered to be of fair to good quality (Montgomery, 1979). However, groundwater produced from the La Habra Groundwater Basin is not currently used directly for potable purposes due to water quality concerns that predate SGMA legislation. Water from the La Bonita and Portola Wells is chlorinated and then blended with water purchased from the California Domestic Water Company in a 250,000-gallon forebay to reduce the concentration of minerals prior to entering the City of La Habra's distribution system (La Habra, 2014).

Groundwater production wells in Brea are strictly used for irrigation purposes as the groundwater beneath the city has poor water quality and would require extensive treatment and blending with higher quality water to meet public health standards (Malcolm Pirnie, 2011).

Table 3-3 below shows historical water quality for select constituents. Recent State database water quality results indicate reported exceedances in raw groundwater for nitrate, perchlorate, volatile organic compounds (VOCs), and radioactivity, with the most recent violation occurring in 2014 (Safe Drinking Water Information System).

Table 3-3: Historical Constituent Concentrations (1927-1977)

Constituent	Minimum	Maximum	Average
Specific Conductance	255	2,235	1,324
Total Dissolved Solids	269	1,696	943
Sulfate	0	672	174
Chloride	18	460	161
Nitrate	0	185	44
Fluoride	0	1.6	0.44
Total Hardness	75	931	489

Source: Montgomery, 1977.

3.2.6 Land Subsidence

Based on Orange County Water District's 2015 Update to its Groundwater Management Plan, there is no evidence that the observed minimal land surface changes in portions of Orange County has caused, or are likely to cause, any structural damage within the area (OCWD, 2015). As long as groundwater elevations and storage within the basin are maintained within their historical operating ranges, the potential for problematic land subsidence is reduced.

Additionally, the United States Geological Survey (USGS) does not show the La Habra Groundwater Basin as an area where there have been historical or current subsidence recorded due to either groundwater pumping, loss of peat, or oil extraction (USGS, 2021). There is also no evidence of land subsidence within the La Habra Groundwater Basin according to the Department of Water Resources' SGMA Data Viewer. Vertical displacement estimates are derived from Interferometric Synthetic Aperture Radar (InSAR) data and show only a minimal positive vertical displacement within the area (DWR, 2021a). Accordingly, there are no known land subsidence undesirable results caused by depletion of groundwater resources.

3.2.7 Groundwater and Surface Water Interactions and Groundwater Dependent Ecosystems

The La Habra Groundwater Basin lies entirely within the Coyote Creek Watershed (see Figure 3-7). The Coyote Creek Watershed drains approximately 165 square miles of densely populated areas of residential, commercial, and industrial areas as well as areas of open space (Atkins, 2012). Coyote Creek is a tributary to the San Gabriel River. Major Creeks within the watershed are: Coyote Creek, Brea Creek, Fullerton Creek, Carbon Creek, Moody Creek, and Los Alamitos Channel, some of which are concrete lined.

Coyote Creek, Brea Creek, and La Mirada Creek (a non-major creek) all flow into and drain out of the La Habra Valley. The total drainage area of these three creeks within the valley is approximately 12,950 acres (Stetson, 2013). Coyote Creek and La Mirada Creek are surface waters flowing through the boundaries of the City of La Habra. Montgomery (1977) determined that about 30% of the runoff available in an average rainfall year percolates to the aquifers underlying the La Habra Valley.

The San Pedro Formation is naturally recharged directly through aquifer outcrops (exposed formation sediments) in the Los Coyote Hills (south of the intersection of Beach Boulevard and Imperial Highway) and in the Puente Hills (along the foothills north of Whittier Boulevard) [Montgomery, 1977]. The San Pedro Formation could also be indirectly recharged through the uplifted and exposed San Pedro beds that lie just below a thin layer of alluvium along the Coyote Creek valley (Montgomery, 1977). Within the La Habra Valley, an estimated 15% of precipitation contributes to aquifer recharge as direct percolation of precipitation. The 40-year average rainfall (14 inches) results in a water supply from precipitation within the 10,160-acre drainage area of approximately 1,780 AFY (Stetson, 2013).

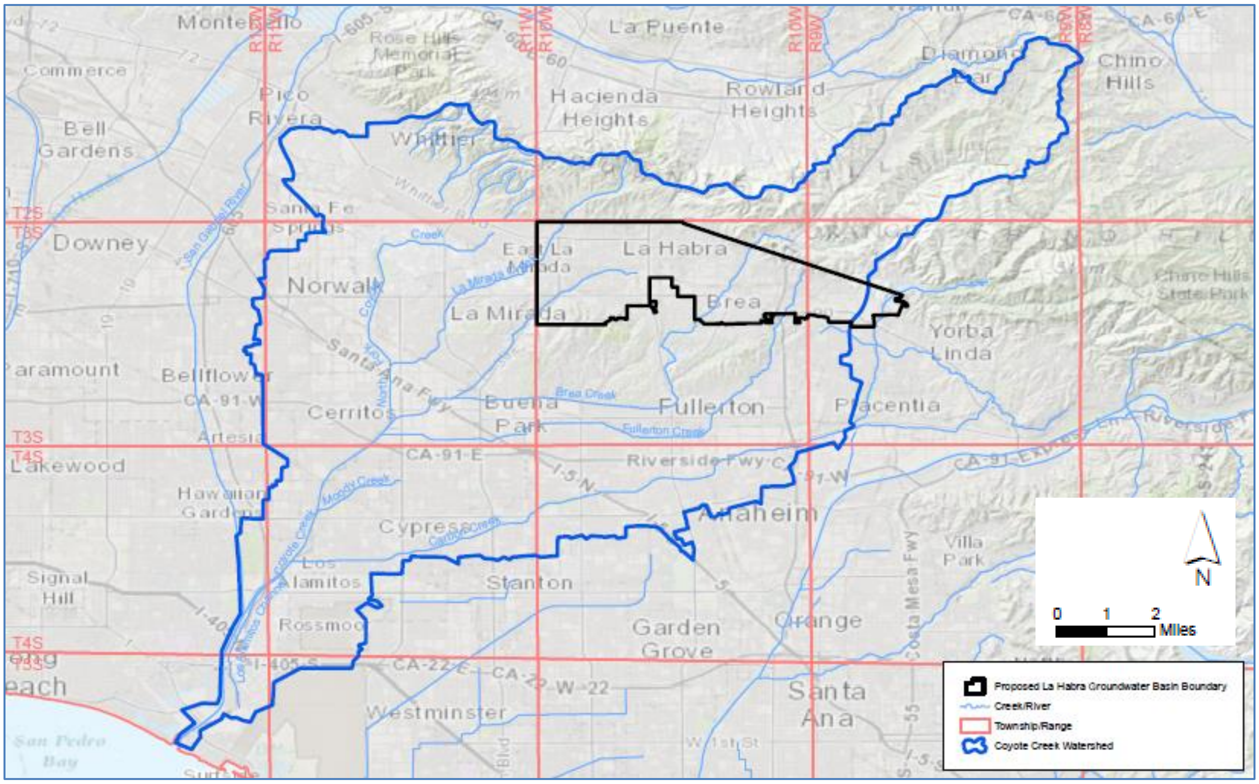


Figure 3-9: Coyote Creek Watershed.

A review of available references was conducted to identify any potential presence of Groundwater Dependent Ecosystems (GDEs) in the La Habra-Brea Management Area and to review potential impacts groundwater extraction may have on the ecosystems. DWR’s Natural Communities (NC) dataset includes two habitat classes which are associated with groundwater: wetland features and vegetation types. Small areas of GDEs such as Palustrine, scrub-shrub, seasonally flooded wetlands, have been found on the western portion of the La Habra Groundwater Basin. Groundwater dependent vegetation, such as Coast Live Oak, Willow, and Riparian Mixed Hardwood have been found in small areas within the central and eastern portions of the La Habra Groundwater Basin (DWR, 2021b). As shown in Figure 3-10 below, groundwater extraction does not occur near groundwater dependent vegetation or wetlands. Likewise, potential groundwater recharge locations are not located near groundwater dependent vegetation; therefore, any future recharge project would not alter the current natural ecosystem. La Habra’s groundwater production wells extract groundwater from the San Pedro formation, the deepest aquifer unit that forms the La Habra Groundwater basin, which is significantly deeper than the than the perched alluvial (Yerkes, 1972). The areas of vegetation identified as groundwater dependent ecosystems are along the base of the surrounding hills at the limits of the basin and are also supported by surface water runoff and rainfall. Cross sections in the region indicate shallow groundwater in those areas.

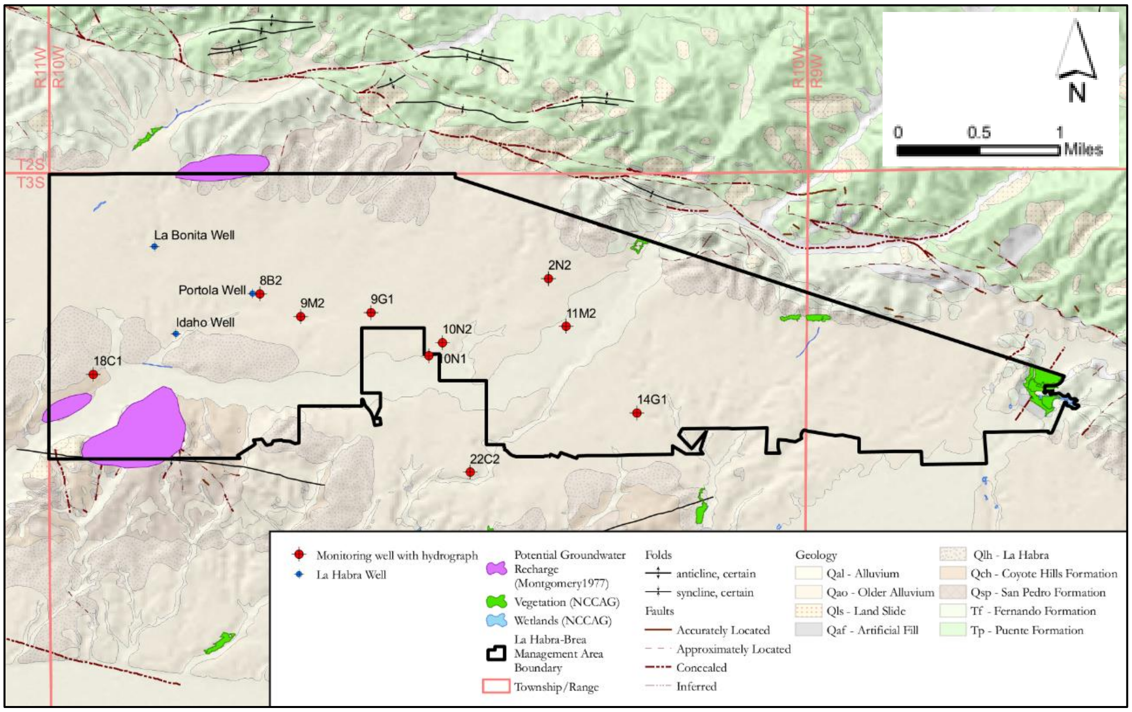


Figure 3-10: Groundwater Dependent Ecosystems.

SECTION 4. WATER BUDGET

4.1 BUDGET COMPONENTS

The components of the water budget generally include recharge from precipitation and runoff, recharge from subsurface inflow, subsurface outflow, and groundwater production.

Recharge components of the water budget consist of mountain front and streamflow recharge and deep percolation of precipitation. Various hydrogeologic studies show that annual natural recharge ranges from 3,300 AFY to 3,900 AFY. No measurable subsurface inflow occurs into the La Habra- Brea Management Area. Additionally, no artificial recharge occurs in the La Habra-Brea Management Area at this time.

Outflow components of the water budget consist of groundwater production and subsurface outflow. Groundwater production in La Habra-Brea Management Area has ranged from approximately 2,000 AFY to 4,200 AFY in recent years (See Table 3-1). Subsurface flow out of the groundwater basin occurs westerly near Coyote and La Mirada Creeks into the Coastal Plain of Los Angeles (Central Basin), and southerly at the gap between the East and West Coyote Hills into the main Coastal Plain of Orange County (Stetson, 2014). Subsurface outflow ranges from 2,200 to 5,500 AFY (OCWD 2015).

4.2 CHANGES IN GROUNDWATER STORAGE

Based on water level measurements the water budget appears to be in balance over the past ten years. Changes in groundwater storage are monitored through the monitoring of groundwater elevations which have shown rising trends since the 1970s. Available groundwater level data indicate groundwater levels have generally increased or remained stable over the last five years. See Section 3.2.3. These conditions indicate groundwater storage changes in the La Habra Groundwater Basin are within an acceptable range and undesirable results are not present.

4.3 WATER YEAR TYPE

The estimated water budget is based on normal/average water year type. However, historical hydrographs indicate stable or rising groundwater levels, even during dry and prolonged drought years, indicating that the water year type has little impact on the water budget.

4.4 ESTIMATE OF SUSTAINABLE YIELD

Groundwater production within the La Habra-Brea Management Area is managed by the establishment of a safe yield so that the groundwater levels and storage capacity in the La Habra Groundwater Basin will be maintained.

In 1977, Montgomery Engineers completed a groundwater study for the City of La Habra and estimated the “probable long-term groundwater basin yield” of the La Habra Groundwater Basin based on the natural recharge and natural discharge methods. Stetson conducted a re-evaluation of Montgomery’s 1977 safe yield analysis in 2013 to re-determine the estimated safe yield based on the natural recharge method. The average of these two methods (natural discharge and natural recharge) results in an approximate safe yield of 4,500 AFY.

The City of La Habra has been producing groundwater since the late 1990s and monitoring static and pumping groundwater elevations since 2008. Previous investigations into groundwater levels and the safe yield have been used to manage the La Habra Groundwater Basin for over 10 years.

4.5 ESTIMATED WATER BUDGET

The estimated water budget is shown in Table 4-1 below. There is currently insufficient data to determine precise estimates of the water budget components; accordingly, the water budget is presented as ranges.

Table 4-1: Estimated Water Budget

Budget Component	Estimated Range [1]
Inflows	
Precipitation	1,600 - 1,800
Mountain Front Recharge	1,700 - 2,100
Incidental/Other Recharge	Unknown
Outflows	
Subsurface Outflow	2,200 – 5,500
Groundwater Extraction	2,000 – 4,000
BALANCE[1]	**0**

1 This water budget is based on previous historically estimated inflows and outflows in the La Habra Groundwater Basin. Available water level data show rising or stable groundwater levels indicating the Basin is in balance. Therefore, the historical estimates may not account for all of the recharge occurring in the Basin.

Sources: Montgomery, 1977. OCWD, 2015. Stetson, 2013.

SECTION 5. WATER RESOURCE MONITORING PROGRAMS

5.1 OVERVIEW

The La Habra Groundwater Basin is currently monitored for groundwater elevations and for groundwater quality through productions wells and monitoring wells within the City of La Habra. Surface water is currently not monitored in the Cities of La Habra and Brea overlying the La Habra Groundwater Basin. Recycled water is not used within the La Habra-Brea Management Area. Imported surface water and groundwater is used within the La Habra-Brea Management Area for potable supply. These potable water sources are monitored prior to delivery and not directly monitored by the Cities of La Habra and Brea.

5.2 GROUNDWATER MONITORING PROGRAMS

Groundwater Elevations

Since 2008, the City of La Habra has measured non-pumping and pumping groundwater elevations at its production wells to review general trends in groundwater elevations in the Basin.

The City of La Habra will supplement its existing groundwater elevation monitoring program by including water level measurements reported by DWR for three monitoring wells in the La Habra Basin. Groundwater elevations have previously been reported by DWR for wells 3/10-9G1, 3/10-8B2, and 3/10-18C1; however, only well 3/10-9G1 is currently being reported. Currently, La Habra is working to expand its monitoring network. See Section 9.2 for additional information.

Groundwater Quality

Currently, the City samples for constituents at its production wells pursuant to Title 22 of the California Code of Regulations (Title 22). Under Title 22, the City monitors and reports groundwater quality for constituents that are regulated by the State Water Resources Control Board Division of Drinking Water pertaining to maximum contaminant levels (MCLs). The City of La Habra also monitors areas of contamination, as described in its Drinking Water Source Assessments provided to the Division of Drinking Water for its production wells. The City of La Habra plans to continue to review and comment on documents regarding these areas within the City limits as well as be aware of any areas outside of its jurisdiction that may affect the water quality of the Basin through surface or subsurface flow.

The City of La Habra plans to continue its existing groundwater water quality monitoring program and will evaluate the need for additional monitoring above its current program in accordance with DWR GSP regulations.

5.3 OTHER MONITORING PROGRAMS

Currently the City of La Habra does not perform any surface water quality monitoring; however, the City of La Habra will investigate any existing programs for the Coyote Creek Watershed including monitoring programs being developed in response to regulations set forth for the watershed by the local Regional Water Quality Control Board (Coyote Creek is shown on the Clean Water Act's 303(d) list of impaired waters). The City of La Habra will consider developing and implementing its own surface and subsurface inflow quality monitoring programs for the local watershed in accordance with DWR GSP regulations.

Likewise, the City of La Habra does not monitor land subsidence within the La Habra-Brea Management Area. However, the City may develop a program to monitor and measure the rate of land surface subsidence in accordance with DWR GSP regulations in the future if a land subsidence is determined to be likely to cause undesirable results.

SECTION 6. WATER RESOURCE MANAGEMENT PROGRAMS

Groundwater resources protection is considered a critical component for safeguarding the long-term sustainability of the La Habra Groundwater Basin. Groundwater resources protection includes water resources planning and an ordinance to prohibit the extraction and exportation of groundwater underlying the City for use outside the City as well as groundwater protection programs including well construction, abandonment, and destruction policies, wellhead protection, and the control of the migration and remediation of contaminated, poor quality, or saline water.

6.1 LAND USE ELEMENTS RELATED TO BASIN MANAGEMENT

The Cities of Brea and La Habra participate in two water resources management planning documents: the Integrated Regional Water Management Plan, and the Urban Water Management Plan.

Integrated Regional Water Management Plan

Integrated Regional Water Management (IRWM) is a collaborative approach of implementing water management solutions on a regional scale in order to address water resources needs. The Greater Los County Region has been designated as an IRWM region and is comprised of the following subregions: North Santa Monica Bay, South Bay, Upper Los Angeles River, Upper San Gabriel and Rio Hondo Rivers, and Lower San Gabriel and Los Angeles Rivers. The Coyote Creek watershed, which overlies the La Habra Groundwater Basin, is within the Lower San Gabriel and Los Angeles Rivers IRWM subregion. The La Habra Groundwater Basin contributes a small portion of the groundwater produced within the subregion.

Urban Water Management Plan

Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act require every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to prepare, adopt, and file an Urban Water Management Plan (UWMP) with the California Department of Water Resources (DWR). The Cities of Brea and La Habra both are required to file an UWMP every five years with DWR. The UWMP is a management tool that provides water planning and identifies water supplies needed to meet existing and future water demands.

6.2 GROUNDWATER WATER QUALITY PROTECTION AND MANAGEMENT

Well Construction, Abandonment, and Destruction Policies

The policies that govern well construction, abandonment, and destruction are designed specifically to protect groundwater quality. The administration of these policies has been delegated to individual counties by California legislature. As stated in Orange County Ordnance No. 2607, all well activity within Orange County will comply with the standards set in DWR Bulletin 74, Chapter 2. These standards are enforced by the Orange County Health Care Agency. The Cities of La Habra and Brea properly construct and abandon wells pursuant to Orange County Ordnance No. 2607.

Wellhead Protection Measures

Wellhead protection is a way to prevent drinking water from being contaminated by managing sources of potential contamination within the vicinity of a production well. Surface contaminants can enter a well through the outside edge of the well casing or directly through opening in the well head. These contaminants can travel in two directions: to the groundwater aquifer or to the distribution system. As defined in the Safe Drinking Water Act Amendments of 1986, a wellhead protection area is “the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field.”

The Cities of La Habra and Brea design and construct wells in accordance with the measures described in DWR Bulletin 74 so that the wellhead is protected from contamination. Important wellhead protection measures described in Bulletin 74 include: methods for sealing the well from intrusion from surface contaminants, site grading to assure drainage is away from the wellhead, and set-back requirements from known pollution sources.

Control of Migration and Remediation of Contaminated Groundwater

Groundwater can become contaminated naturally or through human activity. Based on a 2010 drinking water assessment performed by the City of La Habra, sources of potential groundwater contamination to the La Habra Basin include: car repair and bodywork shops, gas stations, machine and metalwork shops, and sewer collection systems (La Habra, 2013).

The City of La Habra has previously taken the position that oil and gas mining operations in or up gradient of the basin have the potential to release chemicals that could contaminate groundwater, particularly during fracking activities.

The Cities of La Habra and Brea will monitor the migration of contaminants through its water quality monitoring program and will also monitor nearby oil and gas mining operations. This will allow the point and non-point pollution sources to be identified. If contamination becomes a concern in the future, an approach to address the problem will be developed.

Control of Saline Water Intrusion

Raised salinity is a significant water quality problem in many parts of the southwestern United States and southern California, including Orange County. Elevated salinity is of concern as it can limit the implementation of recycling water projects and potentially require water purveyors to perform additional treatment on their water supplies.

The level of salinity is sometimes measured based on Total Dissolved Solids (TDS) concentrations. The TDS concentrations in the La Habra Basin are naturally occurring and it is not believed that current activities in the basin significantly contribute to the TDS loading in the basin. The TDS concentrations are not a result of saline water intrusion. The TDS concentrations in the City of La Habra's wells are below the secondary Maximum Contaminant Level (MCL) of 1,000 mg/L. TDS is listed as a secondary constituent as it does not directly cause harm to consumers but can affect the aesthetic quality of the water, including taste.

Stormwater Pollution Prevention

The City of La Habra is under the Regional Water Quality Control Board (RWQCB) National Pollutant Discharge Elimination System (NPDES) permit, Order R8-2009-0030. The current adopted permit requires mandates for the implementation of water quality control programs including adopting development standards for existing and new development. Although the NPDES permitting program is intended to protect surface water quality by preventing unauthorized stormwater discharges and discharges to navigable water, groundwater quality is also protected through the NPDES program incidental percolation of surface water into the groundwater occurs.

The City of La Habra implements additional best management practices to prevent pollutant discharges. To assist developers and owners with implementation of NPDES requirements and best management practices for construction projects, the City of La Habra has created a Construction Runoff Guidance Manual. Likewise, the Model Water Quality Management Plan has been developed to address urban runoff and pollution. A water quality ordinance has been adopted (La Habra Municipal Code Chapter 13.24) to locally enforce California stormwater regulations. Additionally, the City of La Habra conducts investigations, inspections, trainings, maintenance, and public education to reduce pollution and contamination. These management practices

Blending Program

As discussed in Section 3.2.5, groundwater contamination exists in portions of the La Habra Groundwater Basin. To manage groundwater quality concerns, the City of La Habra blends groundwater from the La Habra Groundwater Basin with imported water (both groundwater and surface water) in order to reduce contaminant levels prior to distribution. See also Section 11.4 discussion on management programs.

6.3 GROUNDWATER EXPORT PROHIBITION

The protection of the health, welfare, and safety of the residents and economy of the City of La Habra require that the groundwater resources of the City be protected for present and future municipal, industrial, and domestic beneficial uses within the City. The sustainable yield of the portion of the La Habra Basin underlying the City is not sufficient to serve beneficial uses in addition to the beneficial municipal, industrial and domestic uses currently served through the City municipal water system. The best interest of the present and future inhabitants of the City is served by the prohibition against the extraction and exportation of groundwater produced from within the City's jurisdictional boundaries. Accordingly, on December 21, 2015, the City of La Habra adopted Ordinance No. 1767 to prohibit the extraction and exportation of groundwater underlying the City for use outside of the City.

SECTION 7. NOTICE AND COMMUNICATION

7.1 INTRODUCTION

The Cities of La Habra and Brea overlie the La Habra Groundwater Basin and are the only producers of groundwater within the basin. Potential agencies that may additionally have a stake in the successful management of the basin include:

- Central Basin Watermaster (DWR): adjudicated Central Basin (Los Angeles)
- OCWD: actively manages Orange County portion
- City of Fullerton: included in OCWD's service area

7.2 GROUNDWATER PRODUCERS

As the City of Brea is a direct stakeholder in the Orange County portion of the La Habra Basin outside of OCWD's service area, Brea was included in the preparation of this plan.

While the Central Basin Watermaster, OCWD, and the City of Fullerton do not have a direct stake in the Orange County portion of the La Habra Basin outside of OCWD's service area that is the focus of this Plan, the portions of the historical La Habra Basin underlying these entities are hydrologically connected to the portion of the basin that is the subject of this Plan. As such these entities were informed that OCWD was preparing this Plan and the planned management of the basin was discussed with them.

7.3 PUBLIC PARTICIPATION

The City of La Habra has invited the public to participate in City Council meetings where management of the La Habra Basin and future actions have been discussed and presented. See the 2017 Alternative for additional information.

The La Habra GSA will strive to involve the public in groundwater management decisions regarding the La Habra-Brea Management Area. In the future, the La Habra GSA plans to provide copies of the periodic groundwater reports that will be prepared to the public at their request and publish information on groundwater management accomplishments on the City's website. The La Habra GSA will also comply with the public participation requirements under SGMA.

7.4 COMMUNICATION PLAN

The La Habra GSA plans to prepare a summary report of the current conditions of the La Habra Groundwater Basin ideally every two to five years using the results from the monitoring program (see Section 5.0). These informative reports will be used to plan future groundwater projects, develop new groundwater policies, and identify any new concerns with the basin.

SECTION 8. SUSTAINABLE MANAGEMENT APPROACH

As the City of La Habra currently depends on local groundwater to meet approximately 40 percent of its water consumption and the City of Brea uses groundwater to meet irrigation needs, preserving the sustainability of the La Habra Groundwater Basin is essential for the well-being of the two cities. Currently (and historically), the City of La Habra manages (and has managed) the La Habra Groundwater Basin through management plans and programs for groundwater levels, basin storage, and water quality, discussed below in Sections 9, 10, and 11, respectively. Seawater intrusion and land subsidence are not occurring in the La Habra-Brea Management Area, and are not anticipated to occur; therefore, they are not actively managed at this time. Likewise, groundwater-surface water interactions are not actively managed at this time. No undesirable results have been observed in the La Habra Groundwater Basin.

As a key component of sustainable management, the Cities of La Habra and Brea strongly promote conservation as a means to preserve water supplies. Both cities have sections on their websites dedicated to water conservation in addition to including conservation guidance in their annual Consumer Confidence Reports distributed to residents.

SECTION 9. MANAGING GROUNDWATER LEVELS

A solid understanding of groundwater elevations, seasonal fluctuations and response to pumping, existing basin yield, and how groundwater is stored and transmitted through the basin is critical for sustainably managing the La Habra-Brea Management Area.

9.1 HISTORY OF BASIN CONDITIONS AND MANAGEMENT ACTIONS

As shown on Figures 3-4, 3-5, and 3-6, groundwater levels in the La Habra-Brea Management Area have recovered from lows in the 1930 to 1950s and have experienced a general rising trend and leveling off since the 1970s. Given consistent groundwater production within the estimated safe yield of the basin, groundwater levels are expected to remain steady in the future.

9.2 MONITORING OF GROUNDWATER LEVELS

The City of La Habra recognizes the great importance of monitoring groundwater levels and acknowledges the current data gaps in the monitoring network. Monitoring groundwater levels is critical to basin management because water levels impact other potential undesirable results: loss of groundwater in storage, degraded water quality, land subsidence, and depletion of interconnected surface water. Groundwater levels can serve as a proxy for identifying potential impacts related to other groundwater conditions.

As discussed in Section 5.2, the City has measured non-pumping and pumping groundwater elevations at its production wells since 2008. At the time the Alternative was first being developed, there were several additional wells actively being monitored in the La Habra Basin by other agencies. These wells with water level data included wells 3/10-9G1, 3/10-8B2, and 3/10-18C1. Many of these wells are no longer being monitored which is causing data gaps. Accordingly, La Habra is currently evaluating potential groundwater wells for inclusion into an expanded monitoring program as part of compliance under SGMA. The need for standard and multi-level monitoring wells to monitor the three aquifers of the basin is being investigated. The La Habra GSA may potentially request State assistance through the Technical Services Support program to install additional monitoring wells. The proposed monitoring program will include wells located within the vicinity of the La Habra Basin. La Habra has been in coordination with the Department of Water Resources regarding wells located in the La Habra Basin that have previously been included in bulletins/reports published by the Department of Water Resources (DWR) in order to acquire pertinent well information that is not publicly available. These wells and other existing monitoring wells are currently being screened and evaluated for available data and suitability for inclusion in the monitoring network for the La Habra Groundwater Basin. Updates and modifications to the monitoring network will be discussed in the next Annual Report.

Characterization of the conditions of the basin using the City’s existing groundwater elevation data from its production wells may not reflect steady state conditions because the wells pump frequently and groundwater levels within the wells do not have enough time to fully recover to obtain a static elevation before the well is put into production once more. Static elevations may be recorded through the use of monitoring wells where no pumping is performed and the well is constantly in a static condition.

9.3 DEFINITION OF SIGNIFICANT AND UNREASONABLE LOWERING OF GROUNDWATER LEVELS

The definition of significant and unreasonable lowering of groundwater levels in the La Habra-Brea Management Area is a lowering of groundwater levels such that a significant loss of well production capacity or a significant degradation of water quality occurs which would impact the intended and current beneficial uses of the groundwater. Currently, the Santa Ana Regional Water Quality Control Board has designated the beneficial uses of groundwater in the La Habra-Brea Management Area to be Municipal and Domestic Supply and Agriculture.

The La Habra Groundwater Basin is currently managed within the safe yield, and groundwater levels have shown rising or stable trends in recent years, as shown by the available groundwater level hydrographs (see Section 3.2). Likewise, no other potential impacts are occurring such as loss of capacity at groundwater production wells, water quality degradation, or land subsidence. Accordingly, there are currently no undesirable results occurring related to the chronic lowering of groundwater levels.

9.4 DETERMINATION OF MINIMUM THRESHOLDS

There are no minimum thresholds established for groundwater levels in the La Habra Groundwater Basin because the basin is currently not in overdraft and is managed within the safe yield of the basin. Accordingly, no undesirable results are occurring. General water levels trends have shown rising and recovering groundwater levels over the past several decades with water levels being relatively stable for the past several years. Additionally, the prolonged and significant regional drought between 2011-2017 did not cause water levels to lower significantly or unreasonably. See Section 3.2.

Recognizing that historical water levels have been significantly lower in previous decades, the La Habra GSA will continue to monitor groundwater levels to determine if chronic or significant lowering of groundwater levels are observed. If declines are observed, the La Habra GSA will evaluate its groundwater management operations, re-evaluate the safe yield, and establish minimum thresholds, where appropriate, and in accordance with SGMA.

SECTION 10. MANAGING BASIN STORAGE

10.1 HISTORY

As discussed in Section 9.1, groundwater levels in the La Habra Groundwater Basin have recovered from lows in the 1930 to 1950s and have experienced a general rising trend and leveling off since the 1970s. Given steady groundwater production within the estimated safe yield of the basin, groundwater levels are expected to remain steady in the future; consequently, water in storage is similarly anticipated to remain steady.

10.2 MONITORING STORAGE LEVELS

The monitoring of storage levels is indirectly monitored through the groundwater level monitoring program described in Section 9.2.

10.3 MANAGEMENT PROGRAMS

10.3.1 Establishment of Safe Yield

A “safe yield” is used for ongoing management and future planning of a groundwater basin for sustained beneficial use. It is generally defined as the volume of groundwater that can be pumped annually without depleting the aquifer beyond its ability to recover through natural recharge over a reasonable hydrologic period. As discussed in Section 4.4, the approximate safe yield of the basin is 4,500 AFY, determined by taking the average of two methods to determine the natural discharge and natural recharge of the basin.

Based on a review of groundwater elevations performed in January 2014, groundwater elevations in the San Pedro aquifer of the La Habra Basin appear to have risen about 100 feet from the 1940s to the present with an overall rising trend of 50 to 60 feet between 1970 and 2007 (Stetson, 2014). Therefore, it appears that the basin is not currently in an overdraft condition. More recently, groundwater levels appear to be stable indicating no unreasonable loss of groundwater in storage.

The City of La Habra maintains sustainable groundwater production by maintaining and coordinating groundwater production within the estimated safe yield of the La Habra Groundwater Basin. This results in no undesirable results caused by depletion of groundwater in storage.

10.3.2 Review and Evaluation of Groundwater Levels

The condition of the basin can be verified through a periodic review of groundwater elevations within the basin. The City can utilize and supplement its existing groundwater elevation monitoring program to review general trends in groundwater elevations in the Basin.

As discussed in Section 9.2, the City has evaluated the current monitoring network and has determined additional monitoring of groundwater elevations is required in the La Habra Groundwater Basin. Additional monitoring wells are currently being evaluated for inclusion into the monitoring program. When the City of La Habra chooses to expand its groundwater monitoring program in the future, the City will prepare basin management reports on a periodic basis (every two to five years) using the results of the monitoring program. These informative reports will be used to review whether groundwater production is within the safe yield of the basin, plan future groundwater projects, develop new groundwater policies, and identify any new concerns within the La Habra-Brea Management Area.

10.3.3 Groundwater Recharge or Storage Projects

The City of La Habra currently does not operate any groundwater recharge or storage projects. In the future, the City may perform a basin replenishment study that identifies potential recharge areas and measures to protect these areas. Two areas where a groundwater recharge project could be studied for implementation are shown in Figure 10-1. The San Pedro Formation is naturally recharged directly through aquifer outcrops (exposed formation sediments) in the Los Coyote Hills (south of the intersection of Beach Boulevard and Imperial Highway) and in the Puente Hills (along the foothills north of Whittier Boulevard) [Montgomery, 1977]. The San Pedro Formation could also be indirectly recharged through the uplifted and exposed San Pedro beds that lie just below a thin layer of alluvium along the Coyote Creek valley (Montgomery, 1977).

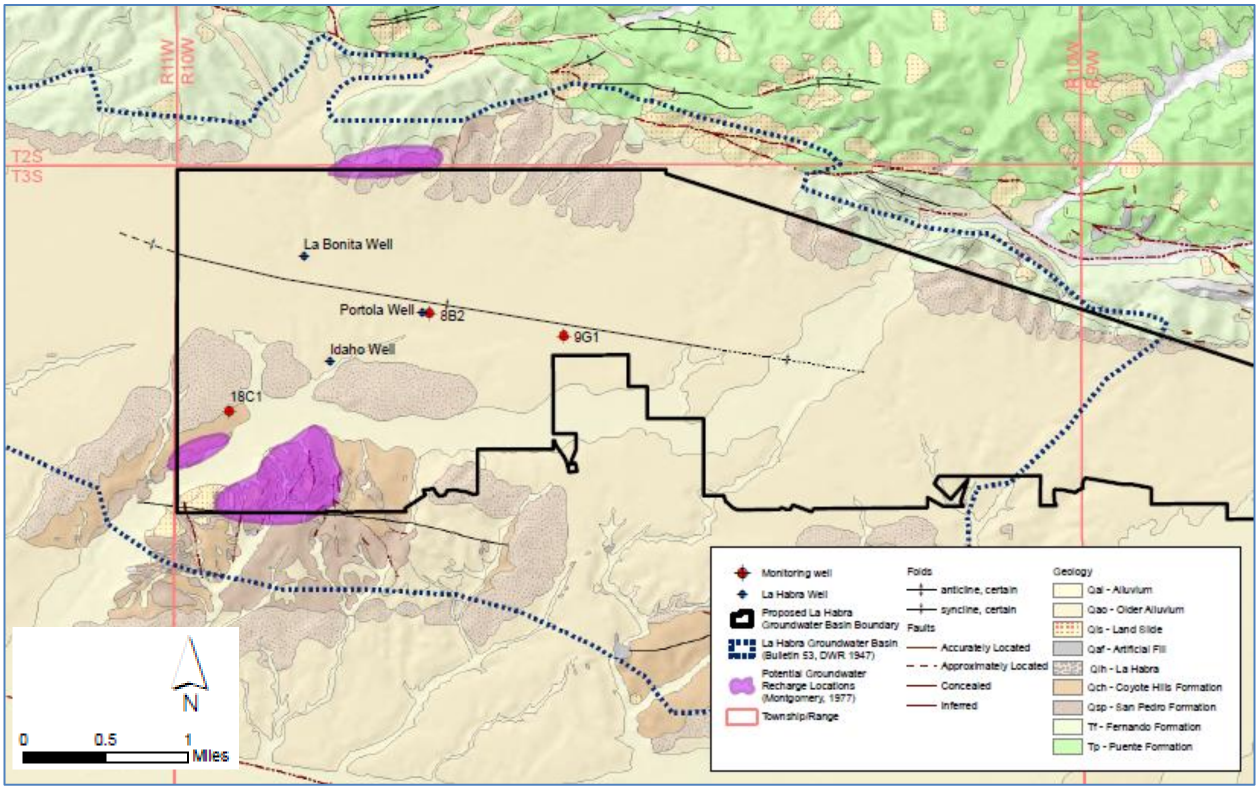


Figure 10-1: Potential Groundwater Recharge Locations.

As discussed in Section 2.2, the City of La Habra is located in the Coyote Creek Watershed. The Coyote Creek Watershed is included in the Municipal Separate Storm Sewer System (MS4) Permit for the Orange County Santa Ana Region. The City implements stormwater control practices as required by the NPDES permit. Stormwater recharge activities in compliance with the NPDES permit program may occur in the future.

The City of La Habra currently does not operate any conjunctive use projects. The City may study the feasibility of conjunctive use projects in the future.

10.3.4 Potential Management Programs

No known desktop flow model exists for the La Habra Basin. As such, the La Habra GSA will consider developing a desktop flow model for the La Habra-Brea Management Area in the future once a sufficient amount of data are collected (as additional monitoring wells are constructed and monitored, for example). Groundwater models are used to represent natural flow conditions of an aquifer and can predict the effects of hydrological changes (such as pumping and replenishment) on the behavior of the aquifer.

10.4 DEFINITION OF SIGNIFICANT AND UNREASONABLE REDUCTION IN STORAGE

As with groundwater levels, the definition of significant and unreasonable reduction in groundwater storage in the La Habra-Brea Management Area is a lowering of groundwater levels such that a significant loss of well production capacity or a significant degradation of water quality occurs which would impact the intended use of the groundwater. Currently, there are no observed undesirable results observed related to the chronic loss of groundwater in storage. Since the Basin is managed within the safe yield, no chronic loss of groundwater in storage is anticipated.

10.5 DETERMINATION OF MINIMUM THRESHOLDS

As with groundwater levels, minimum thresholds have not been established for changes in groundwater storage. If chronic or significant lowering of groundwater levels is observed through groundwater level monitoring, the La Habra GSA will evaluate its groundwater management operations, re-evaluate the safe yield, and establish minimum thresholds, where appropriate, and in accordance with SGMA. Groundwater levels would be used as a proxy to set thresholds for groundwater in storage.

SECTION 11. MANAGING BASIN WATER QUALITY

It is the intent of the La Habra GSA to protect and enhance the groundwater quality in the La Habra-Brea Management Area. This can be achieved through groundwater quality programs, understanding the quality of surface waters and subsurface water that naturally recharge the basin, and implementing measures to protect potential recharge areas.

11.1 HISTORY

Previous investigations of water quality within the La Habra Groundwater Basin determined that the quality is extremely variable. Overall, groundwater from the San Pedro Aquifer is considered to be of fair to good quality (Montgomery, 1979). However, groundwater produced from the La Habra Groundwater Basin is currently blended with imported water prior to distribution in order to reduce certain contaminant levels.

11.2 SUMMARY OF GROUNDWATER QUALITY ISSUES

As discussed in Section 3.2.5, water from the La Bonita and Portola Wells is chlorinated and then blended with water purchased from the California Domestic Water Company in a 250,000-gallon forebay to reduce the concentration of minerals prior to entering the City of La Habra's distribution system (La Habra, 2014).

The City of Brea's non-potable well is strictly used for irrigation purposes as the groundwater beneath the city has poor water quality and would require extensive treatment and blending with higher quality water to meet public health standards (Malcolm Pirnie, 2011).

11.3 MONITORING OF GROUNDWATER QUALITY

The La Habra GSA will continue the City of La Habra's existing water quality monitoring program, described in Section 5.2, and supplement the program as required by SGMA. If the La Habra GSA were to choose to construct monitoring wells for groundwater elevations, these wells can also be sampled for water quality.

The La Habra Basin is recharged through surface runoff and streamflow recharge as well as mountain front recharge (Stetson, 2013). Understanding the quality of the surface and subsurface water that recharges the La Habra Basin is important in protecting and enhancing the water quality of the groundwater basin as the groundwater within the basin originates from these waters. Although the City currently does not have a surface water quality monitoring program for the Coyote Creek Watershed, the La Habra GSA will investigate any existing programs for the watershed including regulations set forth for the watershed by the local Regional Water Quality Control Board (Coyote Creek is shown on the Clean Water Act's 303(d) list of impaired waters). The La Habra GSA will consider developing and implementing its own surface and subsurface inflow quality monitoring programs for the local watershed in the future.

To protect the water quality of the Basin, the La Habra GSA will continue to monitor and review areas of contamination within the La Habra-Brea Management Area, as described in its Drinking Water Source Assessments provided to State Water Resources Control Board Division of Drinking Water (DDW) for its production wells. The La Habra GSA will continue to review and comment on documents within the La Habra-Brea Management Area as well as be aware of any areas outside of its jurisdiction that may affect the water quality of the La Habra-Brea Management Area through surface or subsurface flow.

11.4 DESCRIPTION OF MANAGEMENT PROGRAMS

The management programs intended to protect the groundwater quality of the La Habra-Brea Management Area and prevent groundwater quality degradation include well construction, abandonment, and destruction policies, wellhead protection measures, control of migration and remediation of contaminated water, and control of saline water. Indirectly, the City of La Habra's Stormwater contamination protection programs help prevent groundwater quality degradation as well. See Section 6.

As discussed in Section 3.2.5, groundwater contamination exists in portions of the La Habra Groundwater Basin. The contaminants in the local groundwater are primarily naturally occurring and are not caused by excess groundwater production. Consequently, the only effective management action to address groundwater with existing poor water quality is treatment. As discussed previously, the City of La Habra blends groundwater from the La Habra Groundwater Basin with imported water (both groundwater and surface water) in order to reduce contaminant levels prior to distribution.

11.5 DEFINITION OF SIGNIFICANT AND UNREASONABLE DEGRADATION OF WATER QUALITY

The definition of significant and unreasonable degradation of water quality is a reduction of water quality in the La Habra-Brea Management Area such that the groundwater can no longer be used for the intended purposes even with the implementation of reasonable mitigation measures or management actions. Currently, the City of Brea only uses groundwater produced from the La Habra Groundwater Basin for irrigation; however, the City of La Habra uses groundwater for its potable supply, thus requiring a higher level of quality. Currently, groundwater produced from the La Habra Groundwater Basin is able to be put to beneficial use as a potable water supply. Historically, groundwater quality in the La Habra Groundwater Basin has been variable with areas with poor water quality; however, these historical water quality issues are not caused by groundwater management actions or current groundwater production (see Section 3.2.5). Thus, no undesirable results related to degraded water supply are occurring. See Section 11.6 below for further discussion.

11.6 DETERMINATION OF MINIMUM THREHOLDS

Because groundwater from the La Habra Groundwater Basin is used as a potable source, the minimum thresholds for groundwater quality are exceedances of Maximum Contaminant Levels (MCLs) or other applicable regulatory limits that are directly attributable to groundwater management actions in the La Habra-Brea Management Area that prevents the use of groundwater for its intended purpose. As discussed previously, the current water quality concerns in the La Habra Groundwater Basin are naturally occurring and are not caused by over-production or other groundwater management actions. These concerns pre-date SGMA legislation and are currently being managed through a blending program. Drinking water distributed to residents in the cities of Brea and La Habra currently meet all regulatory requirements. Accordingly, undesirable results as defined above in Section 11.5 by the definition of “significant and unreasonable” are not occurring and are not anticipated to occur due to groundwater production being managed within the Basin sustainable yield. If groundwater water quality trends indicate declining water quality, additional management actions will be established.

SECTION 12. MANAGING SEAWATER INTRUSION

The La Habra Groundwater Basin is not located near the ocean. Accordingly, there is no need to manage or consider the potential impact of seawater intrusion in the La Habra-Brea Management Area.

SECTION 13. MANAGING LAND SUBSIDENCE

As discussed in Section 3.2.6, there is no evidence that land subsidence is, or will likely become, problematic within the La Habra-Brea Management Area. Accordingly, sustainable management criteria or active monitoring are not required at this time. However, the City of La Habra may develop a program to monitor and measure the rate of land surface subsidence within the La Habra-Brea Management Area in accordance with DWR GSP regulations if it is determined that there is a potential for significant or unreasonable land subsidence to occur. The need for land surface subsidence monitoring will be considered on an annual basis.

SECTION 14. MANAGING GROUNDWATER DEPLETIONS IMPACTING SURFACE WATER

As discussed in Section 3.2.7, the La Habra Groundwater Basin lies within the Coyote Creek Watershed with the major creeks in the watershed being Coyote Creek, Brea Creek, Fullerton Creek, Carbon Creek, Moody Creek, and Los Alamitos Channel. The watershed is highly urbanized with densely populated areas of residential, commercial, and industrial areas, as well as open space. Montgomery (1977) determined that about 30% of the runoff available in an average rainfall year percolates to the aquifers underlying the La Habra Valley.

In recent years, the depth to groundwater from the ground surface is approximately 30 feet (see Figure 3-6. However, groundwater production occurs within the confined San Pedro aquifer which is significantly deeper than the perched alluvial aquifer with a depth to groundwater of approximately 140 feet in the year 2000 (see Figure 3-6). As discussed previously in Section 3.2.7, there are small areas overlying the La Habra Groundwater Basin identified as GDEs. The areas of vegetation identified as groundwater dependent ecosystems are along the base of the surrounding hills at the limits of the basin where groundwater is shallow. The vegetation is also supported by surface water runoff and rainfall. Additionally, these areas are not located near the groundwater production wells which produce from the confined San Pedro aquifer. Accordingly, groundwater production is not anticipated impact surface waters and local habitats Thus, there is no evidence that groundwater depletions will impact surface water or groundwater dependent ecosystems within the La Habra-Brea Management Area.

SECTION 15. PROTOCOLS FOR MODIFYING MONITORING PROGRAMS

Available data and groundwater management programs are reviewed annually. Additionally, data gaps are identified and evaluated. This plan will be amended to reflect any new policies or practices relevant to the management of the La Habra-Brea Management Area. It will also be updated to reflect changes in groundwater conditions as necessary.

Monitoring protocols are necessary to ensure consistency and accuracy in monitoring efforts and are required for monitoring assessments to be valid. Consistency should be reflected in factors such as the locations of the sampling points, frequency and seasonality of measurements, sampling procedures, and testing procedures. Accordingly, the La Habra GSA will undertake uniform data gathering procedures to ensure comparable measurements of groundwater are taken.

15.1 ESTABLISHMENT OF PROTOCOLS FOR WATER QUALITY

The protocols for water quality sampling are discussed in the 2017 Alternative.

15.2 ESTABLISHMENT OF PROTOCOLS FOR GROUNDWATER ELEVATION/STORAGE

The protocols for groundwater level measurements are discussed in the 2017 Alternative.

SECTION 16. PROCESS TO EVALUATE NEW PROJECTS

The La Habra GSA will evaluate any proposed actions for the La Habra-Brea Management Area pursuant to this Basin 8-1 Alternative in cooperation with the City of Brea. Additionally, new projects would be evaluated through the CEQA process (i.e. by reviewing and commenting on draft CEQA documents). Likewise, OCWD would have an opportunity to comment on projects proposed within the La Habra-Brea Management Area, but OCWD has no authority under this Plan to obstruct any action taken by the La Habra GSA regarding the La Habra-Brea Management Area.

SECTION 17. LIST OF REFERENCES AND TECHNICAL STUDIES

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Basin 8-1 Alternative

OCWD Management Area

2022 UPDATE

Prepared by: Orange County Water District

January 1, 2022

Basin 8-1 Alternative
OCWD Management Area
2022 UPDATE

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January 1, 2022

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SECTION 1 EXECUTIVE SUMMARY

The Orange County Water District (OCWD) is a special district formed in 1933 by an act of the California Legislature, the “OCWD Act”. OCWD manages the groundwater basin that underlies north and central Orange County pursuant to the OCWD Act. Water produced from the basin is the primary water supply for approximately 2.5 million residents living within the service area boundaries. The mission of OCWD includes sustainably managing the Orange County Groundwater Basin, Basin 8-1, over the long-term. Additionally, as a special act district listed in Water Code § 10723 (c)(1), OCWD is the exclusive local agency within its jurisdictional boundaries with powers to comply with the Sustainable Groundwater management Act (SGMA) via a groundwater sustainability plan (“GSP”) or via an Alternative prepared in accordance with Water Code § 10733.6.

The OCWD Management Area includes 89 percent of the area designated by the Department of Water Resources (DWR) as Basin 8-1, the “Coastal Plain of Orange County Groundwater Basin” in Bulletin 118 (DWR, 2003). The OCWD Management Area includes the same land area as the OCWD service area within Basin 8-1 except for a small 6.7-square mile area in the northeast corner of the basin that is part of the Santa Ana Canyon Management Area. The boundaries of Basin 8-1, the OCWD service area and the OCWD Management Area are shown in Figure 1-1.

The agencies within Basin 8-1 collaborated to prepare and submit an Alternative to a Groundwater Sustainability Plan (GSP). In accordance with Water Code §10733.6(b)(3)(c), the Basin 8-1 Alternative presented an analysis of basin conditions that demonstrated that Basin 8-1 had operated within its sustainable yield over a period of at least 10 years. The Alternative was submitted to DWR on December 22, 2016. On July 17, 2019, DWR determined that the Alternative satisfied SGMA objectives and was therefore approved.

Approved alternatives are required to submit annual reports to DWR on April 1 of each year. Annual reports for Basin 8-1 were submitted to DWR as follows:

- Water Year 2016-17, submitted on March 29, 2018
- Water Year 2017-18, submitted on March 29, 2019
- Water Year 2018-19, submitted on March 30, 2020
- Water Year 2019-20, submitted on March 30, 2021

*Note, the DWR Water Year extends from Oct. 1 to Sept. 30.

According to Water Code §10733.8, “At least every five years after initial submission of a plan pursuant to Section 10733.4, the department shall review any available groundwater sustainability plan or alternative submitted in accordance with Section 10733.6, and the implementation of the corresponding groundwater sustainability program for consistency with this part, including achieving the sustainability goal. The department shall issue an assessment for each basin for which a plan or alternative has been submitted in accordance with this chapter, with an emphasis on assessing progress in achieving the sustainability goal within the basin. The assessment may include recommended corrective actions to address any deficiencies identified by the department."

This document, called the 2022 Update, represents the first five-year update, which is due January 1, 2022.

For purposes of this report, the Basin 8-1 Alternative submitted on December 22, 2016, will be referred to as the 2017 Alternative. The first five-year update will be referred to as the 2022 Update for ease of reference. The 2017 Alternative was a comprehensive document showing that Basin 8-1 had been managed sustainably for more than 10 years. For the 2022 Update, the focus is on documenting that the basin has been sustainably managed during the five years since the 2017 Alternative was submitted and to present relevant new information from the last five years. As such, the 2017 Alternative is considered a key reference document with background information that is not duplicated in the 2022 Update.

1.1 GROUNDWATER BASIN CONDITIONS

GROUNDWATER ELEVATIONS

OCWD prepares groundwater elevation contour maps for each of the three major aquifer systems (Shallow, Principal, and Deep) annually. In addition to illustrating regional groundwater gradients, the maps are used to prepare water level change maps and to calculate the amount of groundwater in storage and the annual storage change. OCWD's basin-wide network of monitoring wells is used to monitor groundwater levels and quality, assess effects of pumping and recharge, estimate groundwater storage, characterize basin hydrogeology, and develop and calibrate a numerical flow model of the basin. Groundwater elevation contours for the Principal Aquifer as of June 2021 are shown in Figure 1-2.

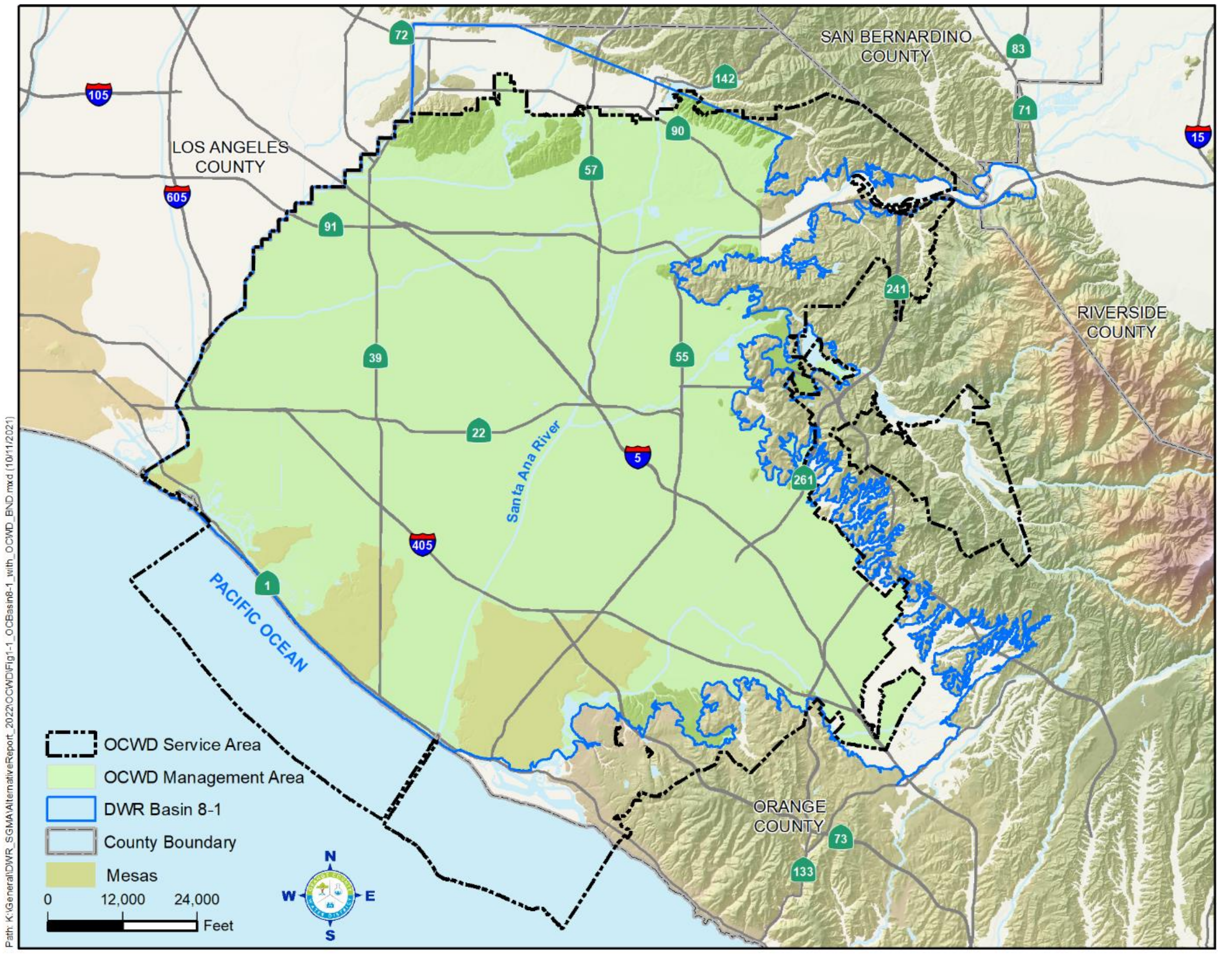

Figure 1-1: Basin 8-1, OCWD Service Area and OCWD Management Area

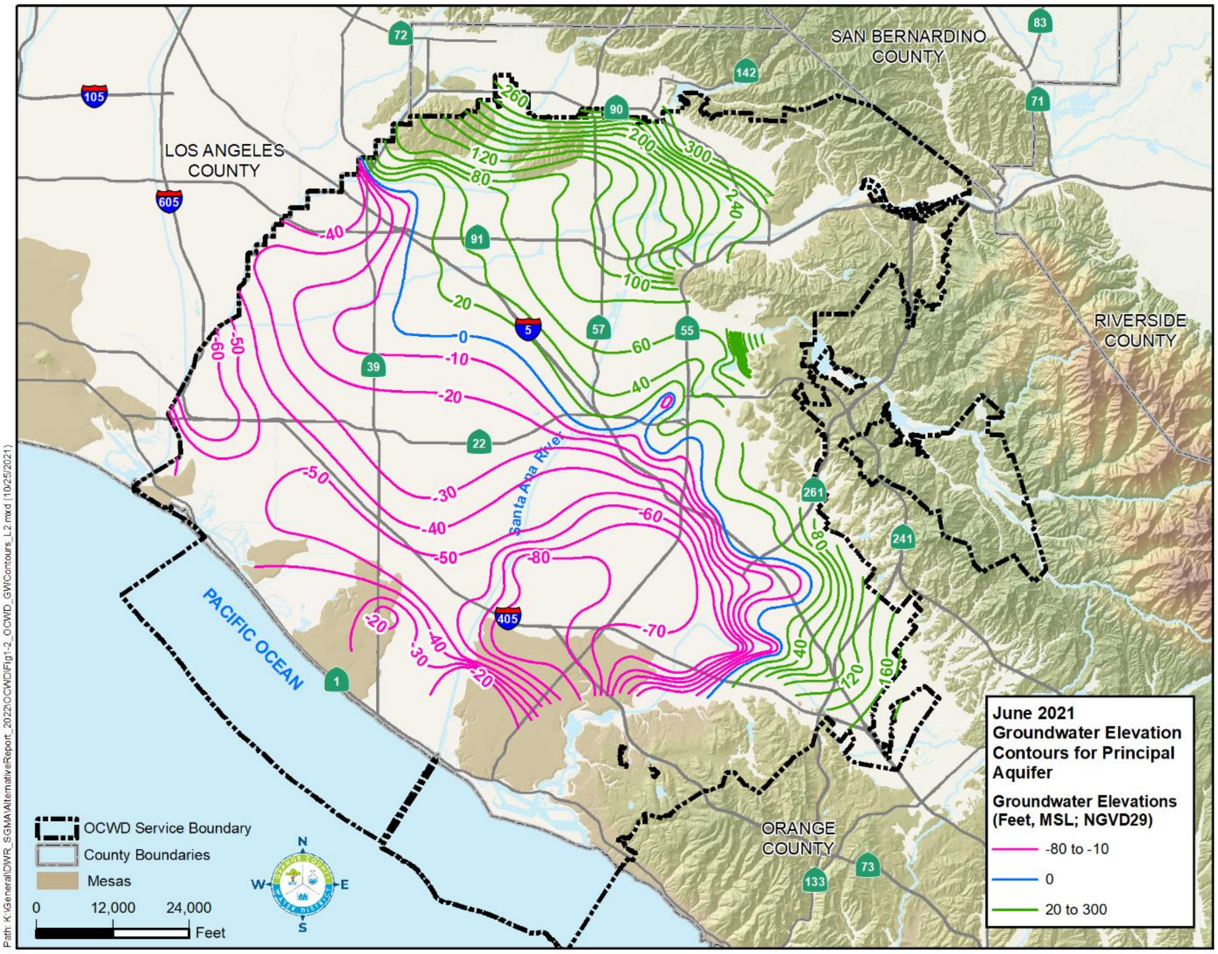

Figure 1-2: Groundwater Elevation Contours for the Principal Aquifer, June 2021

GROUNDWATER STORAGE

The groundwater basin contains an estimated 66 million acre-feet when full. However, OCWD manages the basin within an established operating range of up to 500,000 acre-feet below full condition. This operating range was established to designate the levels of groundwater storage within which the basin that can be maintained without causing adverse impacts. In order to manage the basin within this operating range, OCWD calculates the amount of groundwater in storage on an annual basis. Long-term groundwater storage levels based on OCWD's water year (July 1 to June 30) are shown in Figure 1-3.

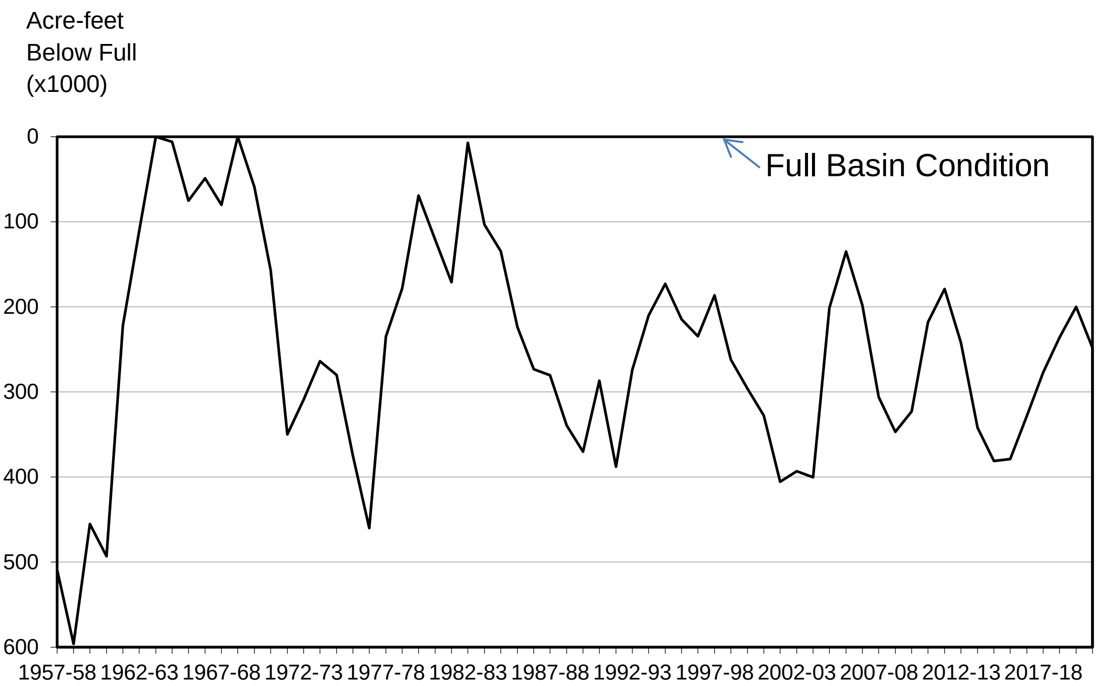

Figure 1-3: Available Basin Storage WY1957-58 to 2020-21

WATER QUALITY

The California Regional Water Quality Control Board, Santa Ana Region (Regional Water Board) is responsible for protection and enhancement of the quality of waters in the watershed, which includes surface water and groundwater in the OCWD Management Area. The watershed's salinity management program, overseen by the Regional Water Board, is managed by the Basin Monitoring Program Task Force. Water quality objectives for total dissolved solids (TDS) and nitrate-nitrogen in groundwater management zones were adopted by the Regional Water Board based on historical water quality data. Every three years the Task Force calculates the current ambient water quality for each groundwater management zone. The most recent recalculation for the groundwater basin was completed in 2020 (OCWD, 2020).

There are several regional groundwater contamination plumes within the OCWD Management Area, all of which are under active remediation, and some are being evaluated for additional remediation. The U.S. Environmental Protection Agency (EPA) is the lead agency in overseeing a remedial investigation/feasibility study (RI/FS) to develop an interim remedy for the VOC plume in the North Basin area. OCWD is conducting an RI/FS to develop an interim remedy for the plume in the South Basin area. Investigations and remediation for individual contaminant source sites within the North Basin and South Basin areas are within the jurisdiction of either the California Department of Toxic Substances Control or the Regional Water Board. The U.S. Navy is taking the lead in remediation of plumes from the former El Toro and Tustin Marine Corps Air Stations and the Naval Weapons Station Seal Beach.

Per- and Polyfluoroalkyl Substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of manmade chemicals that includes perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). PFAS compounds have been commonly used in many products including, among many others, stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams. Beginning in the summer of 2019, the California Division of Drinking Water (DDW) began requiring testing for PFAS compounds in some groundwater production wells in the OCWD area.

As a result of required testing, as of September 2021, approximately 60 wells in the OCWD service area have been temporarily turned off until treatment systems can be constructed. As additional wells are tested, this figure may increase.

In April 2020, OCWD as the groundwater basin manager, executed a multi-party agreement with the impacted groundwater producers to fund and construct the necessary treatment systems for production wells impacted by PFAS compounds. OCWD expects the treatment systems to be constructed for the approximately 60 impacted wells within the next 2 to 3 years.

LAND SUBSIDENCE

Ground surface elevations rise and fall due to groundwater conditions in the OCWD Management Area and do not show a pattern of widespread, permanent lowering of the ground surface. There is no evidence of permanent, inelastic land subsidence within the OCWD Management Area.

1.2 WATER BUDGET

OCWD developed a hydrologic budget for the purpose of constructing a basin-wide numerical groundwater flow model and for evaluating basin production capacity and recharge requirements. The key components of the budget include measured and unmeasured (estimated) recharge, groundwater production and subsurface outflows.

The groundwater basin is not operated on an annual safe-yield basis. The net change in storage in any given year may be positive or negative; however, over a period of several years, the basin is maintained in an approximate balance. Amounts of total basin production and total water recharged from OCWD water years (WY)1999-2000 to 2020-21 are shown in Figure 1-4. The OCWD water year extends from July 1 to June 30.

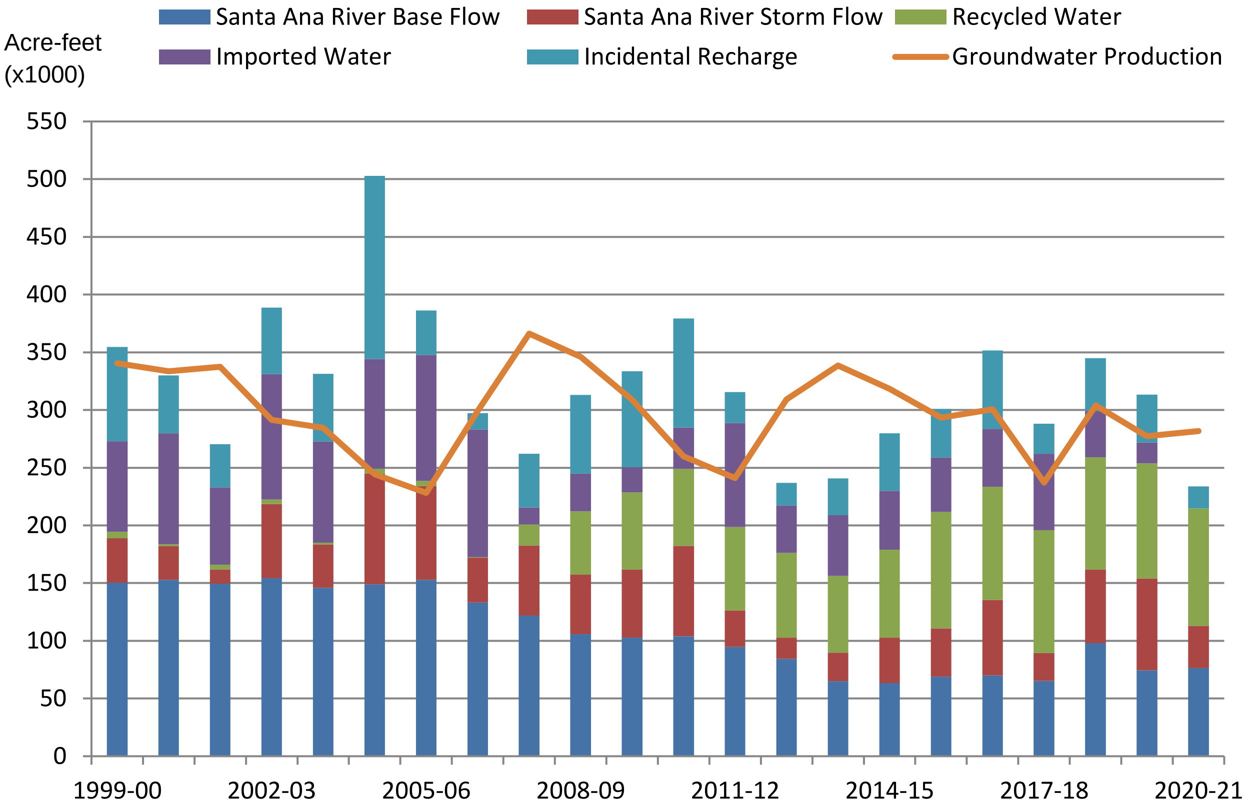

Figure 1-4: Basin Production and Recharge Sources, WY1999-20 to 2020-21

1.3 WATER RESOURCE MONITORING PROGRAMS

Water resource monitoring programs for groundwater, surface water, recycled water, and imported water remain unchanged (see 2017 Alternative for list). The only slight modification is the replacement of the CA Statewide Groundwater Elevation Monitoring (CASGEM) Program with annual data reports required for SGMA compliance.

1.4 GROUNDWATER MANAGEMENT PROGRAMS

LAND USE

The OCWD Management Area is highly urbanized. As such, OCWD monitors, reviews and comments on local land use plans, environmental documents, and proposed regulatory agency permits to provide input to land use planning agencies regarding proposed projects and programs that could cause short- or long-term water quality impacts to the groundwater basin.

DEMAND MANAGEMENT

The average annual water demand within the OCWD Management Area for the most recent five water years, WY2016-17 to 2020-21 is approximately 400,000 acre-feet. Total water demands in the management area are met by a combination of groundwater, imported water, and recycled water. From WY1996-97 to present, water demands have ranged between 367,000 and 526,000 acre-feet per year but have generally decreased, as shown in Figure 1-5. It is noted that water demands in WY2015-16 reflect mandatory demand reductions imposed by the State Water Board in response to an extended drought. OCWD strives to sustainably maximize both production from the basin and recharge of the groundwater basin.

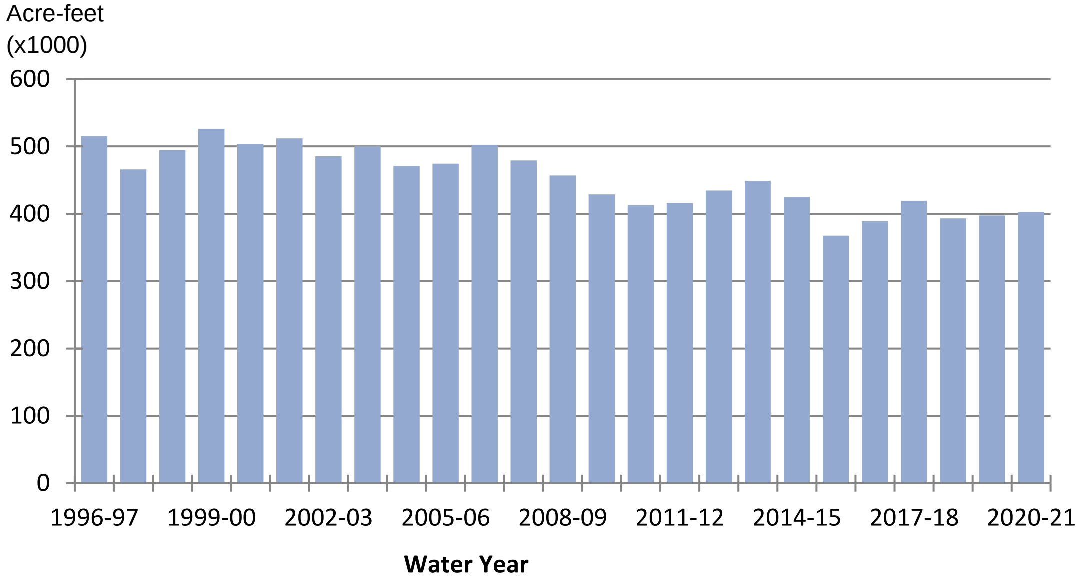

Figure 1-5: Total Water Demands within OCWD, WY1997-98 to 2020-21

GROUNDWATER QUALITY PROTECTION AND MANAGEMENT

OCWD adopted a Groundwater Quality Protection Policy in 1987 and updated it in 2014. This policy guides the actions of OCWD to maintain groundwater quality suitable for all existing and potential beneficial uses; prevent degradation of groundwater quality and protect groundwater from contamination; maintain surface water and groundwater quality monitoring programs, a monitoring well network and data management system; and assist regulatory agencies in remediating contaminated sites.

In January 2020, in preparation for the impacts of PFAS to groundwater supply, OCWD adopted a Per- and Polyfluoroalkyl Substances (PFAS) Policy. Central to this policy is OCWD’s desire to maintain a groundwater supply of suitable quality for all existing and potential beneficial uses. Among other items, the policy states that OCWD will fund the lowest reasonable and efficient treatment system design and construction costs to remove PFAS compounds for groundwater producers. Additionally, the policy states that OCWD will fund 50 percent of operation and maintenance expenses up to $75 per acre-foot plus potential adjustments.

As of September 2021, approximately 60 production wells operated by 11 groundwater producers have been temporary shut down until treatment systems can be constructed. OCWD expects these treatment systems to be constructed within the next 2 to 3 years.

RECYCLED WATER PRODUCTION

OCWD's Groundwater Replenishment System (GWRS) produces up to 100 million gallons per day (mgd) of highly treated recycled water. The GWRS Final Expansion is under construction and will be on-line in early 2023. The final expansion will increase plant capacity to 130 mgd. GWRS water is recharged into the groundwater basin and is the primary source of water for the Talbert Seawater Barrier. OCWD also operates the Green Acres Project, a non-potable recycled water supply for irrigation and industrial water users.

CONJUNCTIVE USE PROGRAMS

Recharge water sources include the Santa Ana River and tributaries, imported water, and recycled water supplied by the GWRS as well as incidental recharge from precipitation and subsurface inflow. OCWD's conjunctive use program includes over 1,500 acres of land on which there are 1,067 wetted acres of recharge facilities.

MANAGEMENT OF SEAWATER INTRUSION

The Alamitos and Talbert Seawater Intrusion Barriers control seawater intrusion through the Alamitos and Talbert Gaps by injecting fresh water into susceptible aquifers through a series of injection wells to create a hydraulic barrier.

Work is underway to characterize intrusion in the Sunset Gap, including installation of monitoring wells, development of a groundwater flow model, and feasibility studies. This information is needed to guide design of a potential new seawater barrier in the Sunset Gap.

1.5 NOTICE AND COMMUNICATION

The local agencies that produce the majority of the groundwater from the basin include 19 cities, water districts, and a private water company. OCWD staff holds monthly meetings with this group to provide information and seek input on issues related to groundwater management. OCWD has a proactive community outreach program that includes conducting an annual Children's Water Education Festival attended by over 7,000 elementary school students and a monthly electronic newsletter with approximately 5,700 subscribers.

1.6 SUSTAINABLE BASIN MANAGEMENT

The sustainability goal for the OCWD Management Area is to:

> Continue to manage the groundwater basin to prevent basin conditions that would lead to significant and unreasonable (1) lowering of groundwater levels, (2) reduction in storage, (3) water quality degradation, (4) seawater intrusion, (5) land subsidence and (6) depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

Existing monitoring and management programs in place today enable OCWD to sustainably manage the groundwater basin. Since its founding in 1933, OCWD has developed a managed aquifer recharge program, constructed hundreds of monitoring wells, developed an extensive water quality monitoring program, installed seawater intrusion barriers, and doubled the volume of groundwater production while protecting the long-term sustainability of the groundwater resource. OCWD's management of the OCWD Management Area will continue to provide long-term sustainable basin management that is able to adapt to changing conditions affecting the groundwater basin.

1.6.1 Sustainable Management: Water Levels

OCWD manages the basin for long-term sustainability by maximizing groundwater recharge and managing basin production within sustainable levels. Long-term groundwater level trends demonstrate the undesirable result of "chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply" is not present. Hydrographs representative of long-term water levels in the basin are shown in Figure 1-6. These hydrographs demonstrate that groundwater levels in the OCWD Management Area are being managed at long-term sustainable levels. Chronic lowering of groundwater levels is not anticipated to occur in the future in the OCWD Management Area due to OCWD's management programs.

1.6.2 Sustainable Management: Basin Storage

OCWD manages basin storage within an established operating range of up to 500,000 acre-feet below full condition. Maintaining basin storage within this range protects the basin from detrimental impacts such as land subsidence, chronic lowering of groundwater levels and chronic reduction in storage. OCWD manages groundwater pumping such that it is sustainable over the long-term; however, in any given year pumping may exceed recharge or vice versa. Thus, the amount of groundwater stored in or withdrawn from the basin varies from year to year and often goes through multi-year cycles of emptying and filling, which typically correlates with state-wide and/or local precipitation patterns and other factors.

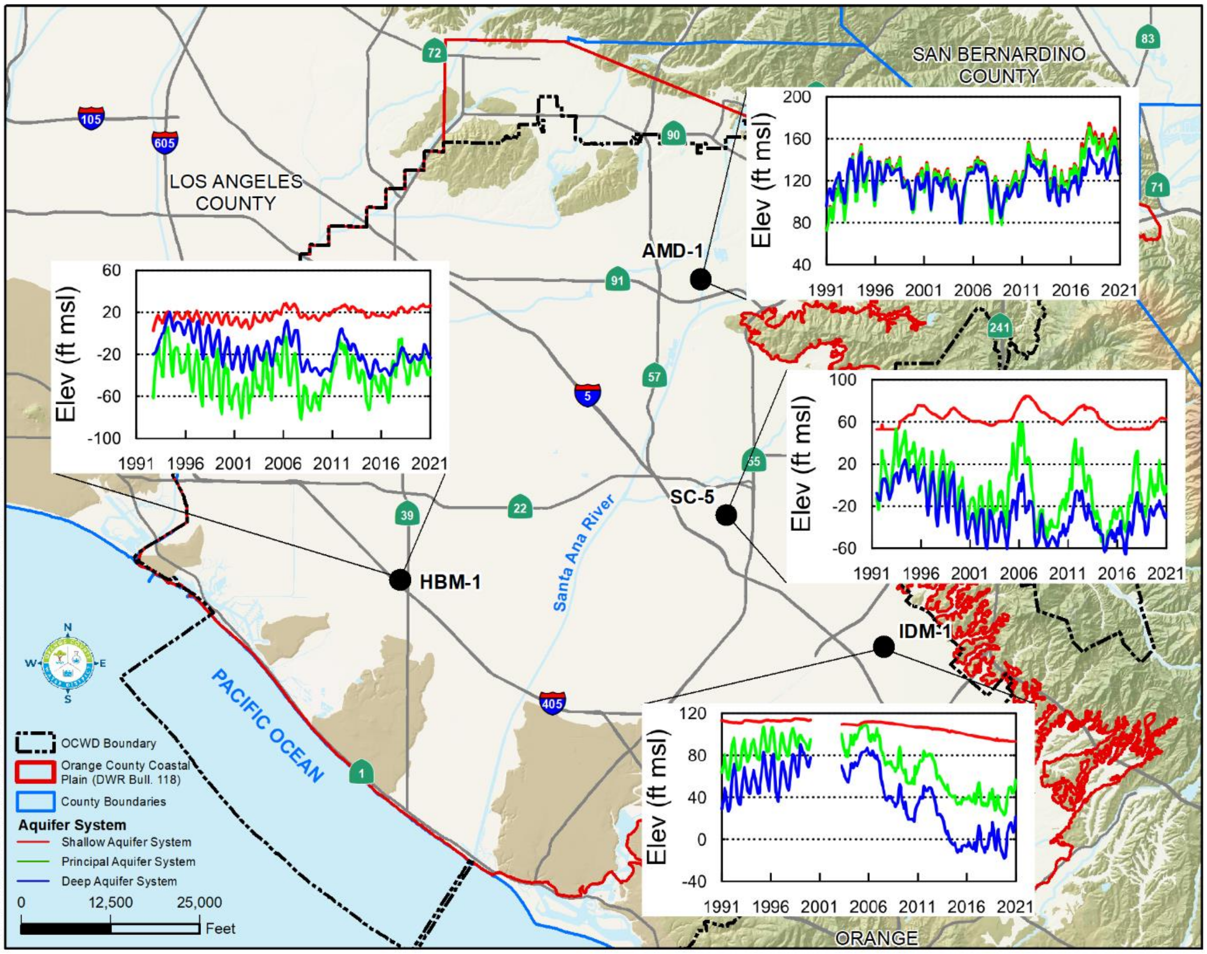

Figure 1-6: Example Hydrographs

Each year OCWD calculates the volume of groundwater storage change from a theoretical “full” benchmark condition based on a calculation using changes in groundwater elevations in each of the three major aquifer systems and aquifer storage properties. This calculation is checked against an annual water budget that accounts for all production, measured recharge and estimated unmeasured recharge (also referred to as “incidental recharge”). The amount of available or unfilled storage from the theoretical full condition is shown on Figure 1-3. Maintaining the basin storage condition on a long-term basis within the established operating range allows for long-term sustainable management of the basin without experiencing undesirable effects. Therefore, the undesirable result of “significant and unreasonable reduction of groundwater storage” is not present and is not anticipated to occur in the OCWD Management Area in the future due to OCWD’s management programs.

1.6.3 Sustainable Management: Water Quality

OCWD has extensive monitoring and management programs in place to monitor and protect groundwater quality. OCWD's network of approximately 400 monitoring wells is distributed throughout the basin. Water quality in these wells is tested on a regular basis for a large number of parameters. OCWD also conducts groundwater quality sampling of approximately 200 production wells on behalf of the groundwater producers to comply with Title 22 requirements. An additional approximately 120 private, domestic, and irrigation production wells area also sampled periodically.

OCWD has a sampling protocol in place that includes standards for increased monitoring of individual wells. In cases where there is a detection of an organic compound for the first time, for example, OCWD will resample that well and if the detection is confirmed will increase the sampling frequency of that well. Another example is an increased frequency for monitoring when there is a detection of nitrate at 50% of the Maximum Contaminant Level (MCL). These sampling protocols are designed to detect water quality problems at the earliest possible stage.

The recent detections of per- and polyfluoroalkyl substances (PFAS) in groundwater have affected the use of groundwater by 11 groundwater producers. As described in detail later in this report, OCWD is taking steps to restore the beneficial uses of impacted groundwater by installing treatment systems to remove PFAS.

The undesirable result of "significant and unreasonable degradation of water quality that impair water supplies" is not present and is not anticipated to occur in the future in the OCWD Management Area due to OCWD's management programs.

1.6.4 Sustainable Management: Seawater Intrusion

OCWD's management of seawater intrusion is implemented through a comprehensive program that includes operating two seawater intrusion barriers, monitoring and evaluating barrier performance, monitoring and evaluating susceptible coastal areas, and coastal groundwater management.

The Alamitos Seawater Intrusion Barrier manages seawater intrusion in the Alamitos Gap. The Talbert Seawater Intrusion Barrier manages seawater intrusion in the Talbert Gap. Work is underway to further characterize intrusion in the Sunset Gap, including construction of additional monitoring wells, further development of the Alamitos Barrier groundwater model to evaluate seawater intrusion in the area of the Sunset Gap, and feasibility studies to evaluate potential future barrier design.

Monitoring and evaluating barrier performance and potential seawater intrusion consists of sampling monitoring wells semi-annually, measuring water levels at least quarterly, installing monitoring wells when needed to fill data gaps, and conducting other management activities to reduce potential for seawater intrusion, such as construction of additional injection wells and the Coastal Pumping Transfer Program.

The undesirable result of “significant and unreasonable seawater intrusion” is not present and is not anticipated to occur in the future in the OCWD Management Area due to OCWD’s management programs.

1.6.5 Sustainable Management: Land Subsidence

Management of the groundwater basin by maintaining storage levels within the established operating range has prevented the undesirable result of significant and unreasonable land subsidence that substantially interferes with surface uses. Within the OCWD Management Area ground surface movements rise and fall as basin storage levels rise and fall. There is no evidence of long-term inelastic land subsidence, nor any land subsidence that has interfered with surface uses. Therefore, the undesirable result of “significant and unreasonable land subsidence that substantially interferes with surface uses” is not present and is not anticipated to occur in the OCWD Management Area in the future due to OCWD’s management programs.

1.6.6 Sustainable Management: Depletion of Interconnected Surface Waters

There are no surface water bodies within the OCWD Management Area that are interconnected with groundwater in which the groundwater connection to the surface water provides surface water flow to sustain beneficial uses in a surface water body. Therefore, the undesirable result of “depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water due to groundwater conditions occurring throughout the basin” is not present and is not anticipated to occur in the OCWD Management Area due to OCWD’s management programs.

1.7 PROTOCOLS FOR MODIFYING MONITORING PROGRAMS

Protocols that trigger a change in a monitoring program include a change in regulations, a first-time detection of a constituent in a water sample, an increase in a constituent in a water sample that approaches or exceeds a regulatory limit or MCL, an indication of an adverse water quality trend or water level, a special study, or a recommendation from OCWD’s Independent Expert Panel.

1.8 EVALUATION OF POTENTIAL PROJECTS

OCWD regularly evaluates potential projects and conducts studies to improve existing operations. This may include:

- Increasing the capacity of existing recharge basins
- Constructing new recharge facilities
- Constructing new production wells
- Improving seawater intrusion barriers

- Constructing a new seawater barrier in the Sunset Gap
- Constructing water quality improvement projects

1.9 CONCLUSION

OCWD has been managing the OCWD Management Area since its formation by the State Legislature in 1933. Monitoring and management programs described in the 2017 Alternative, submitted in compliance with CA Code of Regulations (Title 23, Division 2, Chapter 1.5, Subchapter 2) demonstrated that the groundwater basin has been and will continue to be sustainably managed. The Alternative submitted in 2017 and approved by DWR in 2019 demonstrated that the OCWD Management Area operated within its sustainable yield over a period of at least 10 years, as required by CCR Title 23, Division 2, Chapter 1.5, Subchapter 2, Article 9, Section 358.2 (c)(3). The 2022 Update, prepared to satisfy Water Code §10733.8, shows that the OCWD Management area continues to be managed sustainably.

Please note that for consistency, the same chapter headings used in the 2017 Alternative are used in the 2022 Update. The goal of the update is to present new relevant information that has become available over the last five years. Where there is no new relevant information, the reader is directed to the 2017 Alternative by reference.

SECTION 2 AGENCY INFORMATION

2.1 HISTORY OF OCWD

The Orange County Water District (OCWD) is a special district formed in 1933 by an act of the California Legislature, the OCWD Act. Additionally, as a special act district listed in Water Code § 10723 (c)(1), OCWD is the exclusive local agency within its jurisdictional boundaries with powers to comply with the Sustainable Groundwater Management Act (SGMA) via a groundwater sustainability plan (“GSP”) or via an Alternative prepared in accordance with Water Code § 10733.6.

OCWD manages the groundwater basin that underlies north and central Orange County. Water produced from the basin is the primary water supply for approximately 2.5 million residents living within OCWD’s boundaries. With passage of SGMA (Water Code §10723(c)) in 2014, OCWD was designated the exclusive local agency within its jurisdictional boundaries with powers to comply with SGMA.

Nineteen major groundwater producers, including cities, water districts, and a private water company, pump groundwater from approximately 200 large-capacity wells for retail water use. There are also approximately 120 small-capacity wells that pump water from the basin. OCWD protects and manages the groundwater resource for long-term sustainability, while meeting approximately 75 percent of the water demand within its service area.

Since its founding, OCWD has grown in area from 162,676 to 243,968 acres and has experienced an increase in population from approximately 120,000 to 2.5 million people. OCWD has employed groundwater management techniques to increase the annual yield from the basin including operating over 1,500 acres of recharge basins in the cities of Anaheim, Orange, and unincorporated areas of Orange County. Annual groundwater production increased from approximately 150,000 acre-feet per year in the mid-1950s to a high of over 366,000 acre-feet per year in WY2007-08.

OCWD has managed the basin to provide a reliable supply of relatively low-cost water, accommodating rapid population growth while at the same time avoiding the costly and time-consuming adjudication of water rights experienced in many other major groundwater basins in Southern California. Facing the challenge of increasing demand for water has fostered a history of innovation and creativity that has enabled OCWD to increase available groundwater supply while ensuring the long-term sustainability of the groundwater basin.

A brief history of OCWD from 1933 to 2015 is provided in the 2017 Alternative. Significant events that have occurred during the last five years are as follows:

2018: GWRS sets the Guinness World Record for most wastewater recycled in 24 hours. The official amount was 100,008,000 gallons.

2019: OCWD’s Philip L. Anthony Water Quality Laboratory was the first public agency laboratory in California to achieve state certification to analyze for PFAS in drinking water. OCWD launched the nation’s largest pilot program to test various treatment options for PFAS.

2019: Construction of the GWRS Final Expansion began. Construction is anticipated to be completed in early 2023. Once complete the plant will produce up to 130 mgd and recycle 100 percent of reclaimable sources from the Orange County Sanitation District.

2021: U.S. Army Corps of Engineers approves Prado Conservation Pool increase up to elevation 505 feet mean sea level (approx. 20,000 acre-feet of storage) based on the Prado Basin Ecosystem Restoration and Water Conservation Feasibility Study.

2021: The first PFAS treatment system, at Fullerton's KIM-1A production well, is completed and the well returned to service.

2.2 GOVERNANCE AND MANAGEMENT STRUCTURE

The Orange County Water District was created by the OCWD Act for the purpose of:

> "providing for the importation of water into said district and preventing waste of water in or exportation of water from said district and providing for reclamation of drainage, storm, flood and other water for beneficial use in said district and for the conservation and control of storm and flood water flowing into said district; providing for the organization and management of said district and establishing the boundaries and divisions thereof and defining the powers of the district, including the right of the district to sue and be sued, and the powers and duties of the officers thereof; providing for the construction of works and acquisition of property by the district to carry out the purposes of this act; authorizing the incurring of indebtedness and the voting, issuing and selling of bonds and the levying and collecting of assessments by said district; and providing for the inclusion of additional lands therein and exclusion of lands therefrom."
> (Stats.1933, c. 924, p. 2400)

Further details on OCWD governance and management are described in the 2017 Alternative. The nineteen major groundwater producers meet on a monthly basis with OCWD staff to consult with and provide advice on basin management issues. This group is described in more detail in Section 7.1.

2.3 LEGAL AUTHORITY

A description of OCWD's legal authority is described in the 2017 Alternative.

A copy of the OCWD Act, which has been the basis for OCWD's sustainable management of its portion of Basin 8-1 over many years, can be found at: http://www.ocwd.com/media/2681/ocwddistrictact_201501.pdf

2.4 BUDGET

The mission of OCWD is to provide a reliable, high quality water supply in a cost-effective and environmentally responsible manner and to manage the Orange County groundwater basin in a sustainable manner over the long-term.

For a summary description of OCWD's budget structure, see the 2017 Alternative. For more recent information, see OCWD's website at www.ocwd.com where detailed budget reports are published annually.

SECTION 3 MANAGEMENT AREA DESCRIPTION

3.1 OCWD MANAGEMENT AREA

OCWD's service area covers approximately 430 square miles and is co-extensive with the OCWD Management Area for purposes of the Alternative, except as identified below. The OCWD service area includes 90 percent of the area designated by the Department of Water Resources (DWR) as Basin 8-1, the "Coastal Plain of Orange County Groundwater Basin" in Bulletin 118 (DWR, 2003). For the purposes of this Alternative, the OCWD Management Area contains the same geographical area as the portion of the OCWD service area within Basin 8-1 except for a small 6.7-square mile area in the northeast corner of the basin that is part of the Santa Ana Canyon Management Area. The boundaries of Basin 8-1, the OCWD service area and the OCWD Management Area are shown in Figure 3-1.

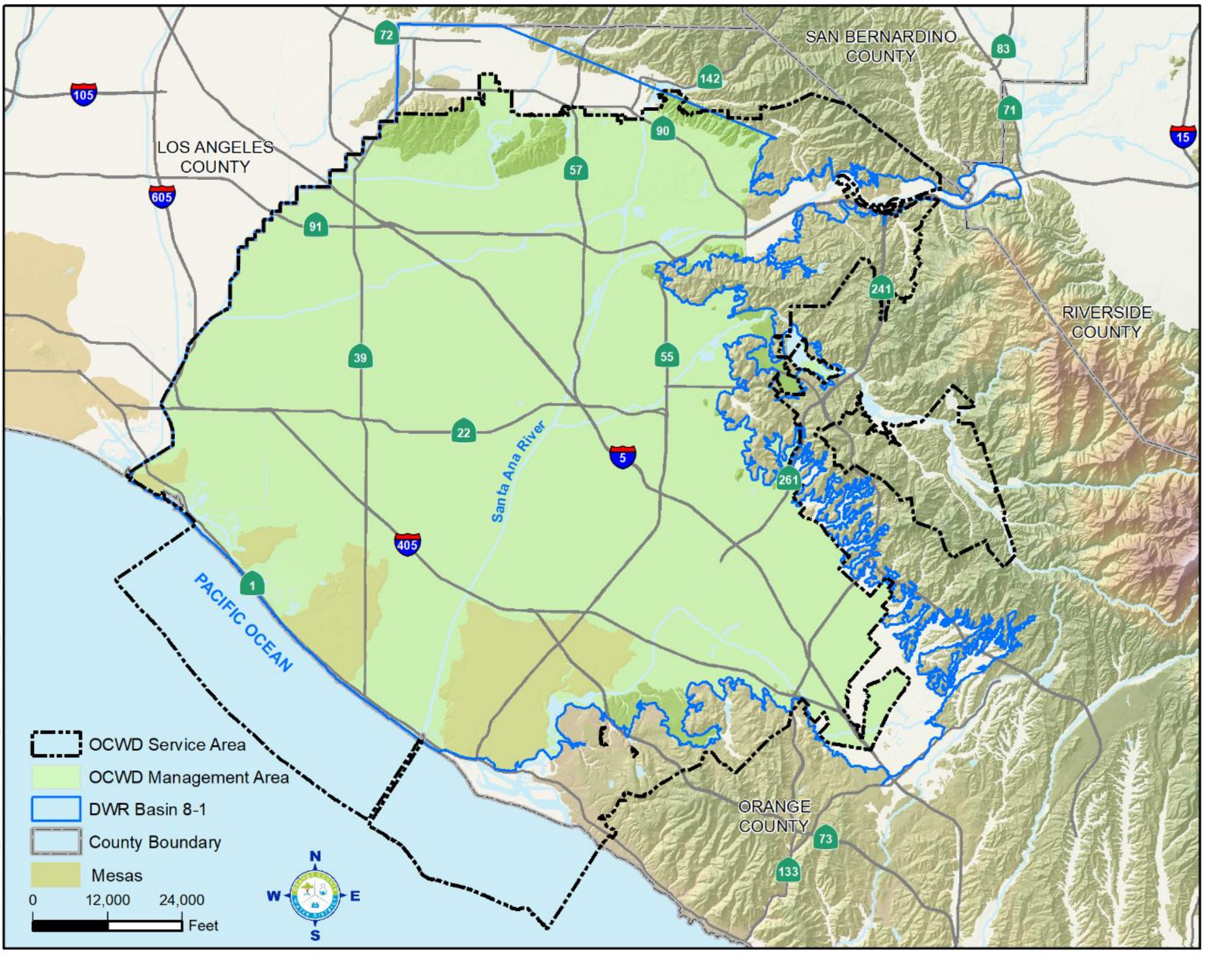

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Figure 3-1: Basin 8-1, OCWD Service Area and OCWD Management Area

Jurisdictional Areas within OCWD Management Area

Federal and state lands within the OCWD Management Area as well as city boundaries are shown in Figure 3-2 and have not changed since the 2017 Alternative. Retail water providers within OCWD's service area are shown in Figure 3-3. The OCWD Management Area with a population of approximately 2.5 million is highly urbanized, as shown in Figure 3-4. Each of the 22 cities within OCWD's jurisdiction has an adopted general plan. There are no federally recognized tribes with land and there are no adjudicated groundwater areas within the OCWD Management Area. The unincorporated areas are managed by the County of Orange. Groundwater supplies are managed as a single, shared resource with no separate water use sectors.

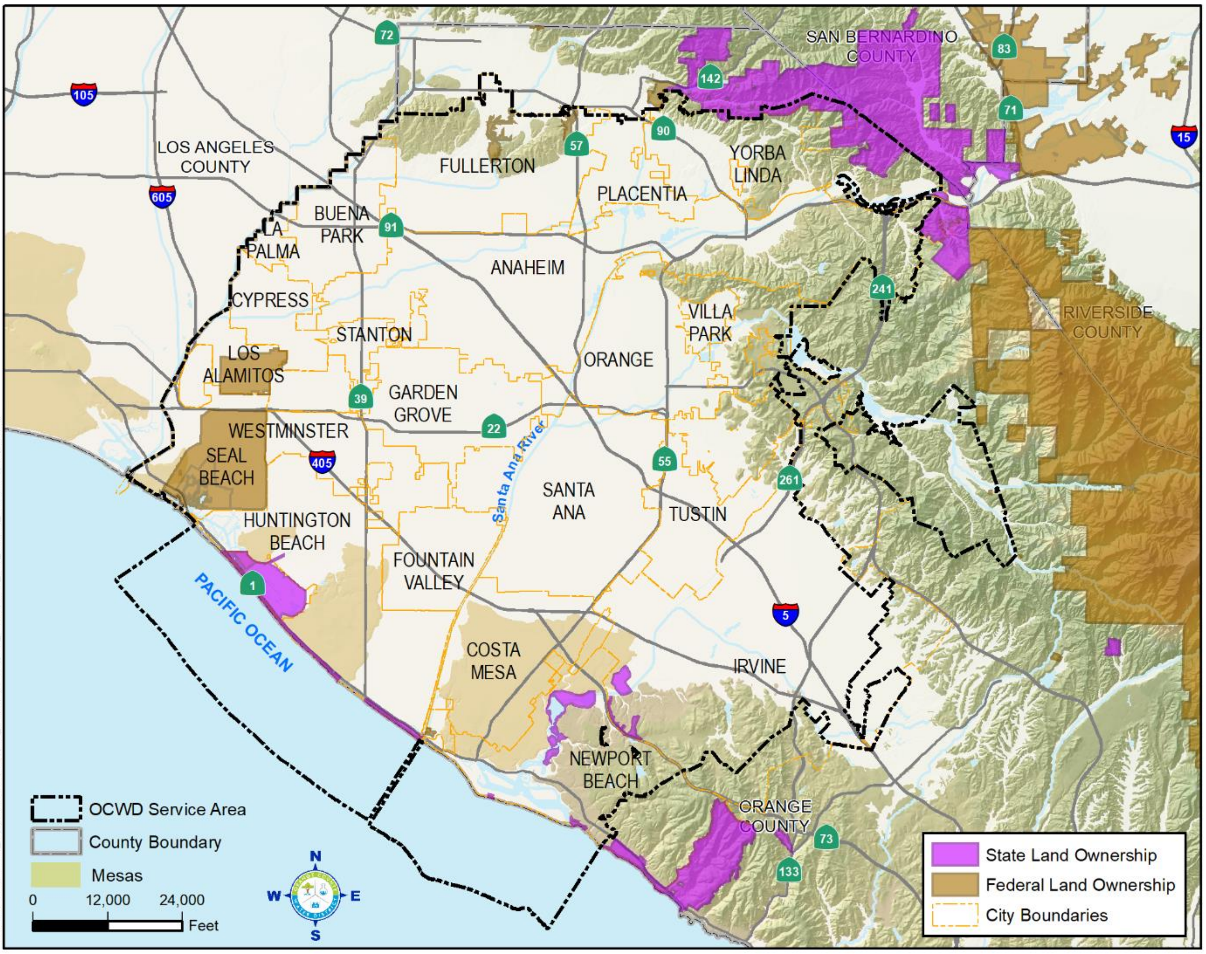

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Figure 3-2: Federal and State Lands

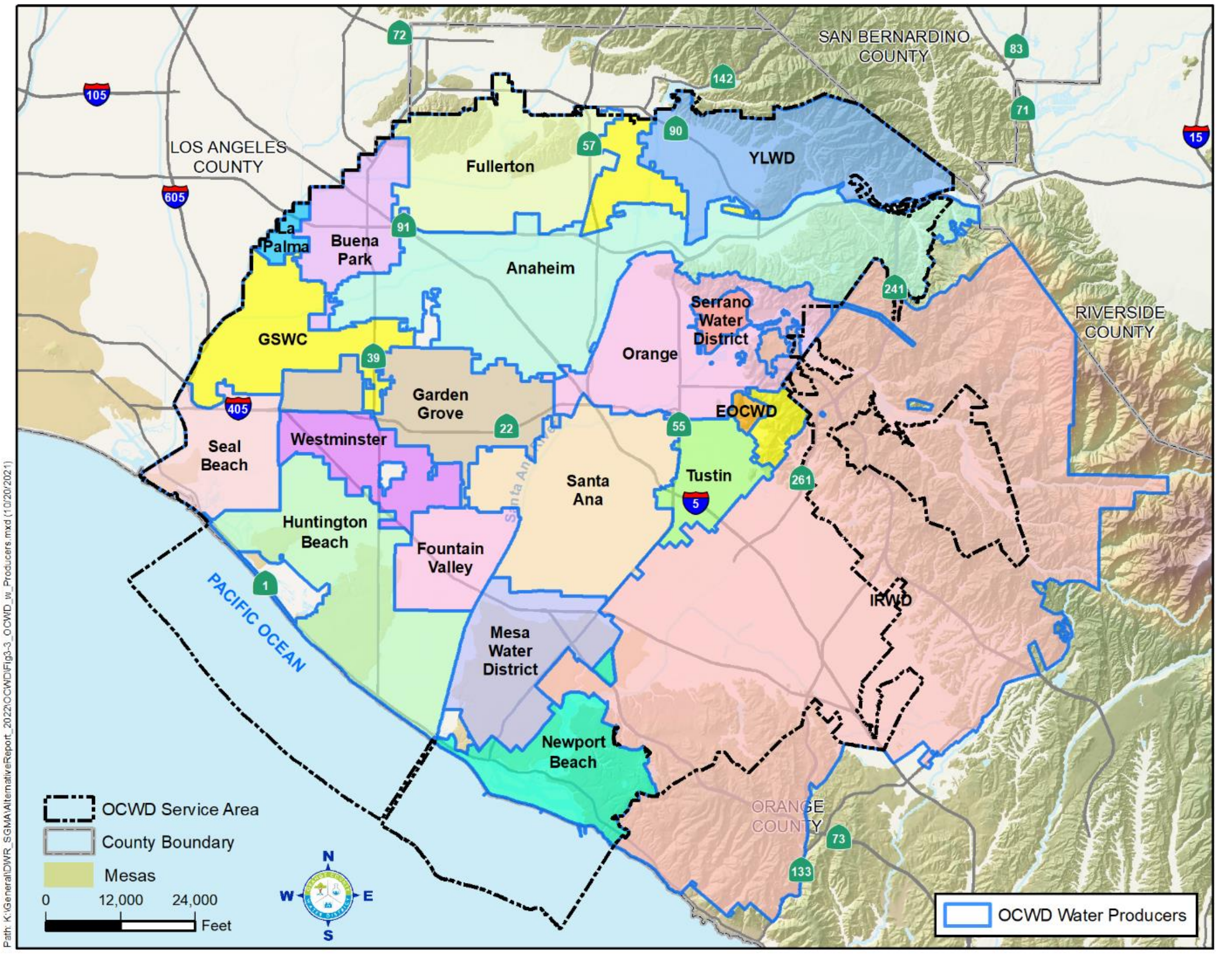


Figure 3-3: Retail Water Supply Agencies

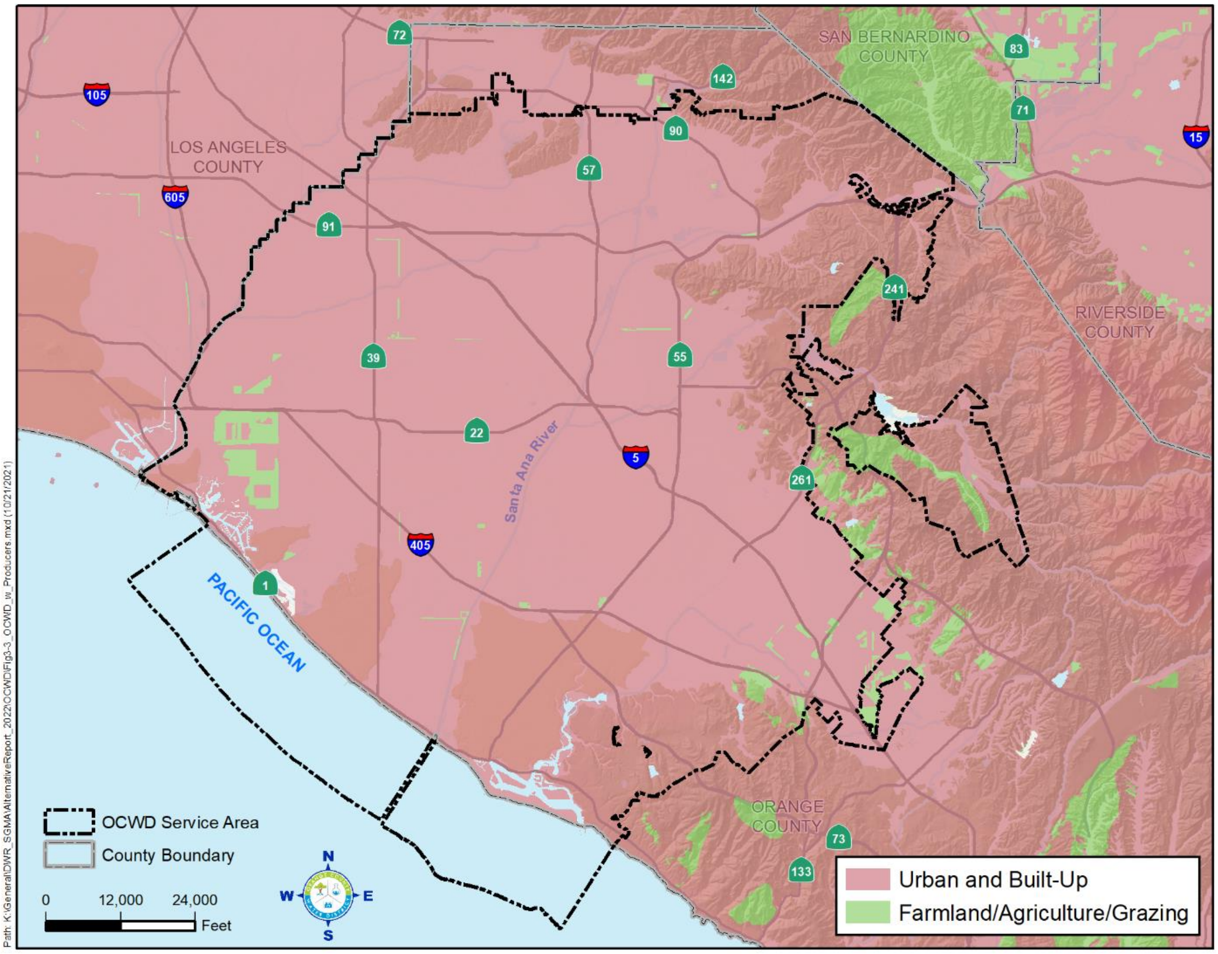


Figure 3-4: Land Uses

3.2 GROUNDWATER CONDITIONS

This section describes the groundwater conditions within the OCWD Management Area. The focus is on data from the last five years. For some historical data, please see the 2017 Alternative. The description includes groundwater elevation, pumping patterns, storage levels, groundwater quality, information concerning land subsidence, seawater intrusion, and interactions between surface water and groundwater. All elevations in this report are in units of feet above mean sea level referenced to vertical datum NGVD29, which can be converted to NAVD88. Geographic locations are reported in GPS State Plane coordinates referenced to NAD83.

3.2.1 Groundwater Elevation Contours

Figures 3-5, 3-6 and 3-7 show the contoured water levels for the Shallow, Principal and Deep Aquifers in June 2021. The contour maps for each of the three aquifer systems are prepared annually. The contour maps are used to prepare water level change maps for the three major aquifer systems and to calculate the amount of groundwater in storage and the annual storage change.

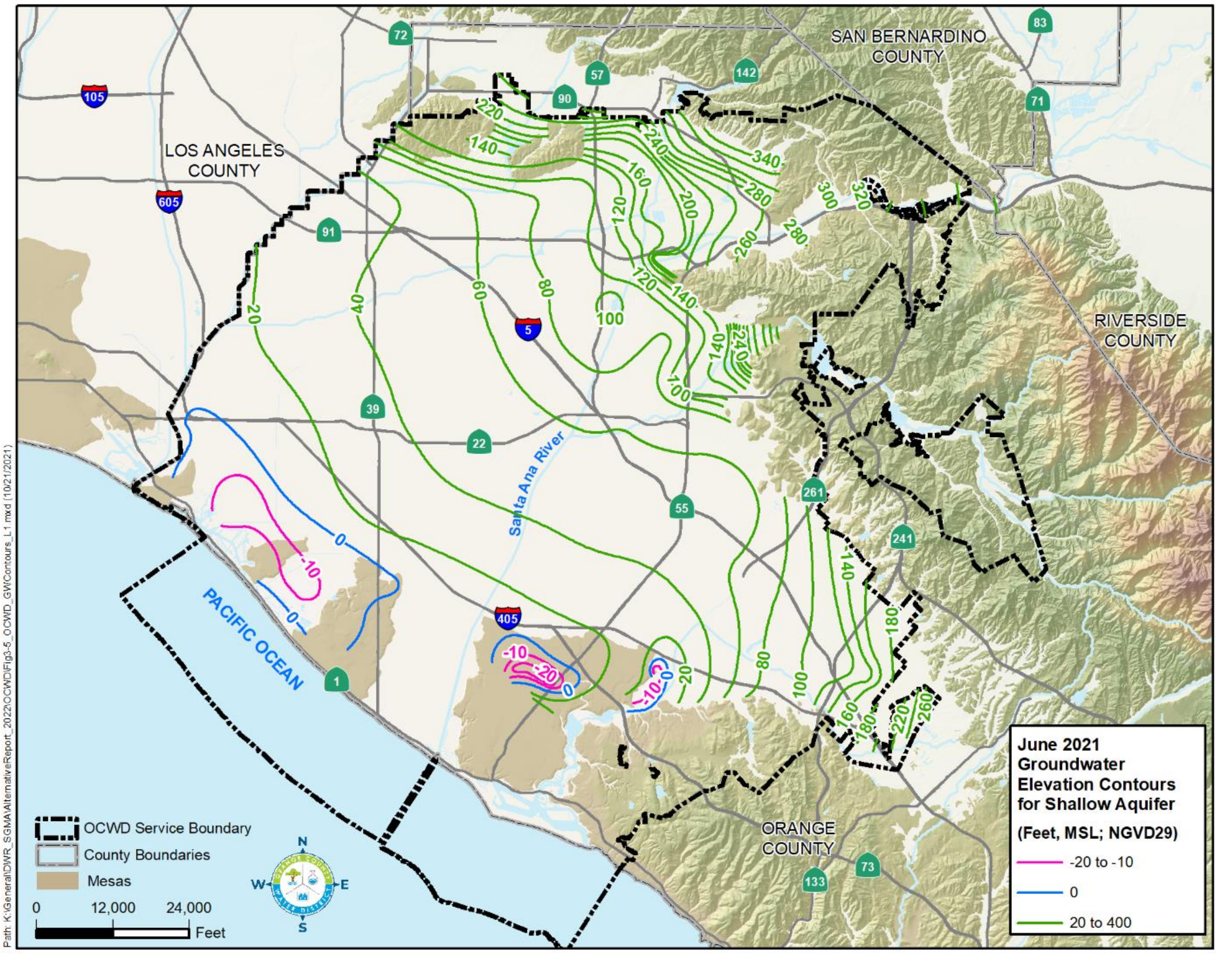


Figure 3-5: Groundwater Elevation Contours for the Shallow Aquifer, June 2021

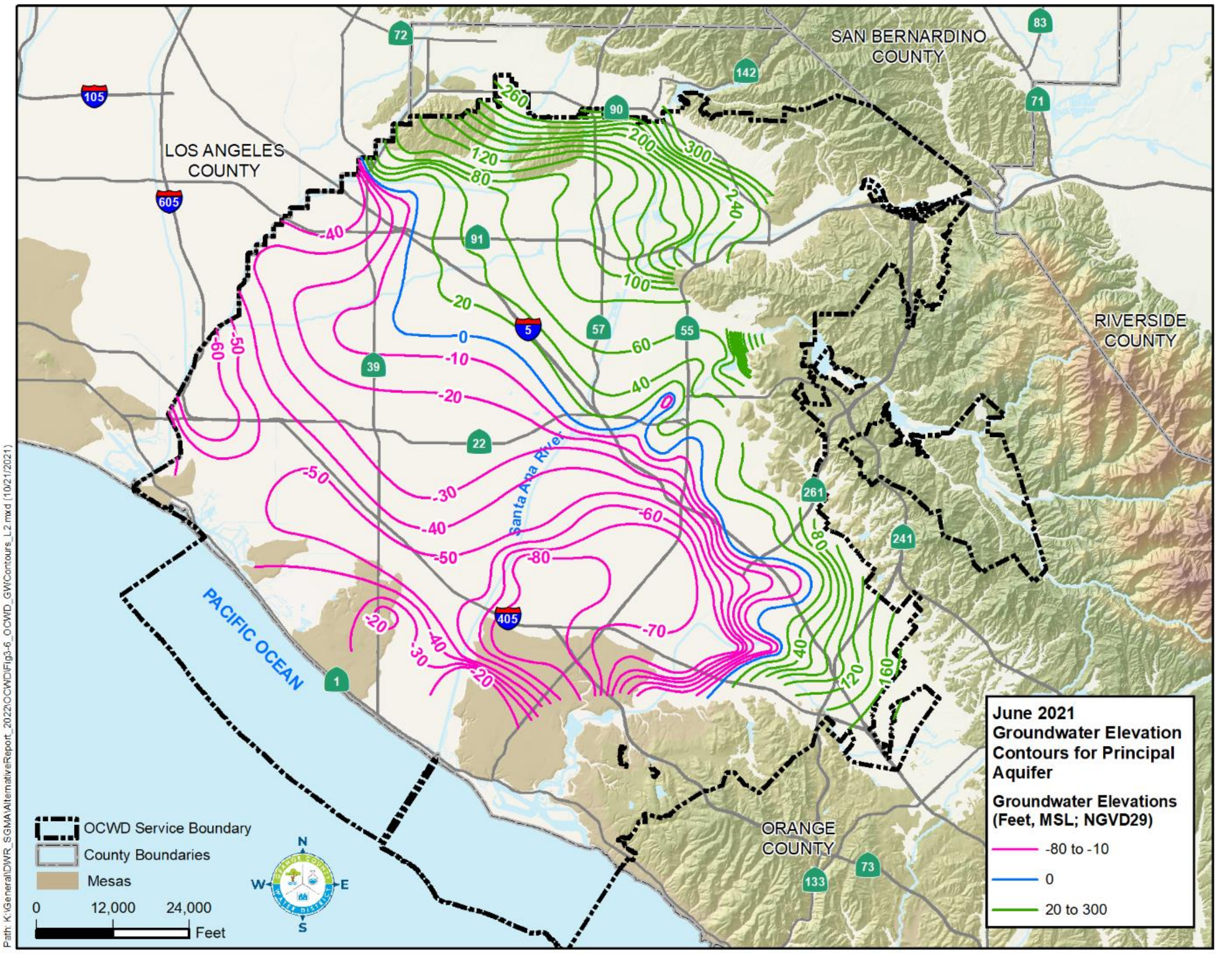


Figure 3-6: Groundwater Elevation Contours for the Principal Aquifer, June 2021

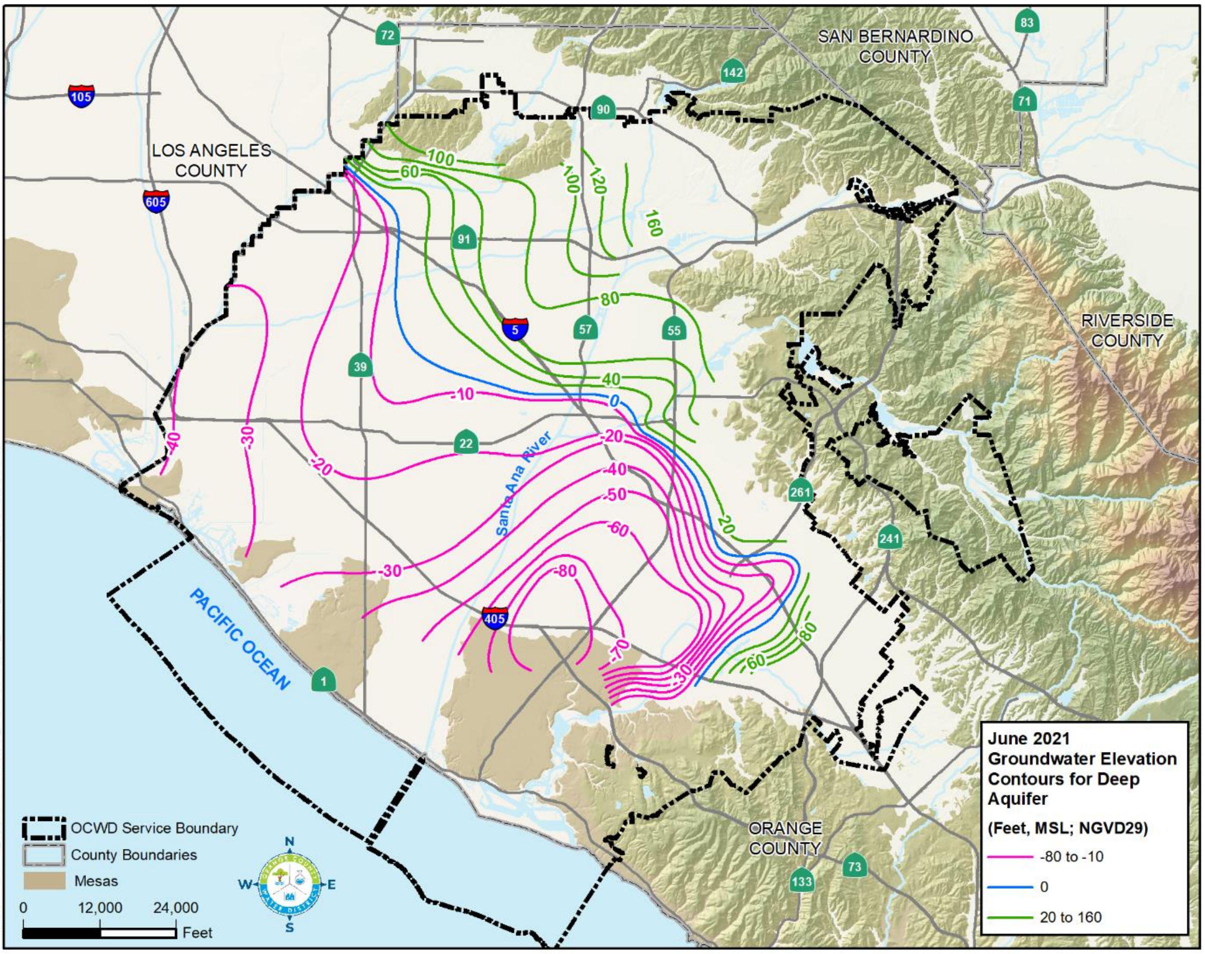
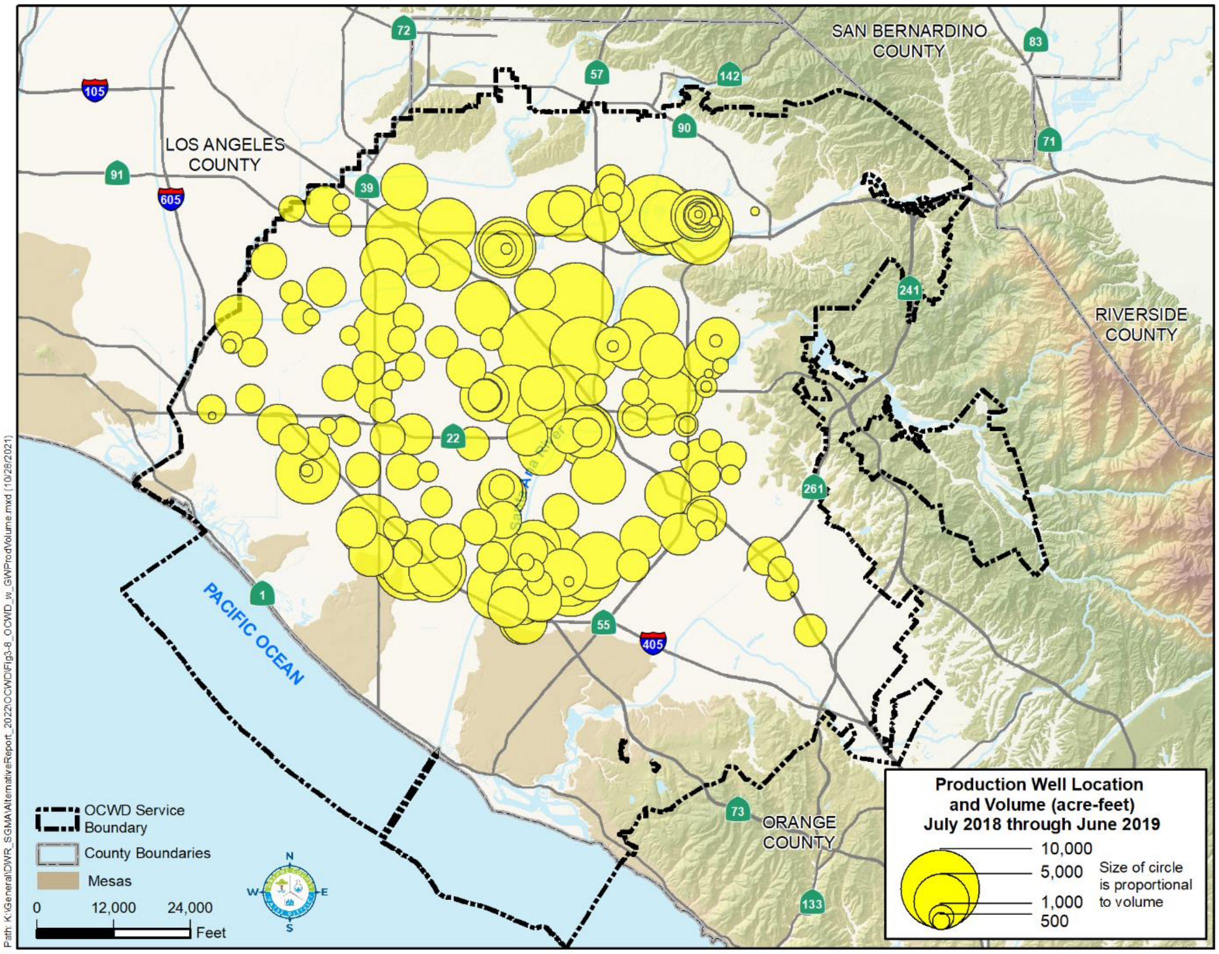


Figure 3-7: Groundwater Elevation Contours for the Deep Aquifer, June 2021

3.2.2 Regional Pumping Patterns

Active wells pumping water from the basin are shown in Figure 3-8. The approximately 200large-system wells account for an estimated 97 percent of the total basin production. The remaining three percent of total basin production includes agricultural and industrial producers, small mutual water companies, domestic well producers, and production from privately-owned wells. As can be seen in Figure 3-8, groundwater production is distributed throughout the basin. Please note that due to the recent impacts of COVID and PFAS, data from WY2018-19 is presented to show the typical average distribution of pumping in the basin.



* Due to impacts from COVID-19 FY 2018-19 groundwater production was chosen to be representative of typical pumping patterns.

Figure 3-8: Groundwater Production, WY2018-19

3.2.3 Long-Term Groundwater Elevation Hydrographs

Groundwater elevation trends exhibit both short-term (seasonal) and long-term fluctuations. Seasonal elevation changes reflect short-term variations in pumping and recharge, while multi-year trends reflect the effects of extended periods of above- or below-average precipitation and/or availability of imported water.

OCWD measures elevations in three principal aquifer systems. In general, groundwater elevations in the Shallow Aquifer system show less amplitude than those in the underlying Principal and Deep Aquifer systems due to the higher degree of pumping and confinement of the Principal and Deep Aquifer systems. Because approximately 95 percent of all production occurs from wells screened within the Principal Aquifer system, groundwater elevations within this system are typically lower than those in the overlying Shallow Aquifer system and, in some areas, the underlying Deep Aquifer system. As a result, vertical gradients created by pumping and recharge drive groundwater into the Principal Aquifer system from the overlying Shallow Aquifer system and, to a lesser extent, from the Deep Aquifer system.

Groundwater elevation trends can be examined using seven wells with long-term groundwater level data, the locations of which are shown in Figure 3-9. Figures 3-10 and 3-11 show water level hydrographs for wells SA-21 and GG-16 representing historical conditions in the Pressure Area and well A-27 representing historical conditions in the Forebay. Water level data for well A-27 near Anaheim Lake dates back to 1932 and indicate that the historic low water level in this area occurred in 1951-52. The subsequent replenishment of Colorado River water essentially refilled the basin by 1965. Water levels in this well reached a historic high in 1994 and have generally remained high as recharge has been nearly continuous at Anaheim Lake since the late 1950s. Well A-27 was destroyed in May 2012. To continue this hydrograph, water levels from nearby OCWD monitoring well, AMD-9/1 is used. A comparison of water levels when the two wells were in operation show they are nearly identical.

The hydrograph for well SA-21 indicates that water levels in this area have decreased since 1970. Also noteworthy is the large range of water level fluctuations from the early 1990s to early 2000s. The increased water level fluctuations during this period were due to a combination seasonal water demand-driven pumping and participation in the Metropolitan Water District of Southern California’s (MWD) Short-Term Seasonal Storage Program by local groundwater producers (Boyle Engineering and OCWD, 1997), which encouraged increased pumping from the groundwater basin during summer months when MWD was experiencing high demand for imported water. Although this program did not increase the amount of pumping from the basin on an annual basis, it did result in greater water level declines during the summer during the period of 1989 to 2002 when the program was active.

Figure 3-12 presents water level hydrographs of two OCWD multi-depth monitoring wells, SAR-1 and OCWD-CTG1, showing the relationship between water level elevations in aquifer zones at different depths. The hydrograph of well SAR-1 in the Forebay exhibits a similarity in water levels between shallow and deep aquifers, which indicates the high degree of hydraulic interconnection between aquifers characteristic of much of the Forebay.

The hydrograph of well OCWD-CTG1 is typical of the Pressure Area in that there are large differences in water levels in different aquifers, indicating a reduced level of hydraulic interconnectivity between shallow and deep aquifers caused by fine-grained layers that restrict vertical groundwater flow. Water levels in the deepest aquifer zone at well OCWD-CTG1 are higher than overlying aquifers, in part, because few wells directly produce water from these zones. The lack of production from the deepest aquifers is due to the presences of amber-colored water, the cost to construct very deep wells, and the fact that sufficient high-quality groundwater is readily available within the overlying Principal aquifer.

Two additional hydrographs for wells HBM-1 and IDM-1 show multi-depth water levels representative of the coastal area and the southwestern portion of the management area. The downward trend in water levels at well IDM-1 shows the effects of a water quality improvement project known as the Irvine Desalter Project. This joint project between OCWD and IRWD, in collaboration with the U.S. Department of Navy, went on line in 2006 and consists of production wells, pipelines, and treatment facilities to remove, treat, and put to beneficial use groundwater that contains elevated TDS, nitrate, and/or trichloroethylene. To provide the intended hydraulic containment of this impacted groundwater, lowered groundwater levels in the Irvine area were necessary and expected based on model projections.

For additional information and background information on groundwater level measurements, see the 2017 Alternative.

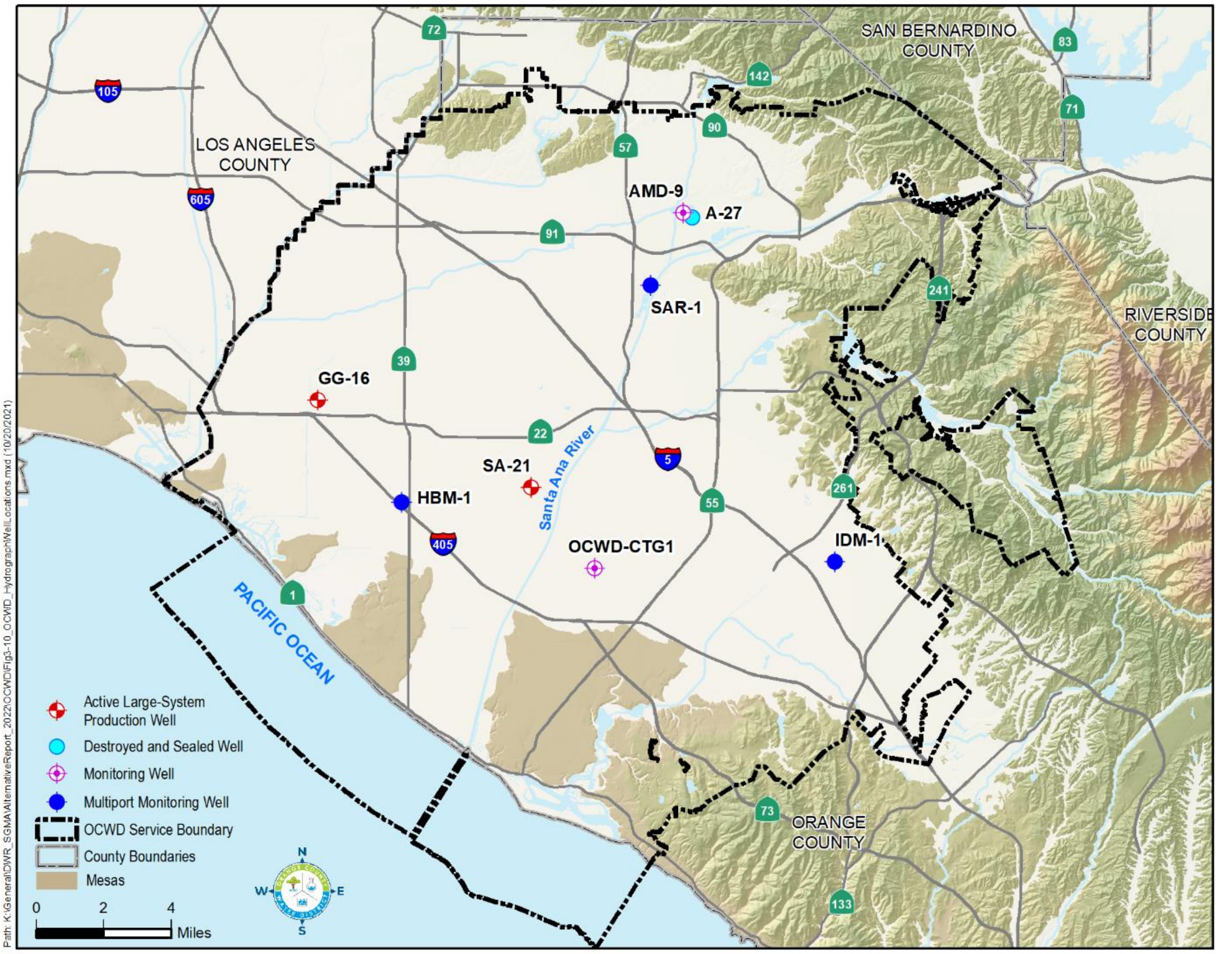
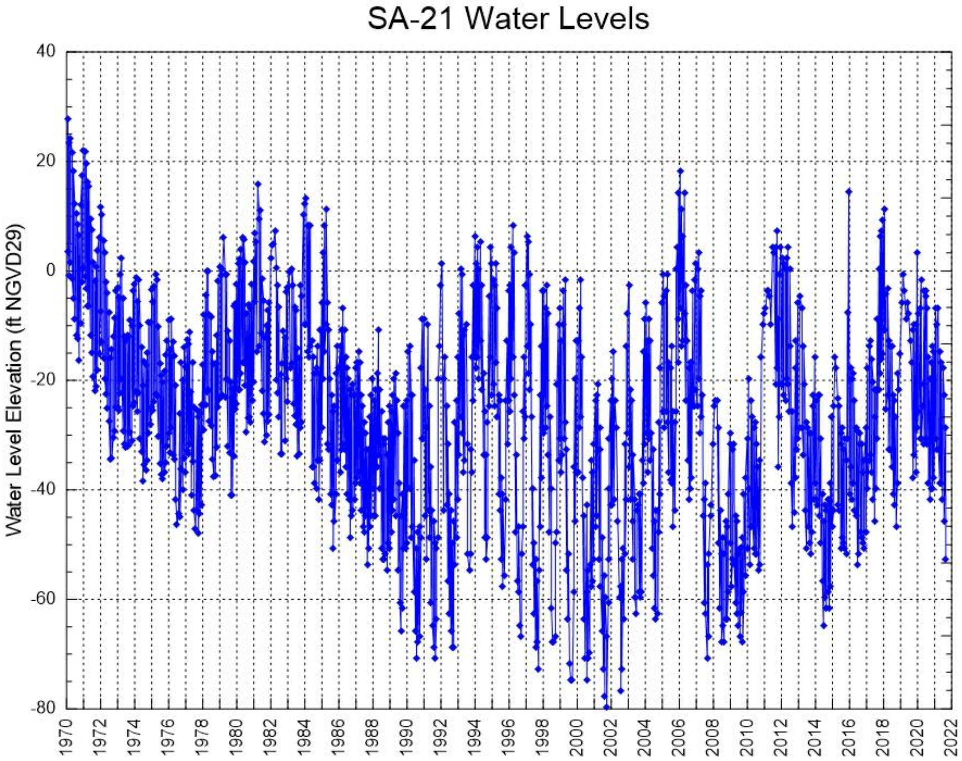


Figure 3-9: Location of Long-Term Groundwater Elevation Hydrographs



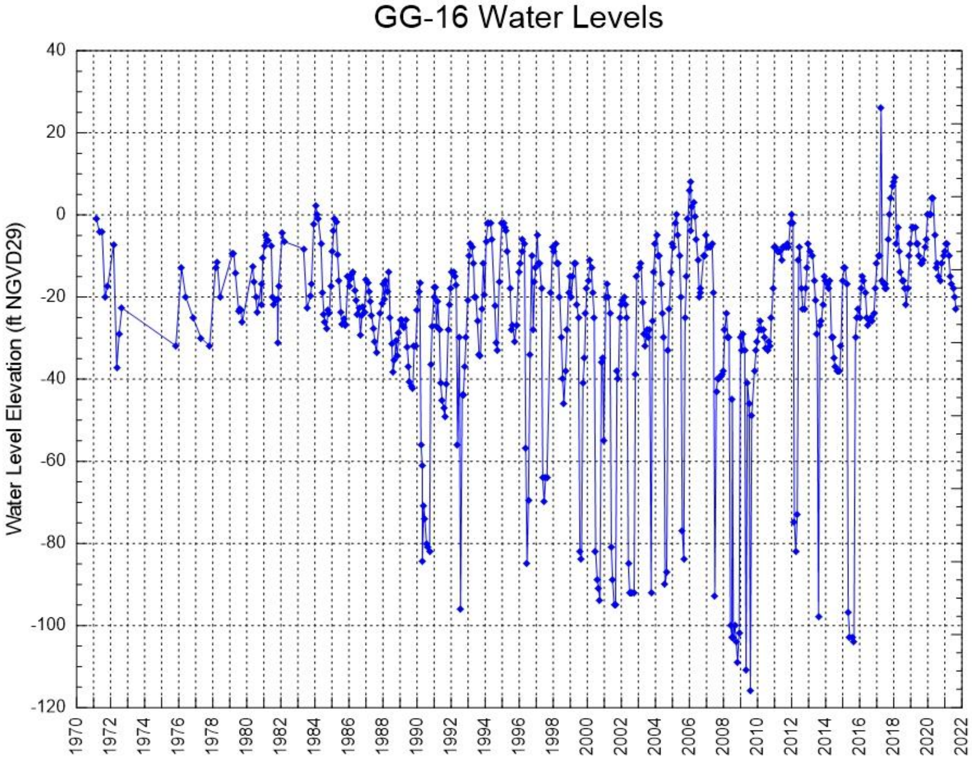


Figure 3-10: Water Level Hydrographs of Wells SA-21 and GG-16 in Pressure Area

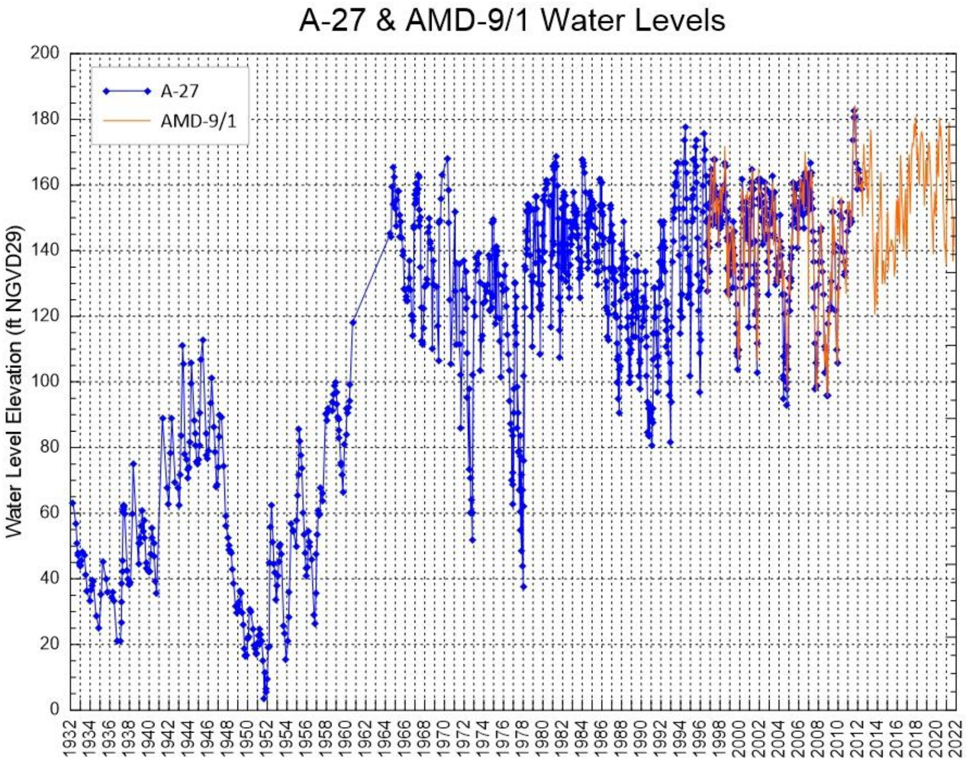


Figure 3-11: Water Level Hydrograph of Well A-27/AMD-9 in Forebay Area

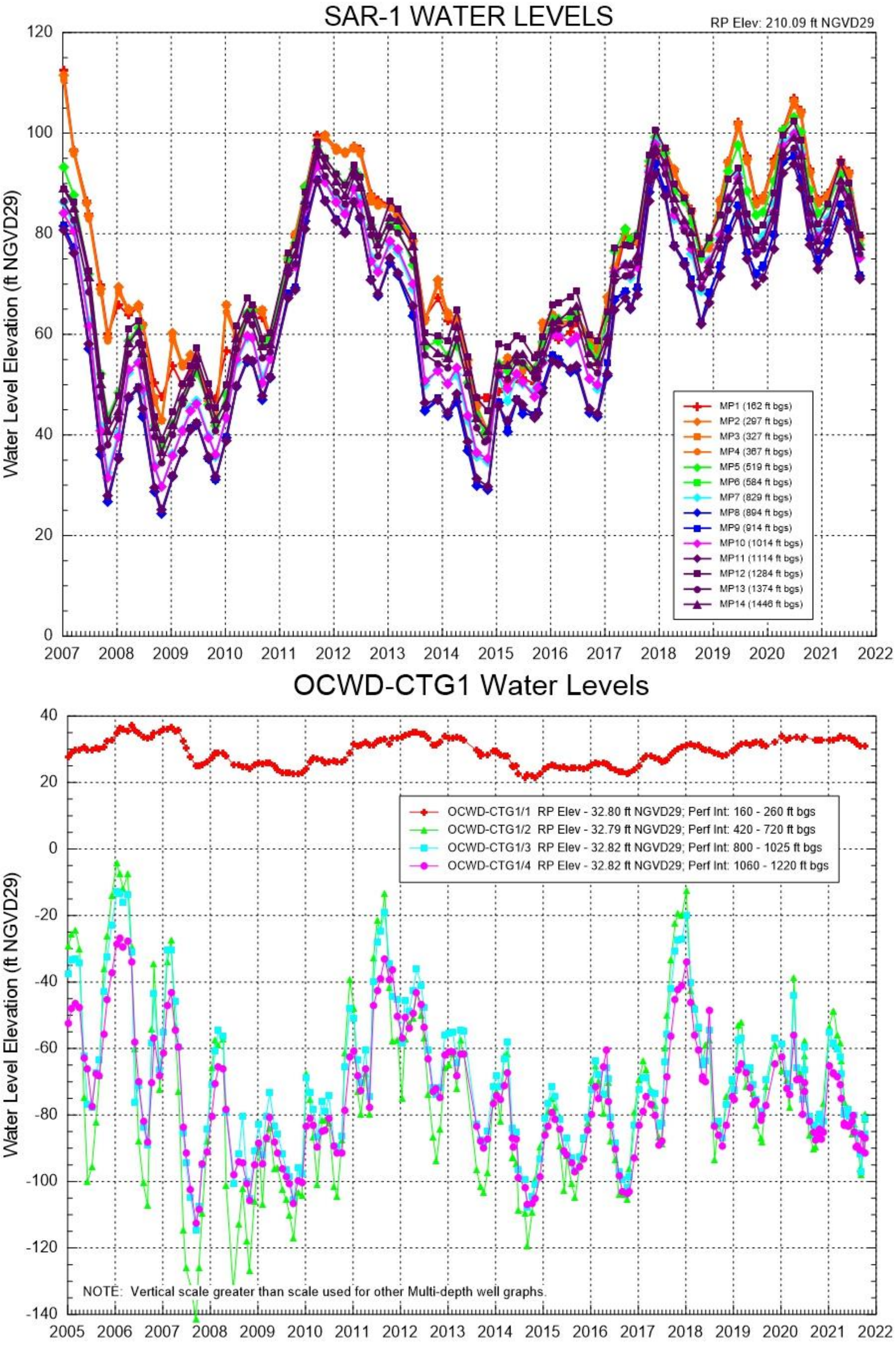


Figure 3-12: Water Level Hydrographs of Wells SAR-1 and OCWD-CTG1

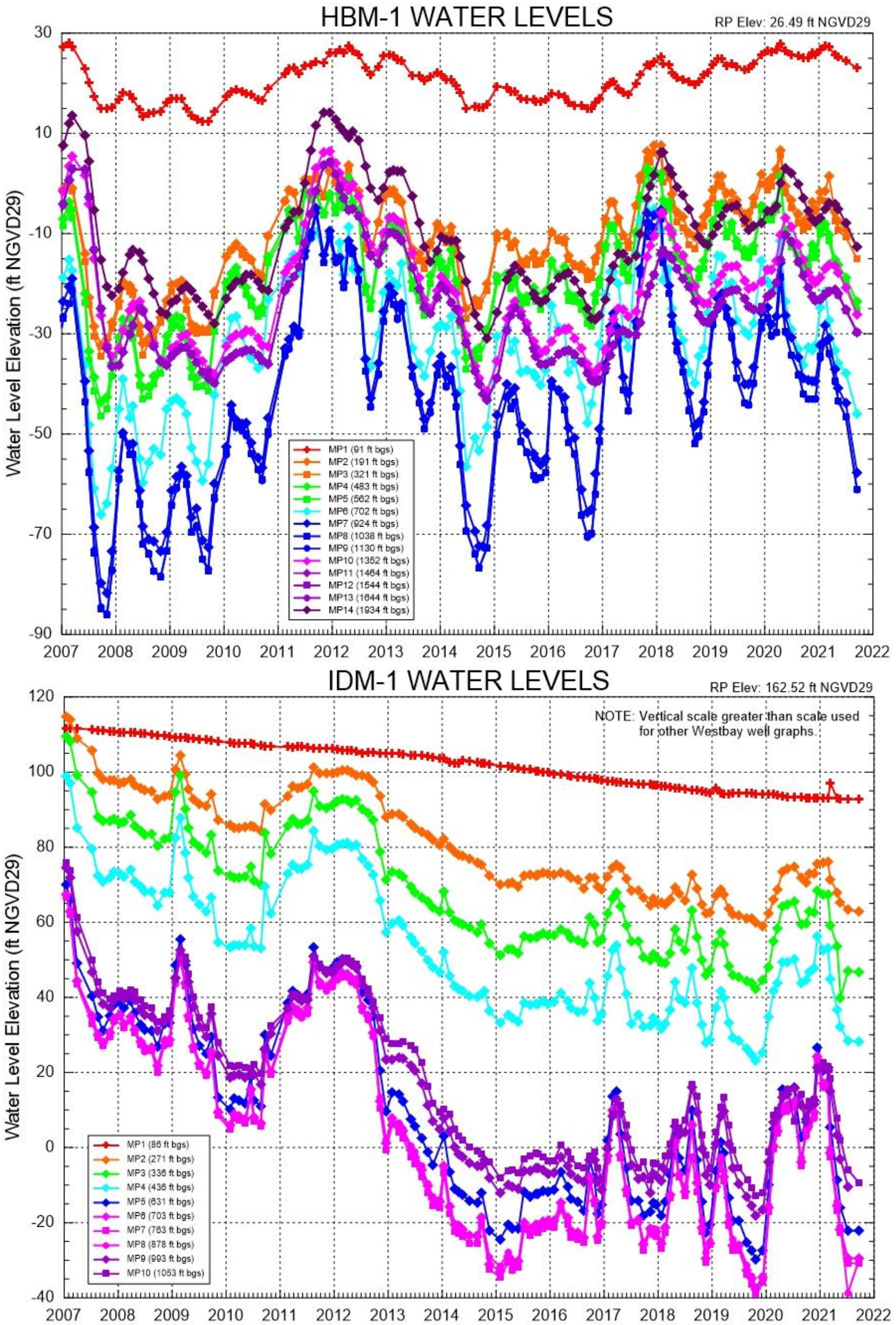


Figure 3-13: Water Level Hydrographs of Wells HBM-1 and IDM-1

3.2.4 Groundwater Storage Data

OCWD operates the basin within an operating range from a full condition to approximately 500,000 acre-feet below full to protect against seawater intrusion, inelastic land subsidence, and other potential undesirable results. Figure 1-3 shows how storage has fluctuated from 1958 to 2021. On a short-term basis, the basin can be operated at an even lower storage level in an emergency.

In order to manage the basin within this operating range, OCWD calculates the change in storage relative to a full basin condition on an annual basis for the three aquifer layers, an example of which is shown in Figure 3-14.

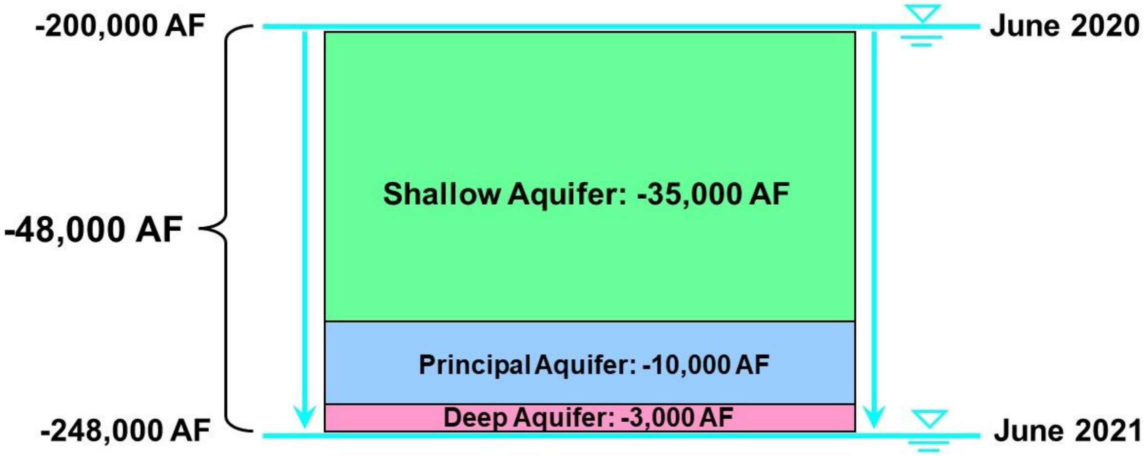


Figure 3-14: Groundwater Storage Change, June 2020 to June 2021

3.3 BASIN MODEL

OCWD's basin model encompasses most of Basin 8-1 and extends approximately three miles into the Central Basin in Los Angeles County to provide for more accurate model results than if the model boundary stopped at the county line (see Figure 3-15). The county line is not a hydrogeologic boundary, and groundwater freely flows through aquifers that have been correlated across the county line. The model provides a tool to supplement the storage change calculations that are done each year with actual groundwater elevation data. The model also provides a tool to conduct evaluations of proposed projects and operating scenarios.

For more detailed information about the model, please refer to the 2017 Alternative.

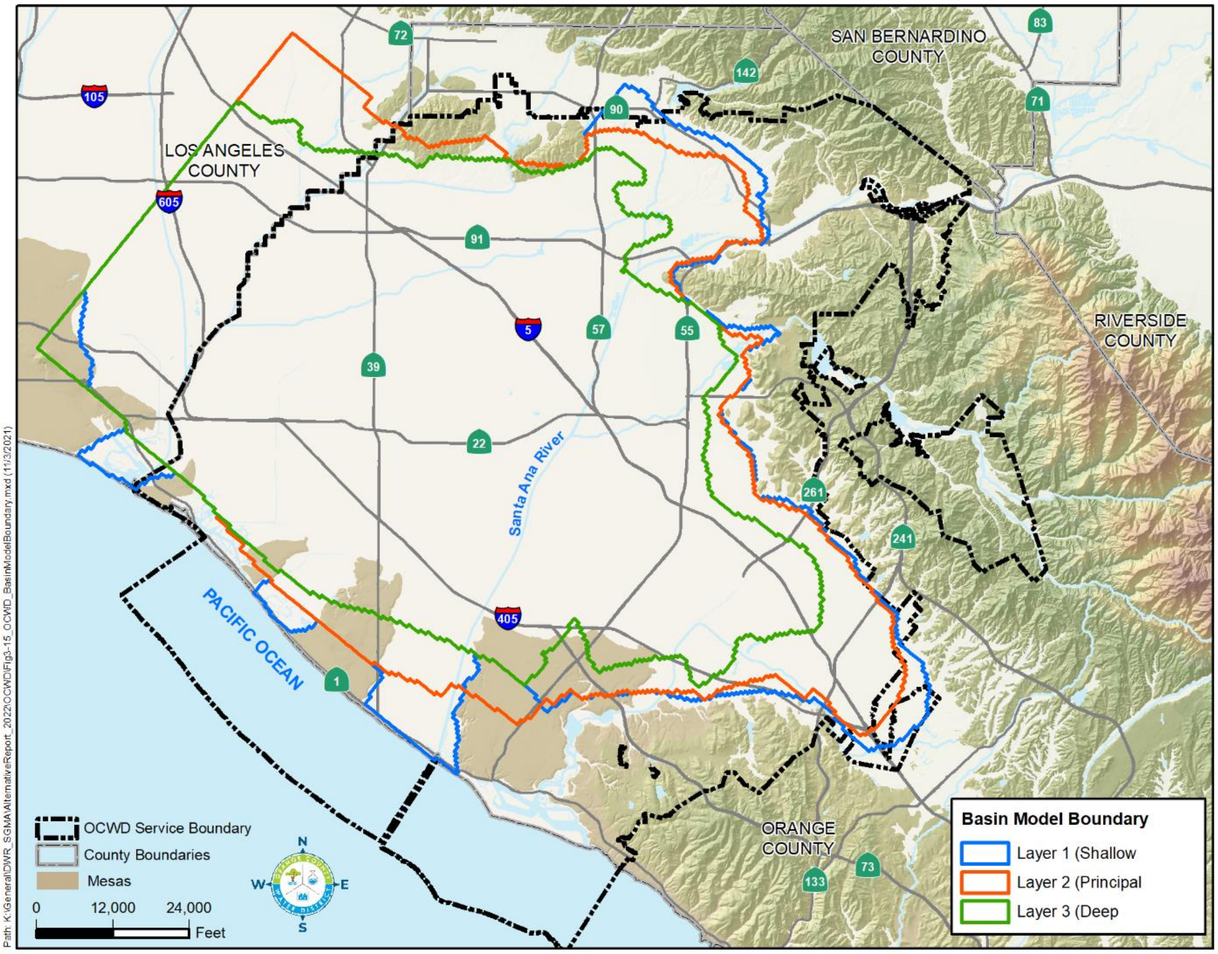


Figure 3-15: OCWD Groundwater Basin Model Boundaries

OCWD staff update the basin groundwater model approximately every three to five years. Major changes and improvements since the 2017 Alternative was submitted include:

1. Extension of the model transient calibration through WY2016-17. The new calibration period is November 1990 to June 2017 which includes a wide range of basin storage conditions as well as a wide range of hydrologic conditions.
2. Addition of new recharge basin, La Palma Basin.
3. Updating aquifer parameters, i.e., hydraulic conductivity and storage parameters, changes during calibration (still in progress).
4. Model layer revision in Irvine Sub Basin area.

3.3.1 Groundwater Quality Conditions

Salinity

At the state level, the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards have authority to manage TDS concentrations in water supplies. The salinity management program for the Santa Ana River Watershed is implemented by the Basin Monitoring Program Task Force (Task Force), a group comprised of water districts, wastewater treatment agencies and the Regional Water Board. OCWD is a member of the Task Force.

Historical ambient or baseline conditions were calculated for levels of TDS and nitrate (as N) in each of the 39 groundwater management zones in the watershed. Management Zones established by the Regional Water Board within the OCWD Management Area are shown in Figure 3-16. The TDS water quality objectives and ambient water quality levels for the two zones within the OCWD Management Area are shown in Table 3-1.

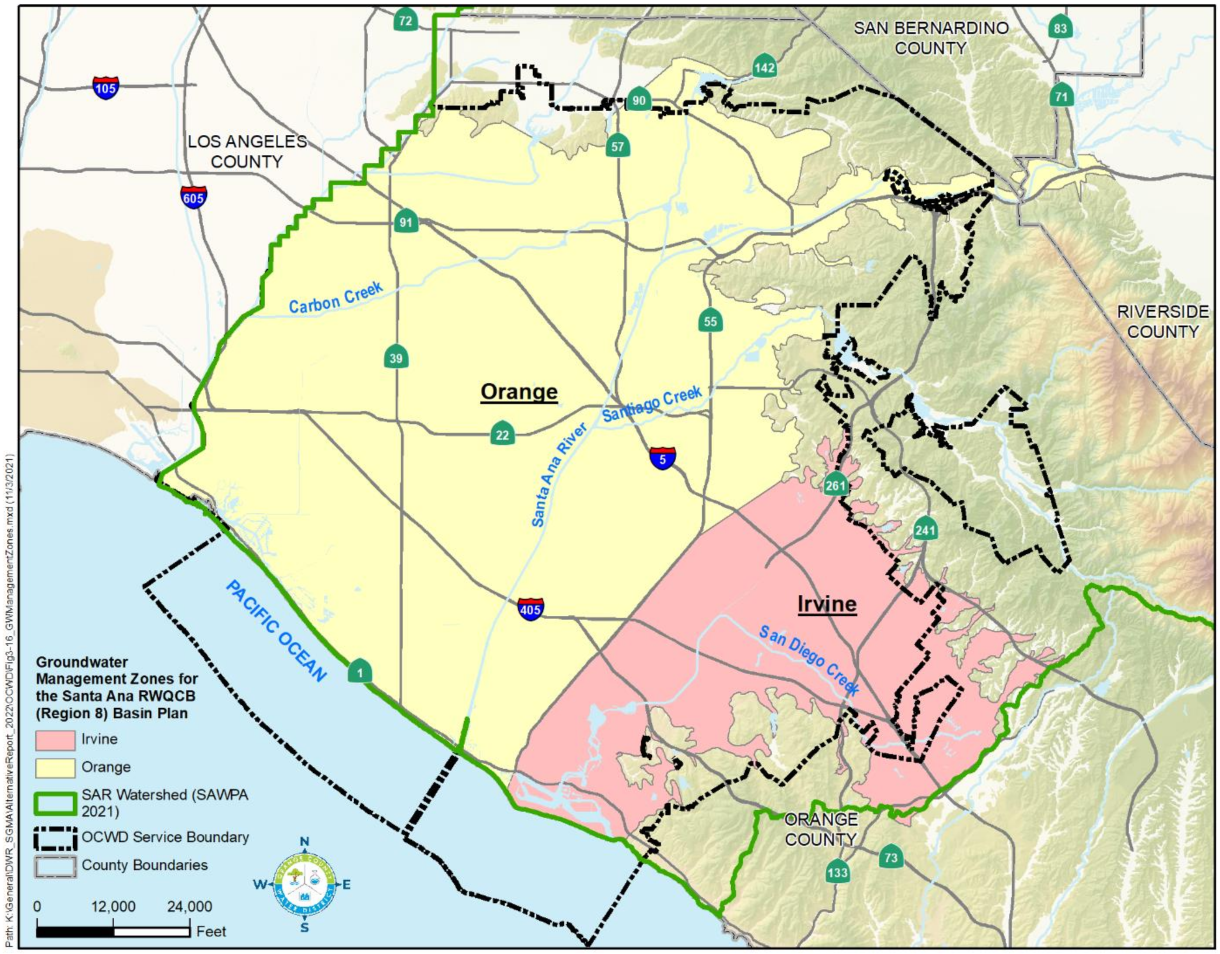


Figure 3-16: Regional Water Board Groundwater Management Zones

Table 3-1: TDS Water Quality Objectives for Lower Santa Ana River Basin Management Zones

Groundwater Management Zone	Water Quality Objective	2018 Ambient Quality*
Orange	580 mg/L	603 mg/L
Irvine	910 mg/L	877 mg/L

*Water Systems Consulting, 2020.

Figure 3-17 shows the average TDS at production wells in the basin for WY2016-17 to 2020-21. In general, the TDS concentrations in the Principal Aquifer in the Orange Groundwater Management Zone generally range from 300 to 400 mg/L in the Pressure Area and from 500 to 700 mg/L in the Forebay Area. In the Irvine Groundwater Management Zone, TDS concentrations range from approximately 400 mg/L west of Culver Drive to 1,000 mg/L in the area northeast of Interstate 5.

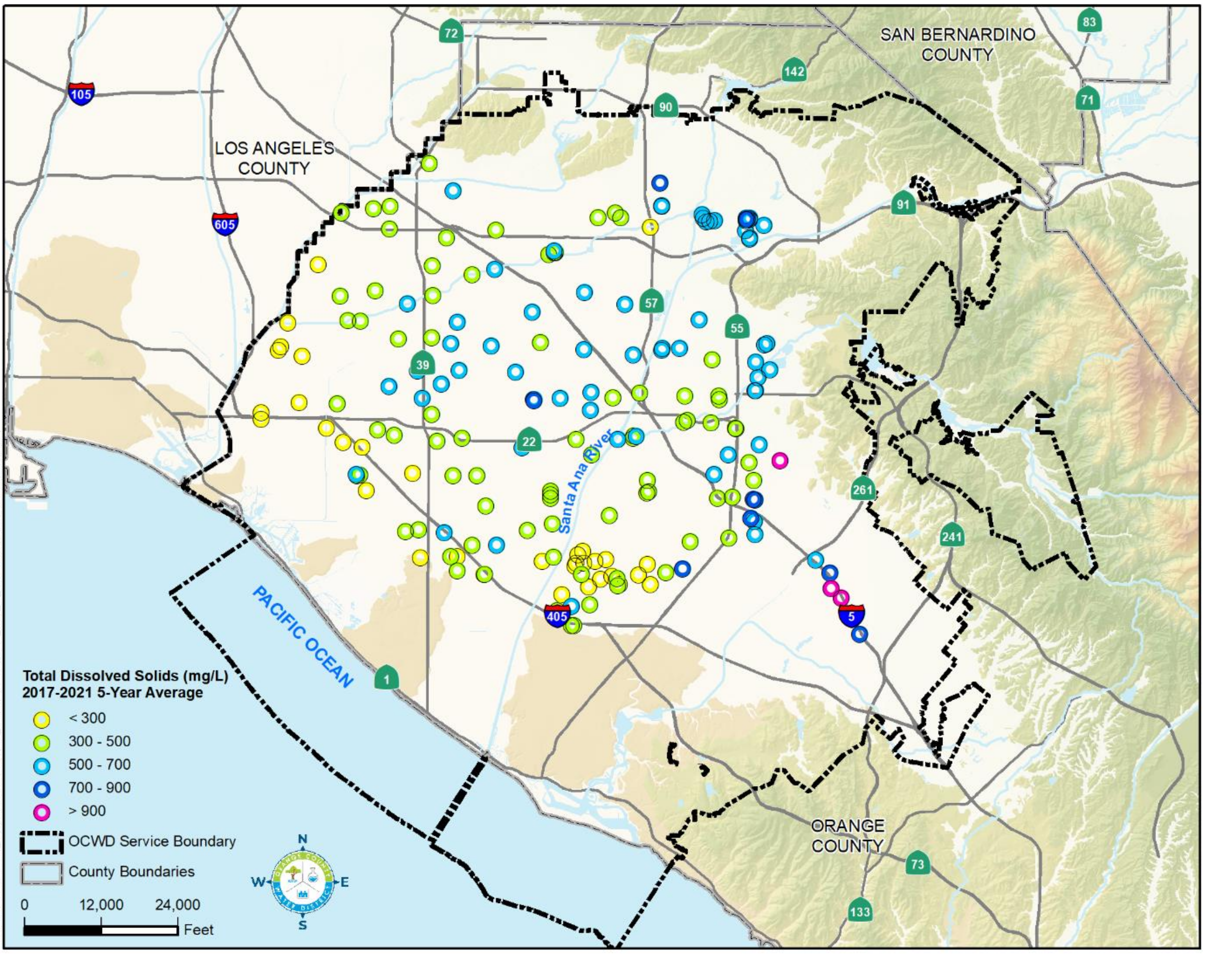


Figure 3-17: TDS in Groundwater Production Wells,
5-year average, WY2016-17 to 2020-21

Nitrate

Management of nitrate is a component of the salinity management program in the Santa Ana River Watershed. Along with TDS objectives, water quality objectives for nitrate (as N) are established for each of the 39 groundwater management zones in the watershed. Water quality objectives and ambient quality levels for the zones within the OCWD Management Area are shown in Table 3-2.

Figure 3-18 shows the 5-year average nitrate (as N) levels in production wells for WY2016-17 to 2020-21. In general, nitrate (as N) concentrations in the Orange Groundwater Management Zone are generally less than 5 mg/L. There are some localized areas with concentrations greater than 10 mg/L. In cases where pumped groundwater exceeds the MCL, the groundwater producer treats the water to reduce nitrate (as N) levels prior to being served to customers.

Table 3-2: Nitrate (as N) Water Quality Objective for Lower Santa Ana River Basin Management Zones

Groundwater Management Zone	Water Quality Objective	2018 Ambient Quality*
Orange	3.4 mg/L	3.0 mg/L
Irvine	5.9 mg/L	6.37 mg/L

*Water Systems Consulting, 2020.

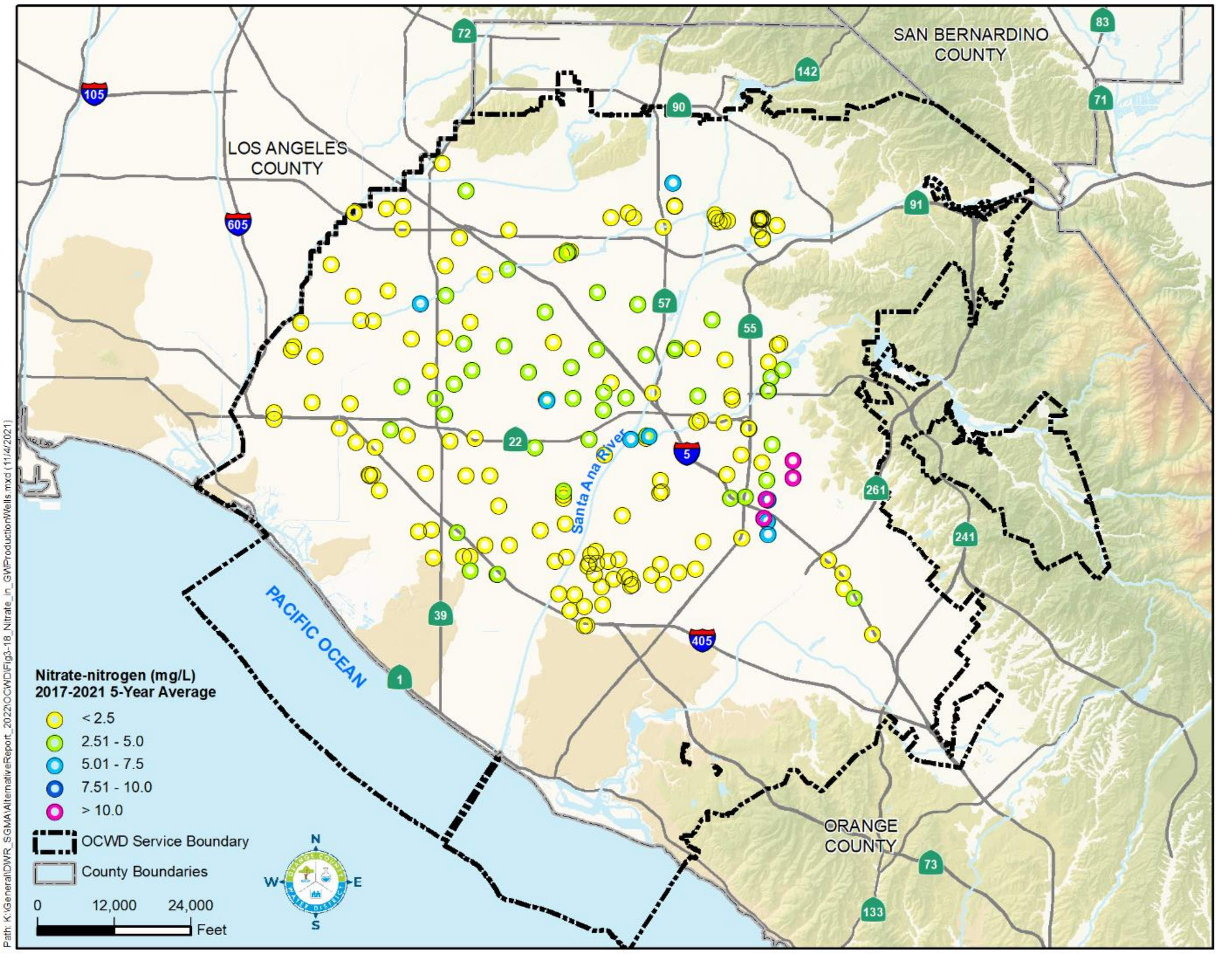


Figure 3-18: Nitrate (as N) Levels in Groundwater Production Wells, 5-year average, WY2016-17 to 2020-21

Per- and polyfluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of manmade chemicals that includes perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). PFAS compounds have been commonly used in many products including, among many others, stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams. Beginning in the summer of 2019, the California Division of Drinking Water (DDW) began requiring testing for PFAS compounds in some groundwater production wells in the OCWD area.

In February 2020, the DDW lowered its Response Levels (RL) for PFOA and PFOS to 10 and 40 parts per trillion (ppt or nanogram/L, ng/L), respectively. In March 2021, DDW established a third PFAS RL for perfluorobutane sulfonate (PFBS) at 5,000 ppt. The DDW recommends the public water systems not serve any water exceeding the RL – effectively making the RL a *de facto* interim MCL while the state undertakes the formal process to set an enforceable MCL. In response to DDW's issuance of the revised RL, as of September 2021, approximately 60 wells in the OCWD service area have been temporarily turned off until treatment systems can be constructed. As additional wells are tested, this figure may increase. The state has begun the process of establishing MCLs for PFOA and PFOS; in July 2021, the state Office of Environmental Health Hazard Assessment (OEHHA) released draft Public Health Goals (PHGs) for PFOA and PFOS or 0.007 ng/L and 1 ng/L, respectively, for public comment. After the PHGs are finalized, DDW will formally begin developing corresponding MCLs and currently anticipates issuing a final MCL by 2023 or 2024. OCWD anticipates the MCLs will be set at or below the RLs.

In April 2020, OCWD as the groundwater basin manager, executed a multi-party agreement with the impacted groundwater producers to fund and construct the necessary treatment systems for production wells impacted by PFAS compounds. The PFAS treatment projects include the design, permitting, construction, and operation of PFAS treatment systems for impacted production wells. Each well treatment system will be evaluated for use with either granular activated carbon (GAC), ion exchange (IX), or an alternative novel sorbent for the removal of PFAS compounds. These treatment systems utilize vessels in a lead-lag configuration to remove PFOA and PFOS to less than 2 ppt, the current laboratory detection limit. These PFAS treatment systems are designed to ensure the groundwater supplied by producer wells can be served in compliance with current and future PFAS regulations. The groundwater producers will own the treatment systems once they are completed. With financial assistance from OCWD, the groundwater producers will operate and maintain the new treatment systems once they are constructed.

To minimize alternative water supply expenses and provide maximum protection to the public water supply, OCWD initiated design, permitting, and construction of the PFAS treatment projects on a schedule that allows rapid deployment of treatment systems. As of September 2021, construction contracts have been awarded for treatment systems for production wells owned by the cities of Orange (Phase 1), and Garden Grove, Serrano Water District, and Yorba Linda Water District. The City of Anaheim has also awarded a design-build contact (phase A) for 8 impacted wells, that will be reimbursed by OCWD. The City of Fullerton's well KIM-1A treatment system has been completed and is in operation. Additional construction contracts are anticipated to be awarded for impacted wells operated by the cities of Fullerton (Main Plant), Orange (Phase 2), Santa Ana, Tustin, Irvine Ranch Water District and East Orange County Water District by early 2022. OCWD expects the treatment systems to be constructed for the approximately 60 impacted wells within the next 2 to 3 years.

As monitoring continues and additional wells are taken off-line due to PFAS detections reported at or near the current RL (or future MCL), OCWD will continue to partner with the affected groundwater producers and take action to design and construct necessary treatment systems to bring the impacted wells back online as quickly as possible.

Groundwater production in WY2020-21 was expected to be approximately 325,000 acre-feet but declined to 282,000 acre-feet primarily due to PFAS impacted wells being turned off around February 2020. OCWD expects groundwater production to be in the area of 250,000 acre-feet in WY2021-22 due to the currently idled wells and additional wells being impacted by PFAS and turned off. As PFAS treatment systems are constructed, OCWD expects total annual groundwater production to slowly increase back to levels similar to years prior to PFAS impacts.

Contamination Plumes

Major groundwater contamination sites within the OCWD Management Area include areas where contamination has migrated significantly beyond the contamination sources and threaten to further impact the groundwater quality. These plumes, shown in Figure 3-19, are in the process of being remediated, and some are being evaluated for additional remediation.

The North Basin Volatile Organic Compound (VOC) plume area contains contaminated groundwater primarily in the Shallow Aquifer, which is generally less than 200 feet deep with migration downward into the Principal Aquifer. OCWD is performing a remedial investigation/feasibility study (RI/FS) under the oversight of the U.S. EPA and working with state regulatory agencies and stakeholders to evaluate and develop effective remedies to address the contamination under the National Contingency Plan process. The U.S. EPA is the lead agency for this North Basin RI/FS.

The South Basin plume area contains VOCs and perchlorate. OCWD has collected extensive data to delineate the comingled plumes. OCWD is performing an RI/FS in consultation with the Regional Water Board, Department of Toxic Substances Control, and stakeholders to evaluate and develop effective remedies to address the contamination under the National Contingency Plan process, designated as the South Basin Groundwater Protection Project (SBGPP).

The U.S. Navy is taking the lead in remediation of three groundwater contamination plumes of VOCs in the vicinity of the former El Toro Marine Corps Air Station (MCAS), former Tustin MCAS, and the Naval Weapons Station Seal Beach.

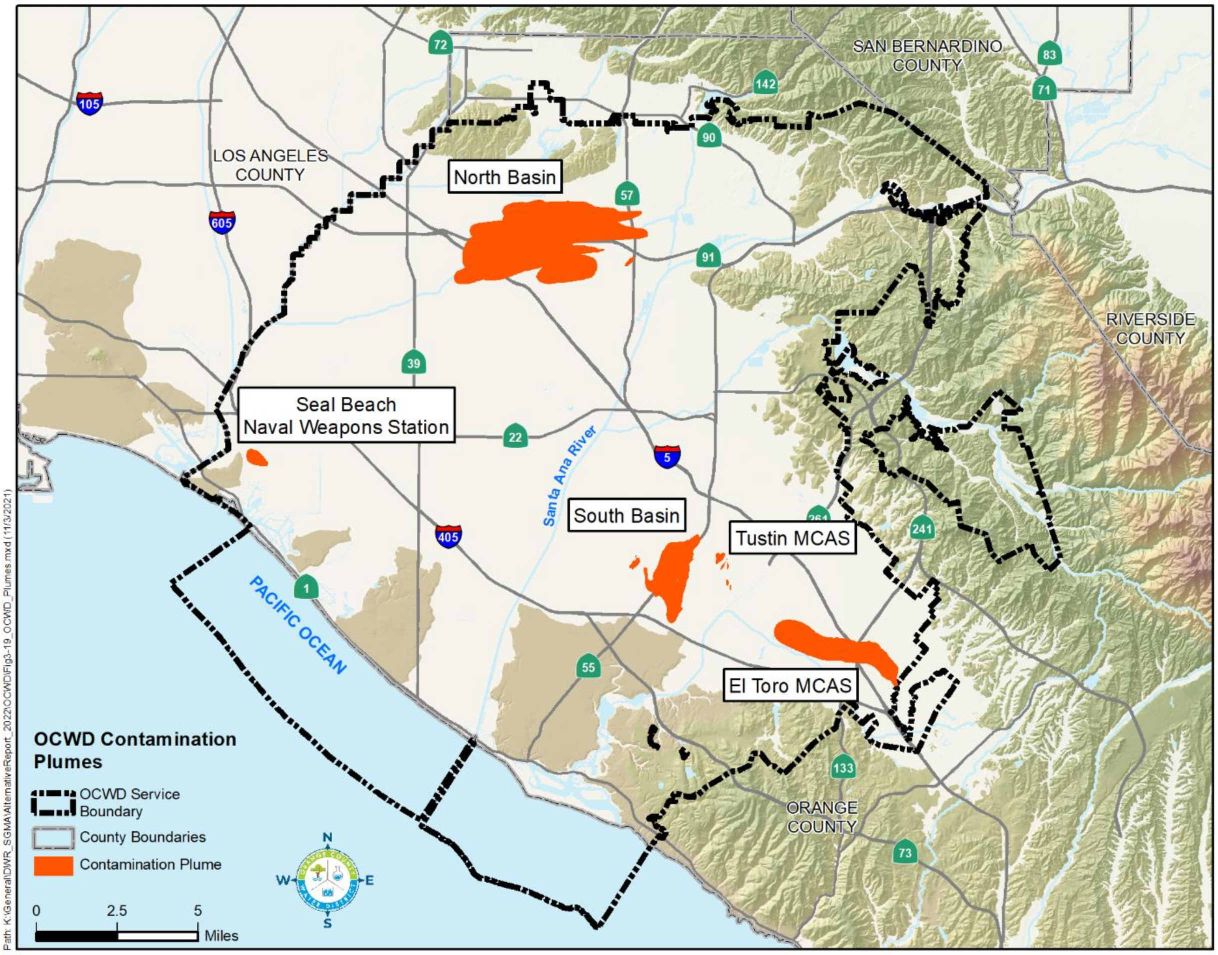


Figure 3-19: Groundwater Contamination Plume Locations

3.3.2 Coastal Gaps

In the coastal area of Orange County, the primary source of saline groundwater is seawater intrusion into the basin through permeable aquifer sediments underlying topographic lowlands or gaps between the erosional remnants or mesas of the Newport-Inglewood Uplift. The susceptible locations from north to south are the Alamitos, Sunset, Bolsa, and Talbert gaps as shown in Figure 3-20. Note that new wells added within the last five years are shown in Figure 3-20.

Background information on these gaps is contained in the 2017 Alternative. Ongoing activities related to seawater intrusion protection is described in subsequent sections of this report.

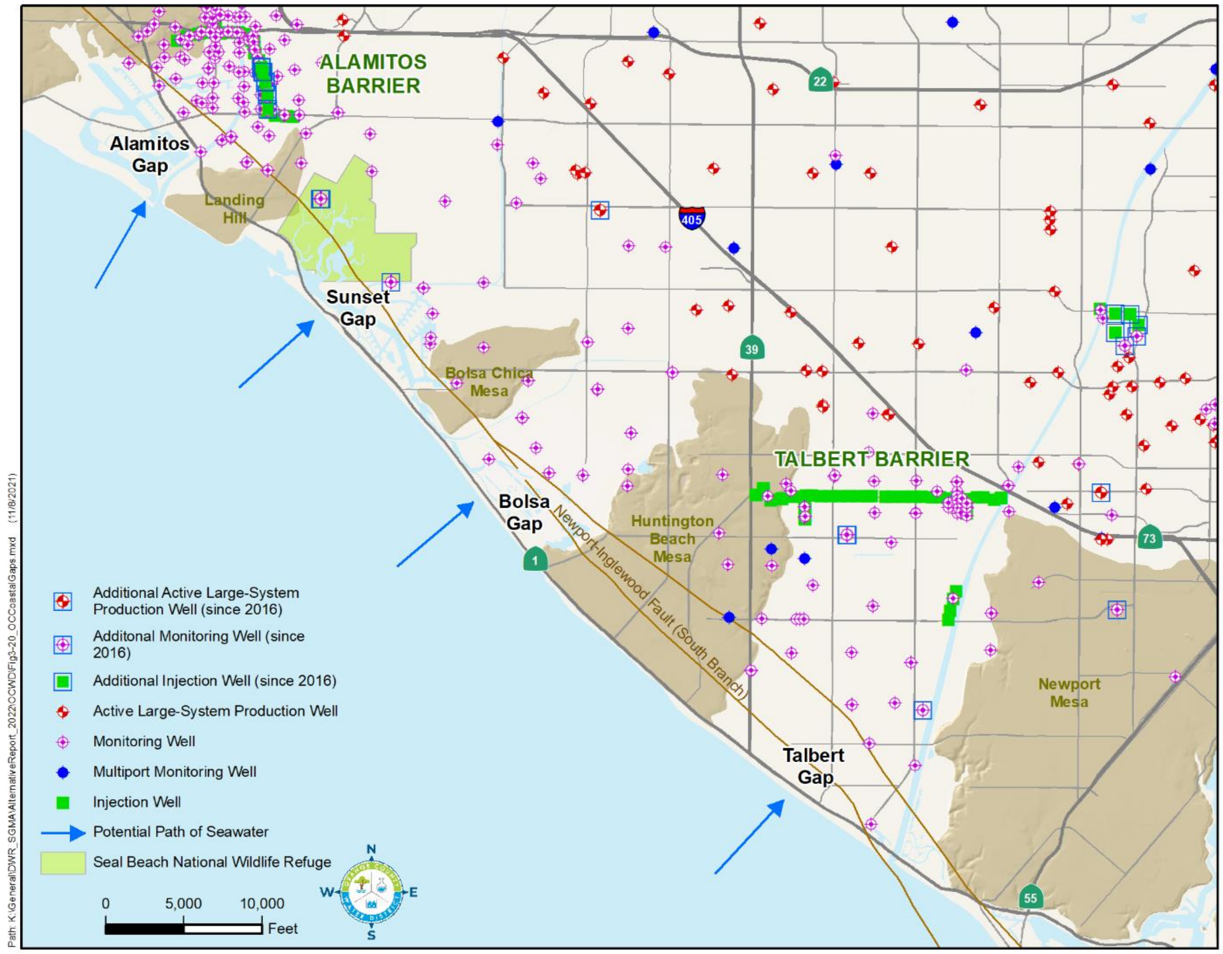


Figure 3-20: Orange County Coastal Gaps

3.3.3 Land Subsidence

In Orange County, subsidence in swampy low-lying coastal areas underlain by shallow organic peat deposits started as early as 1898 when development of these areas for agriculture resulted in excavation of unlined drainage ditches. The ditches drained the swamps and intercepted the shallow water table which was lowered to allow the land to drain adequately for irrigated agriculture. When the shallow water table was lowered, it exposed the formerly saturated peat deposits to oxygen that caused depletion and shrinkage of the peat due to oxidation (Fairchild and Wiebe, 1976).

Subsidence related to shallow peat deposits was associated with land development practices that occurred in Orange County in the late 1800s and early 1900s and, as such, is not something associated with or controlled by groundwater withdrawals in the basin. Another documented cause of subsidence in Orange County unrelated to groundwater basin utilization is oil extraction along the coast, particularly in Huntington Beach (Morton et al., 1976).

Ground surface elevations rise and fall due to groundwater conditions in the OCWD Management Area, and there is no indication of widespread irreversible lowering of the ground surface. Storage conditions in the groundwater basin were at historical lows in the mid-1950s, but since this time OCWD has operated the groundwater basin within a storage range above this historical low. There are reports that some subsidence may have occurred before OCWD began refilling the groundwater basin in the late 1950s (Morton, et al., 1976); however, the magnitude and scope of this subsidence is uncertain, and it is not clear if this subsidence was permanent. As such, there is no evidence of permanent, inelastic land subsidence in the OCWD Management Area (see Section 13), and future subsidence is not expected as long as OCWD continues to manage basin storage above the historic low observed in the late 1950s.

3.3.4 Groundwater/Surface Water Interactions and Groundwater Dependent Ecosystems

Frequent and destructive flooding of the Santa Ana River in Orange County was the impetus for construction of Prado Dam in 1941. Prior to the construction of flood control facilities, the banks of the Santa Ana River naturally overflowed periodically and flooded broad areas of Orange County. Coastal marshes were inundated during winter storms, and the mouth of the river moved both northward and southward of its present location. In the days before flood control, surface water naturally percolated into the groundwater basin, replenishing groundwater supplies.

Subsequent flood protection efforts included construction of levees along the river and concrete-lined bottoms along portions of the river. Flood risk was reduced, increased pumping of groundwater lowered water levels, and low-lying areas were filled in and/or equipped with drains, pumps and other flood control measures to allow for urban development. Since at least the 1950s, groundwater levels throughout the OCWD Management Area have been low enough that the rising and lowering of groundwater levels do not impact surface water flows or ecosystems.

Although it is outside the OCWD Management Area (within the Santa Ana Canyon Management Area described later), it is noted that from Prado Dam to Imperial Highway, the wide soft-bottomed Santa Ana River channel supports riparian habitat. Riparian habitat is dependent on river water released through Prado Dam, which is predominantly treated wastewater discharged in the upper watershed when storm flow is not present. In aggregate, this stretch is generally considered to be in equilibrium between surface water and groundwater based on available stream gage and groundwater level data, although some infiltration may occur due to minor groundwater pumping in the Santa Ana Canyon Management Area.

As the Santa Ana River enters the OCWD Management Area, from Imperial Highway to 17th Street in Santa Ana, there is minimal riparian habitat, and the river is a losing reach with engineered facilities to infiltrate surface water into the groundwater basin. OCWD conducts recharge operations within the soft-bottomed river channel except for a portion of the river where the Riverview Golf Course occupies the river channel. The river levees are constructed of either rip-rap or concrete.

From 17th Street to near Adams Avenue in Costa Mesa, the river channel is concrete-lined for flood control with vertical to sloping concrete side walls and a concrete bottom. From Adams Avenue to the coast, the channel has vertical concrete side walls or rip-rap for flood control and a soft bottom. Estuary conditions within the concrete channel exist at the mouth of the river where the ocean encroaches at high tide. The tidal prism extends from the ocean approximately three miles inland to the Adams Avenue Bridge.

There are no surface water bodies within the boundaries of the OCWD Management Area that are dependent on groundwater. Therefore, there are no groundwater-dependent ecosystems in the OCWD Management Area.

Some areas in the basin experience relatively high groundwater levels due to perched groundwater where shallow groundwater is impeded from flowing into deeper groundwater by a layer of low-permeable clay or silt, known as an aquitard. Except in very low-lying areas near sea level, the high groundwater is not close enough to the surface to support hydrophilic vegetation. OCWD carefully monitors water levels in the vicinity of the Talbert Seawater Barrier in order to maintain injection well rates to assure that groundwater levels do not rise to levels that could threaten urban infrastructure.

SECTION 4 WATER BUDGET

OCWD developed a hydrologic budget (inflows and outflows) for the purpose of constructing a basin-wide groundwater flow model, (Basin Model) and for evaluating basin production capacity and recharge requirements. The key components of the budget include measured and unmeasured (estimated) recharge, groundwater production, and subsurface flows along the coast and across the Orange County/Los Angeles County line. Because the basin is not operated on an annual safe-yield basis, the net change in storage in any given year may be positive or negative; however, over the long-term, the basin is operated within the established operating range. The components of the water budget are described below. OCWD's water year (WY) begins on July 1 and ends on June 30.

4.1 WATER BUDGET COMPONENTS

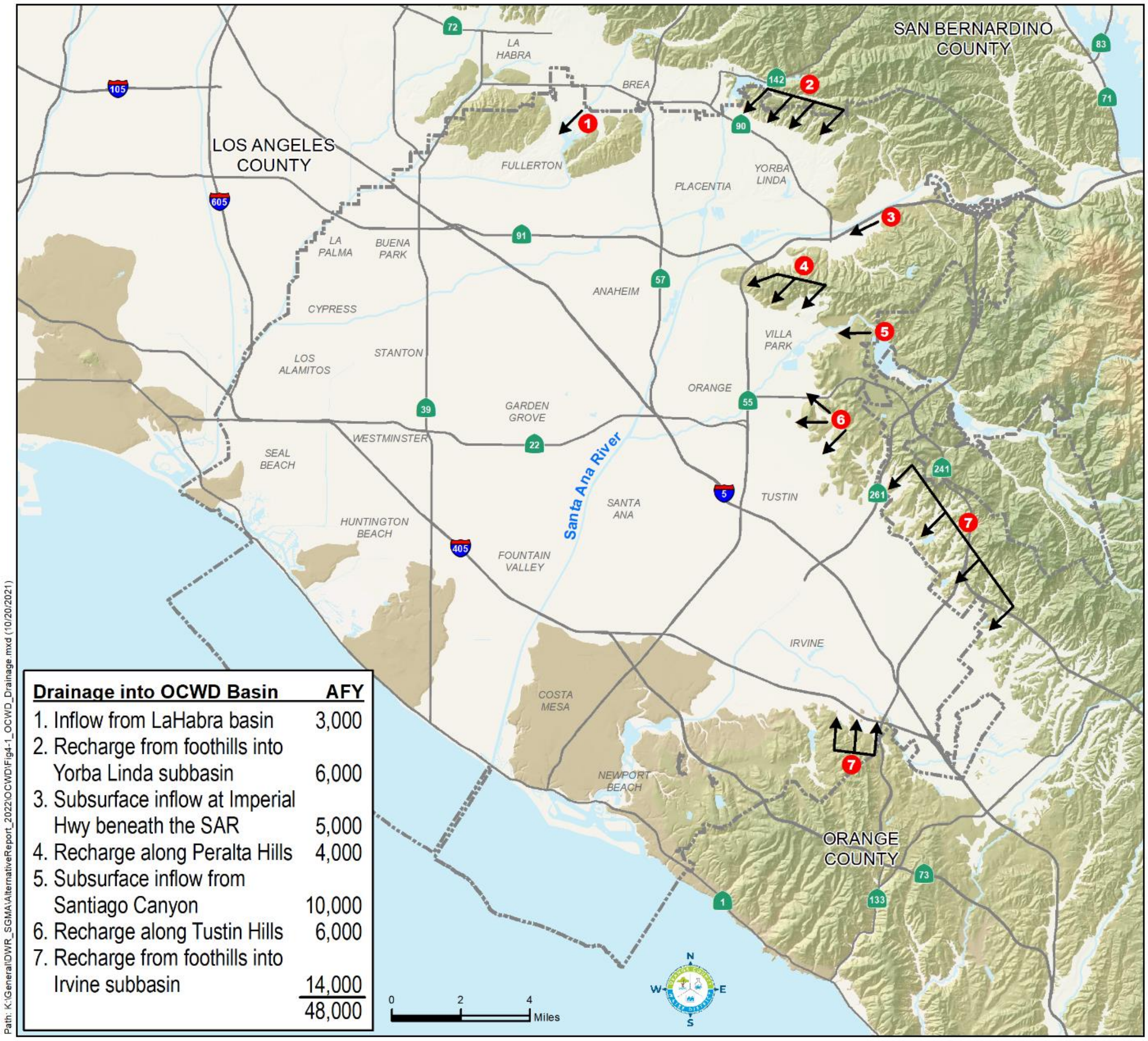
4.1.1 Measured Recharge

Measured recharge consists of all water artificially recharged at OCWD's surface water recharge facilities, water injected in the Talbert and Alamitos Barriers, and water injected in the Mid-Basin Injection wells. The majority of measured recharge occurs in the District's surface water system, which receives Santa Ana River baseflow and storm flow, GWRS water, and imported water.

4.1.2 Unmeasured Recharge

Unmeasured recharge also referred to as "incidental recharge" accounts for a significant amount of the basin's recharge, particularly in wet periods. This includes recharge from precipitation, irrigation return flows, urban runoff, seawater inflow through the gaps as well as subsurface inflow at the basin margins along the Chino, Coyote, and San Joaquin hills and the Santa Ana Mountains, and beneath the Santa Ana River and Santiago Creek. Subsurface inflow beneath the Santa Ana River and Santiago Creek refers to groundwater that enters the basin at the mouth of Santa Ana Canyon and in the Santiago Creek drainage below Villa Park Dam. Estimated average subsurface inflow to the basin is shown in Figure 4-1.

OCWD has estimated total unmeasured recharge, sometimes referred to as "incidental recharge," between 20,000 and 160,000 acre-feet per year. Net unmeasured recharge is the amount of unmeasured recharge remaining in the basin after accounting for underflow losses to Los Angeles County and relatively minor groundwater inflows/outflows at the coastal gaps. Under average hydrologic conditions, net incidental recharge averages 66,000 acre-feet per year. This average was substantiated during calibration of the Basin Model and is also consistent with the estimate of 58,000 acre-feet per year reported by Hardt and Cordes (1971) as part of a USGS modeling study of the basin. Because unmeasured recharge is one of the least understood components of the basin's water budget, the error margin for any given year is likely in the range of 10,000 to 20,000 acre-feet. Since unmeasured recharge is well distributed throughout the basin, the physical significance (e.g., water level drawdown or mounding in any given area) of overestimating or underestimating the total recharge volume within this error margin is considered to be minor.



Drainage into OCWD Basin	AFY
1. Inflow from LaHabra basin	3,000
2. Recharge from foothills into Yorba Linda subbasin	6,000
3. Subsurface inflow at Imperial Hwy beneath the SAR	5,000
4. Recharge along Peralta Hills	4,000
5. Subsurface inflow from Santiago Canyon	10,000
6. Recharge along Tustin Hills	6,000
7. Recharge from foothills into Irvine subbasin	14,000
	48,000

Figure 4-1: Estimated Subsurface Inflow

4.1.3 Groundwater Production

Entities that produce groundwater within the OCWD Management Area include major groundwater producers and small groundwater producers. Ninety-eight percent of groundwater production within Basin 8-1 occurs within the OCWD Management Area. The major groundwater producers include cities, water districts and a private water company that account for approximately 97 percent of the total basin production. These 19 major producers operate approximately 200 large-system wells. Small groundwater producers include entities that typically produce less than 500 acre-feet per year. These include small mutual water companies, agricultural companies, golf courses, cemeteries (irrigation wells), and private-well owners. Groundwater pumping for agricultural irrigation use accounts for less than one percent of total basin production.

4.1.4 Subsurface Outflow

Groundwater outflow from the basin across the Los Angeles County/Orange County line has been estimated to range from approximately 1,000 to 14,000 acre-feet per year based on groundwater elevation gradients and aquifer transmissivity (DWR, 1967; McGillicuddy, 1989). The Water Replenishment District of Southern California (WRD) also has estimated underflow from Orange County to Los Angeles County within the aforementioned range. Groundwater outflow cannot be directly measured and is accounted for in the basin water budget within the net unmeasured recharge described above. Modeling by OCWD indicates that underflow to Los Angeles County increases by approximately 7,500 acre-feet per year for every 100,000 acre-feet of increased groundwater in storage in Orange County, given the assumption that groundwater elevations in Los Angeles County remain constant.

Recent updates to the OCWD groundwater model show that subsurface outflow averaged approximately 13,000 acre-feet per year during the period 1991 to 2017 with a range of 5,000 to 25,000 acre-feet per year. Due to differences in model-estimated inter-basin groundwater flows, OCWD and WRD are jointly conducting a study to evaluate OCWD’s Basin Model and WRD’s groundwater model of Central Basin in Los Angeles County constructed by the USGS. The goal is to improve each model’s ability to more closely represent local groundwater conditions and thereby more accurately estimate inter-basin groundwater flows.

With the exception of unknown amounts of semi-perched (near-surface) groundwater being intercepted and drained by submerged sewer trunk lines and unlined flood control channels along coastal portions of the basin, no other significant basin outflows are known to occur.

4.1.5 Evaporation

The total wetted area of the District’s recharge system is over 1,000 acres. OCWD estimates the evaporation from this system on a monthly basis. Generally, total evaporation is on the order of 2,000 acre-feet per year which is approximately one percent of the total volume recharged annually. The relatively minor impact of evaporation reflects moderate temperatures in the region and high percolation rates (1 to 10 feet per day).

4.2 WATER YEAR TYPE

As explained previously, OCWD manages groundwater pumping and basin storage over the long-term, which includes wet and dry years. Basin storage levels from WY1957-58 to 2020-21 are shown in Figure 1-3. Typically, basin storage levels increase during wet periods and decrease during dry periods. Operating the basin within the operating range provides for maximum basin production while preventing significant and unreasonable undesirable results.

4.3 ESTIMATE OF SUSTAINABLE YIELD

Even though the groundwater basin contains an estimated 66 million acre-feet when full, OCWD operates the basin within an operating range of up to 500,000 acre-feet below full condition to protect against seawater intrusion, inelastic land subsidence, and other potential undesirable results. On a short-term basis, the basin can be operated at an even lower storage level in an emergency.

OCWD manages groundwater production and recharge to maintain groundwater storage levels within the established operating range. In this sense, the basin's sustainable yield can be defined as the volume of groundwater production that can be sustained while maintaining groundwater in storage within the operating range. Basin storage is determined on an annual basis by calculating the difference between groundwater production and recharge based on OCWD's July 1 to June 30 water year.

The sustainable yield of the basin is a function of the amount of groundwater recharge from OCWD's managed aquifer recharge program and natural recharge as a result of precipitation and percolation of irrigation flows. The process that determines a sustainable level of pumping on an annual basis considers the basin's operating range, basin storage conditions and the amount of available recharge water supplies.

As mentioned in Section 1.2, the groundwater basin is not operated on an annual safe-yield basis. The net change in storage in any given year may be positive or negative; however, over a period of several years, the basin is maintained in an approximate balance. Amounts of total basin production and total water recharged from WY1999-2000 to 2020-21 are shown in Figure 1-4.

4.4 WATER BUDGETS

The OCWD Management Area water budget for WY2016-17 to 2020-21 is presented in Table 4-1. Estimated water budgets for dry years, average years and wet years as well as a future projected budget are presented in the 2017 Alternative.

Table 4-1 Water Budget, WY2016-17 to 2020-21

FLOW COMPONENT	2016-17	2017-18	2018-19	2019-20	2020-21
INFLOW					
Santa Ana River baseflow	70,000	65,400	98,000	74,500	76,400
Santa Ana River stormflow	65,400	24,100	63,700	79,500	36,600
Recycled Water (GWRS/Alamitos Barrier)	98,000	106,400	97,200	99,700	101,700
Imported Water	50,400	66,100	40,300	18,100	0
Net Estimated Unmeasured or Incidental Recharge*	67,900	26,200	45,600	41,400	19,100
TOTAL INFLOW:	351,700	288,200	344,800	313,200	233,800
OUTFLOW					
Groundwater Production	300,700	237,200	303,800	277,200	281,800
TOTAL OUTFLOW:	300,700	237,200	303,800	277,200	281,800
CHANGE IN STORAGE:	51,000	51,000	41,000	36,000	(48,000)

SECTION 5 WATER RESOURCE MONITORING PROGRAMS

5.1 OVERVIEW

Water resource monitoring programs can be categorized into groundwater, surface water, and recycled and imported water programs. These programs are summarized in Table 5-1 in the 2017 Alternative. The only change is related to the termination of CASGEM, which is being replaced by annual reporting required by SGMA.

5.2 GROUNDWATER MONITORING PROGRAMS

OCWD collects samples and analyzes water elevation and water quality data from approximately 400 District-owned monitoring wells (shown in Figure 5-1) and at over 250 privately-owned and publicly-owned large and small system drinking water wells that are part of OCWD’s Title 22 program, shown in Figure 5-2. OCWD also has access agreements to sample a number of non-District-owned monitoring wells and privately-owned irrigation, domestic and industrial wells, shown in Figure 5-3. New wells constructed in the last five years are highlighted in these figures. Inactive wells are included in District monitoring programs when feasible. An inactive well is defined as a well that is not currently being routinely operated. The number and location of wells that are sampled change regularly as new wells come online and old ones are abandoned and destroyed.

The District collects, stores, and uses data from wells owned and sampled by other agencies. For example, data collected by the WRD from wells in Los Angeles County along the Orange County boundary are part of the network of wells evaluated to determine annual groundwater elevations and are used for basin modeling. Also included in OCWD’s monitoring network are wells that are owned and operated by the U.S. Navy for remediation of contamination plumes in the cities of Irvine, Seal Beach and Tustin, and wells that are related to operation of the Alamitos Barrier that are located in Los Angeles County. Los Angeles County wells are also used to model the Orange County groundwater basin as groundwater flow is unrestricted across the county line.

Wells sampled under various monitoring programs change in response to fluctuations in the number of available wells, basin conditions, observed water quality, and regulatory and non-regulatory requirements. Appendix A of the 2017 Alternative presented a comprehensive list of all wells in OCWD’s database. This list included well name, owner, type of well, casing sequence number, depth, screened interval, and aquifer zone monitored, when known.

In some cases, well depth and screened intervals are listed in the database as unknown. OCWD maintains data on these wells when water quality or elevation data continues to be collected by the owner or operator. OCWD uses data from these wells in monitoring programs, for groundwater modeling, or for other basin programs. Wells on the list also include inactive wells when water quality or water elevation data continues to be collected or the data is utilized in one or more current basin programs. Groundwater elevation and monthly production data are used to quantify total basin pumping, evaluate seasonal groundwater level fluctuations and assess basin storage conditions.

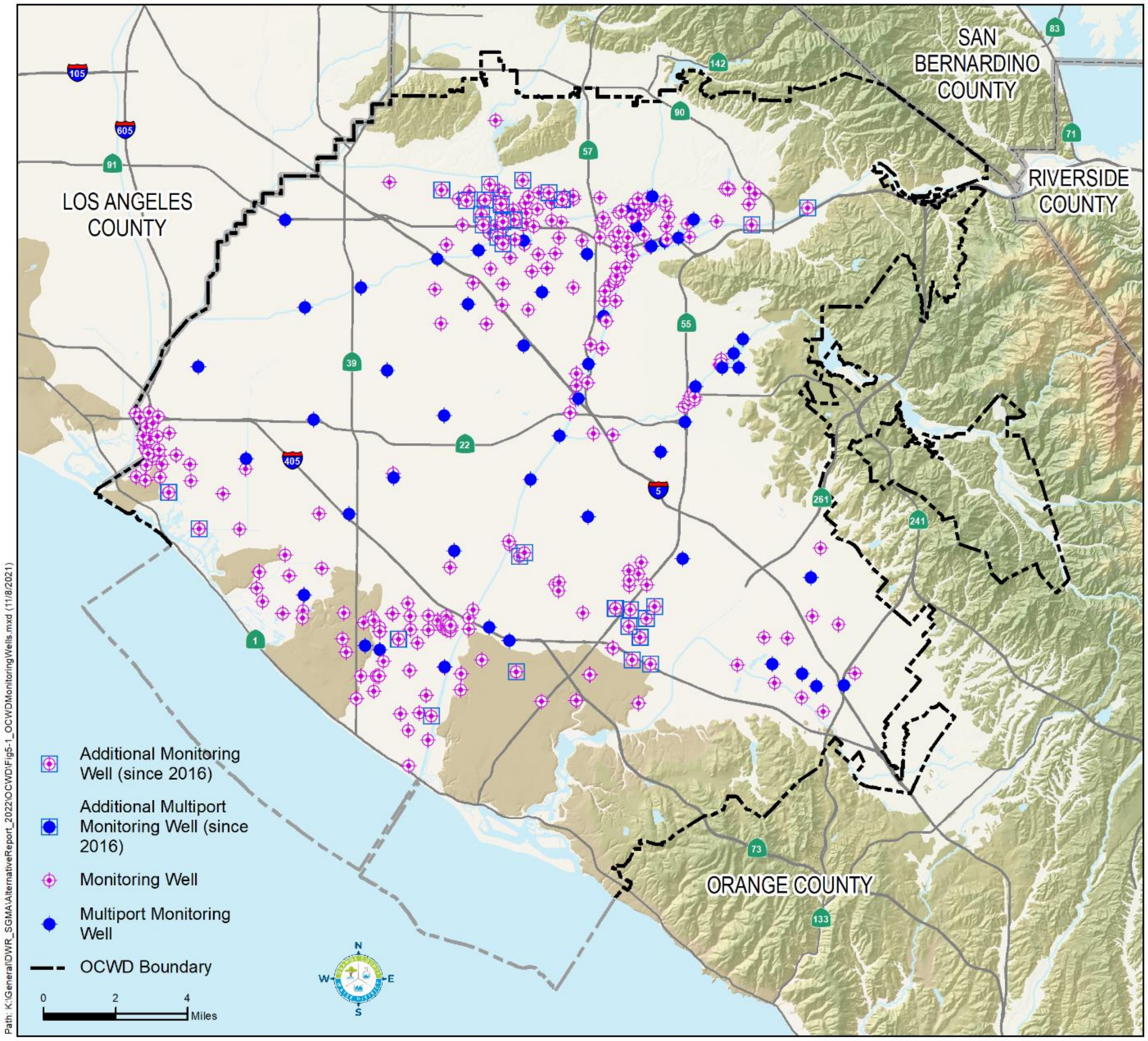


Figure 5-1: OCWD Monitoring Wells

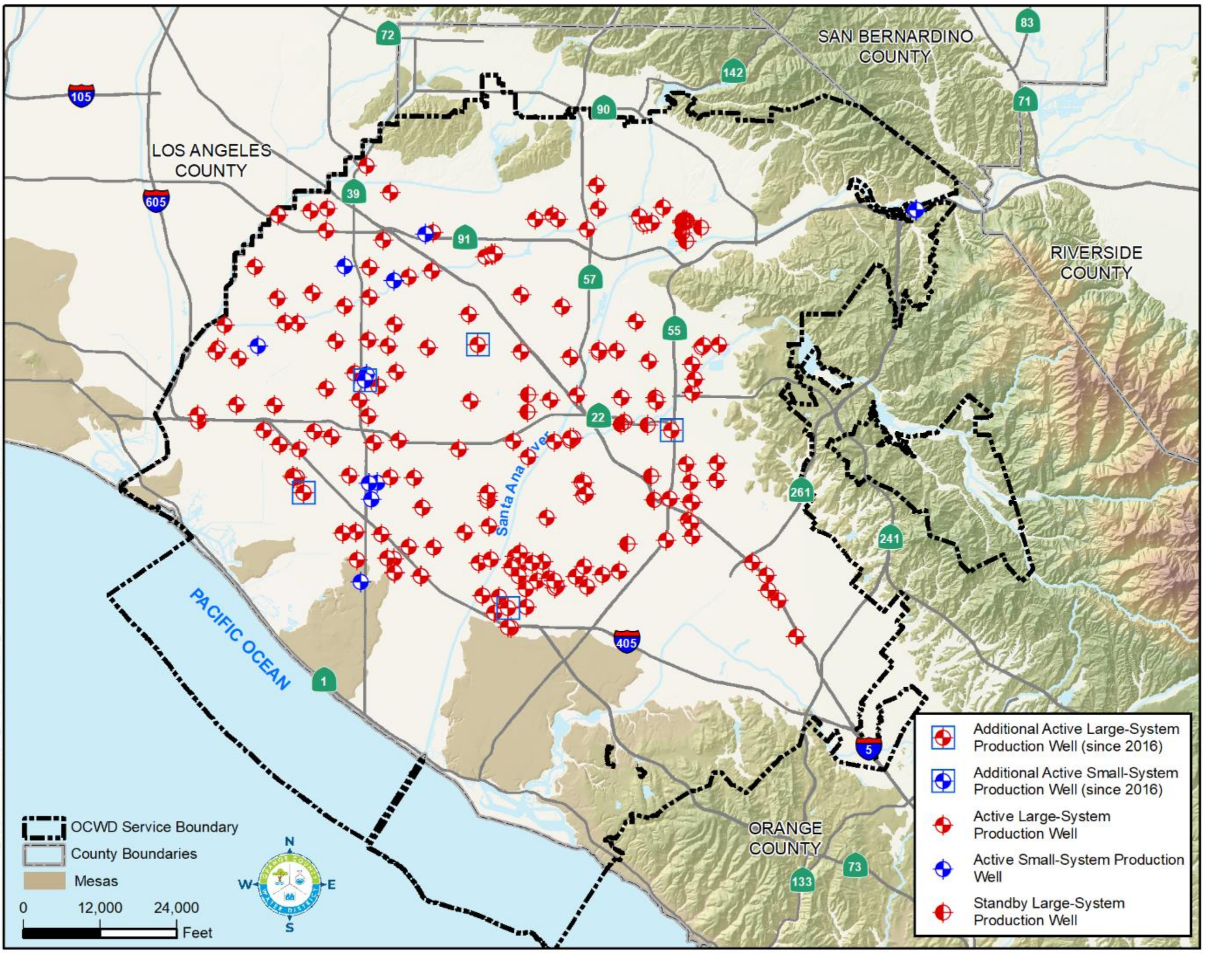


Figure 5-2: Large and Small System Drinking Water Wells in Title 22 Monitoring Program

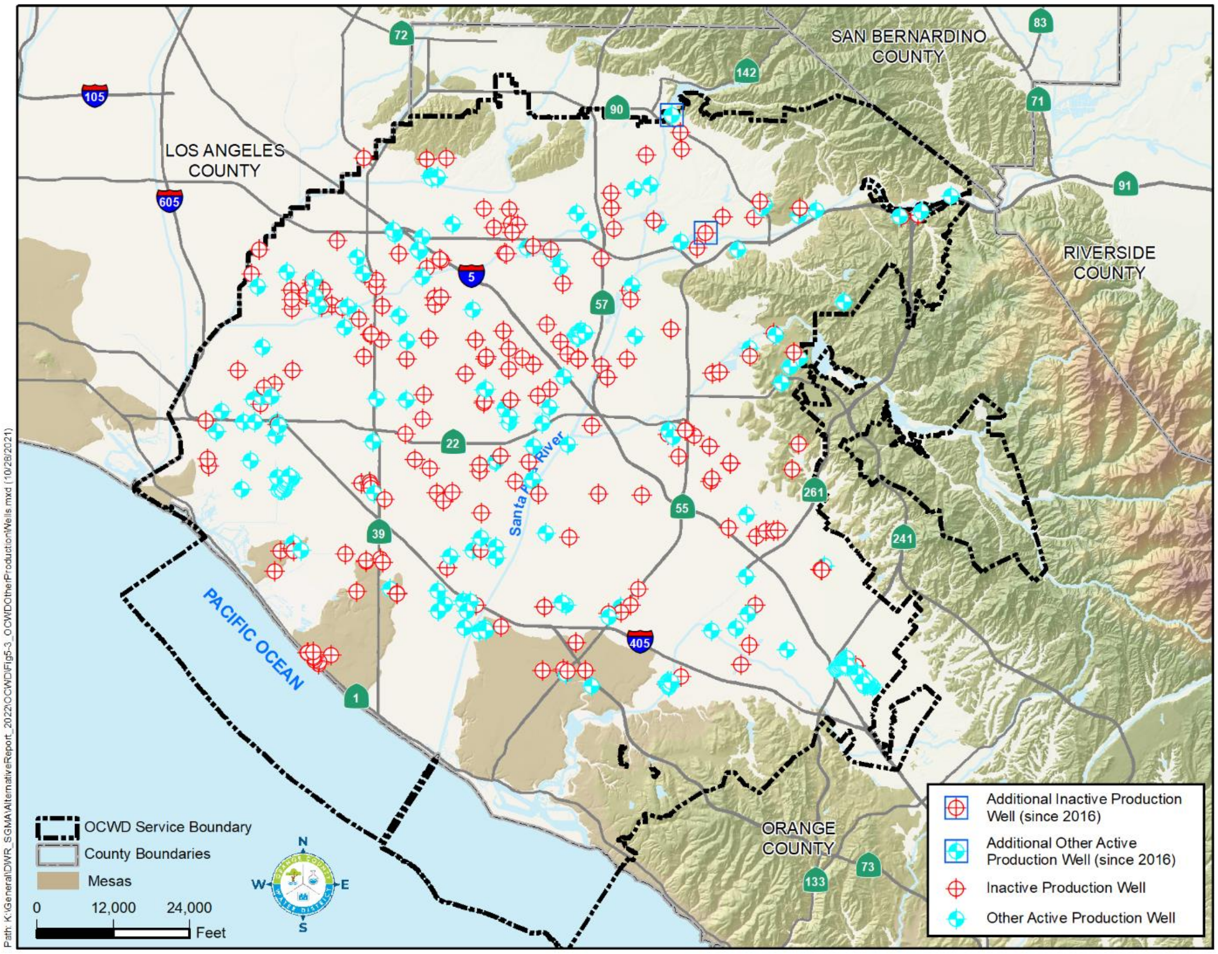


Figure 5-3: Private Domestic, Irrigation and Industrial Wells in OCWD Monitoring Program

5.2.1 Groundwater Production Monitoring

All entities that pump groundwater from the basin are required by the OCWD District Act to report production every six months and pay a Replenishment Assessment. Owners or operators of wells with discharge outlets of two inches in diameter or less and supply an area of no more than one acre pay an annual flat fee as the Replenishment Assessment and do not have to report their production.

Approximately 200 large-capacity production wells owned by 19 major water retail agencies account for ninety-seven percent of production. Large-capacity well owners voluntarily report monthly groundwater production for each of their wells. The production volumes are verified by OCWD field staff. Production data are used to evaluate basin conditions, calculate and manage basin storage, run groundwater model scenarios, and collect revenues.

5.2.2 Groundwater Elevation Monitoring

Production and monitoring wells in the basin are measured for groundwater elevation at varying intervals, as explained below:

- Water elevation measurements are collected for every OCWD monitoring well at least once a year with most wells measured at least monthly;
- Monitoring of production wells is typically monthly but may vary depending on operational status, well maintenance, abandonment, new well construction, and related factors;
- Over 1,000 individual measuring points are monitored for water levels on a monthly or bi-monthly basis to evaluate short-term effects of pumping, recharge or injection operations; and
- Additional monitoring is done as needed in the vicinity of OCWD's recharge facilities, seawater barriers, and areas of special investigation where drawdown, water quality impacts or contamination are of concern.

Beginning in 2011, OCWD began reporting seasonal groundwater elevation measurements to DWR as part of the CASGEM program. The monitoring well network developed for the CASGEM program provide a detailed and representative data set, both spatially and temporally. The initial network established in 2011 consisted of a total of 77 monitoring stations distributed laterally and vertically throughout the groundwater basin. Most of the wells are owned by OCWD and have detailed borehole geologic logs and downhole geophysical logs.

In 2021, DWR instructed agencies that submitted an Alternative to begin submitting data to the SGMA portal. As a result, CASGEM data was incorporated into annual data submittals required for SGMA compliance. For the 2022 Update, OCWD reviewed the CASGEM network and updated it, primarily in removing wells that were no longer accessible, and changed the name to the SGMA Monitoring Well Network.

Figures 5-4 to 5-6 present the monitoring well locations for each of the three aquifer systems. The SGMA network includes wells within the OCWD, La Habra-Brea, Santa Ana Canyon, and Southeast Management Areas. The City of La Habra Groundwater Sustainability Agency will be reporting water levels from the La Habra Management Area separately. Two wells monitored by the Irvine Ranch Water District (IRWD) that are located in the Southeast Management area, IRWD-LA1 and IRWD-LA4 (Figure 5-5) are included in the SGMA reports that OCWD will submit to DWR.

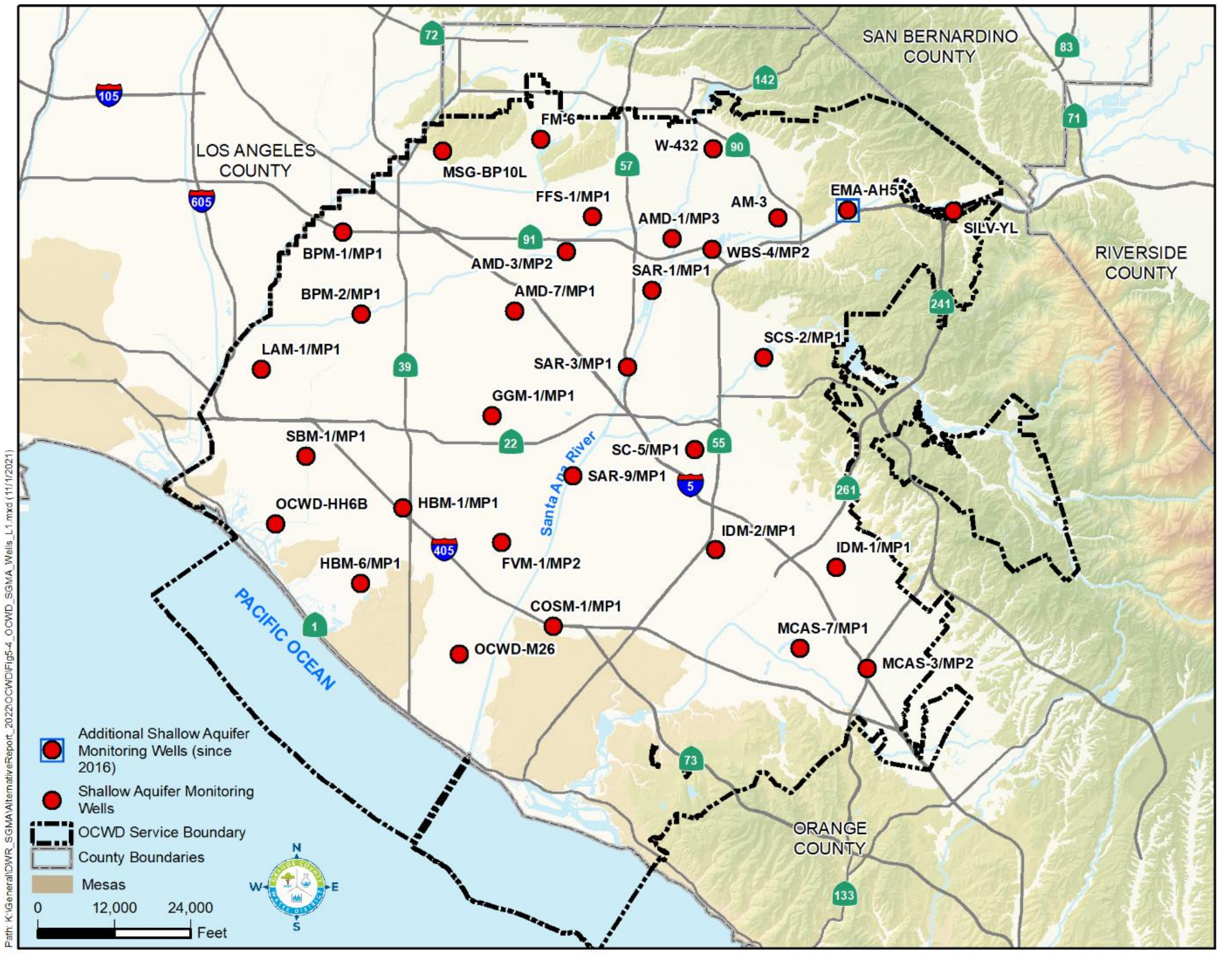


Figure 5-4: SGMA Shallow Aquifer System Monitoring Well Network

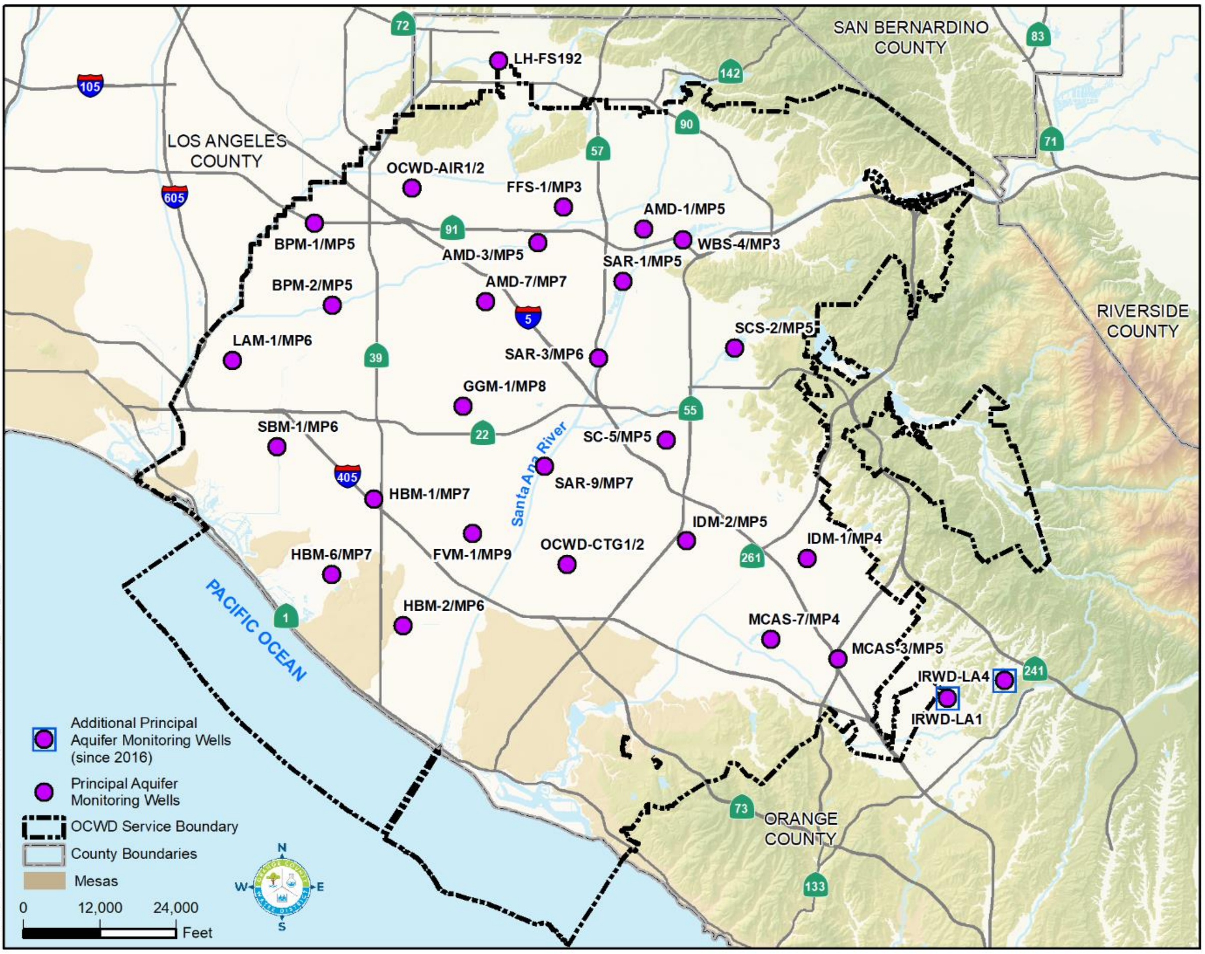


Figure 5-5: SGMA Principal Aquifer System Monitoring Well Network

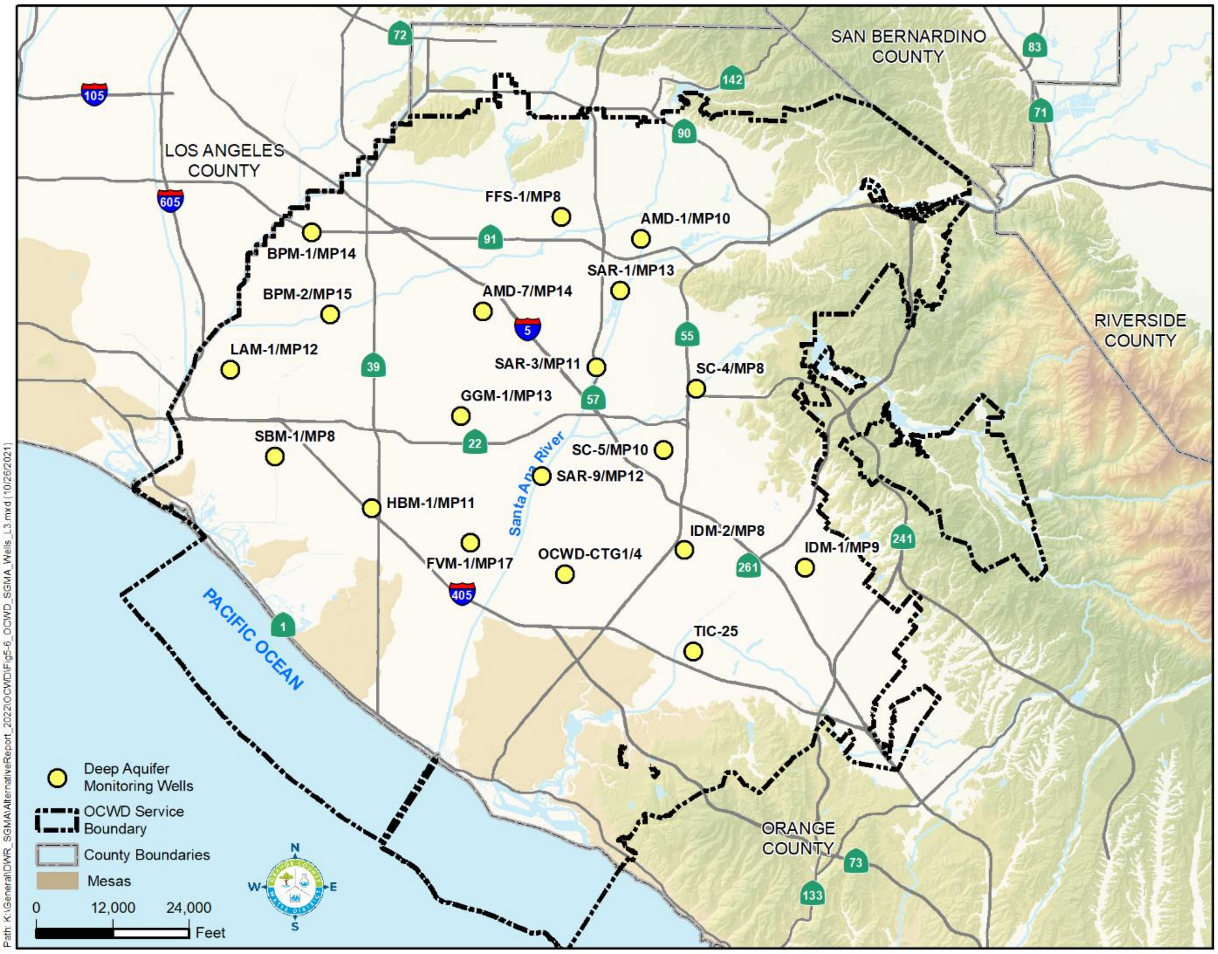


Figure 5-6**:** SGMA Deep Aquifer System Monitoring Well Network

5.2.3 Groundwater Quality Monitoring

OCWD monitors water quality in production wells on behalf of the groundwater producers for compliance with state and federal drinking water regulations. Samples are analyzed for more than 100 regulated and unregulated chemicals at frequencies established by regulations from the DDW and EPA. Over 425 monitoring and production wells are sampled semi-annually to assess water quality conditions during periods of lowest (winter) and peak production (summer).

The total number of water samples analyzed varies year-to-year due to regulatory requirements, conditions in the basin and applied research and/or special study demands. In 2020, OCWD water quality staff collected 15,496 samples, 4,139 of which were collected from drinking water wells.

OCWD developed specific programs to monitor the North Basin and South Basin plumes \\as described in the 2017 Alternative. Several new monitoring wells were constructed within the last five years for the North Basin and South Basin plume areas as shown on Figures 5-7 and 5-8.

Continual monitoring of groundwater near the coast is done to assess the effectiveness of the Alamitos and Talbert Barriers and track salinity levels in the Bolsa and Sunset Gaps. Key groundwater monitoring parameters used to determine the effectiveness of the barriers include water level elevations, chloride, TDS, electrical conductivity, and bromide. Groundwater elevation contour maps for the aquifers most susceptible to seawater intrusion are prepared to evaluate whether the freshwater mound developed by the barrier injection wells is sufficient to prevent the inland movement of saline water.

OCWD's extensive network of monitoring wells within the groundwater basin includes concentrated monitoring along the seawater barrier and near the recharge basins. GWRS-related monitoring wells in the vicinity of Kraemer, Miller, La Palma and Miraloma basins are used to measure water levels and to collect water quality samples. In addition to ensuring the protection of water quality, these wells have been used to determine travel times from recharge basins to production wells.

Permits regulating operation of GWRS require adherence to rigorous product water quality specifications, extensive groundwater monitoring, buffer zones near recharge operations, reporting requirements, and a detailed treatment plant operation, maintenance and monitoring program. GWRS product water is monitored daily, weekly, and quarterly for general minerals, metals, organics, and microbiological constituents. Focused research-type testing has been conducted on organic contaminants and selected microbial species.

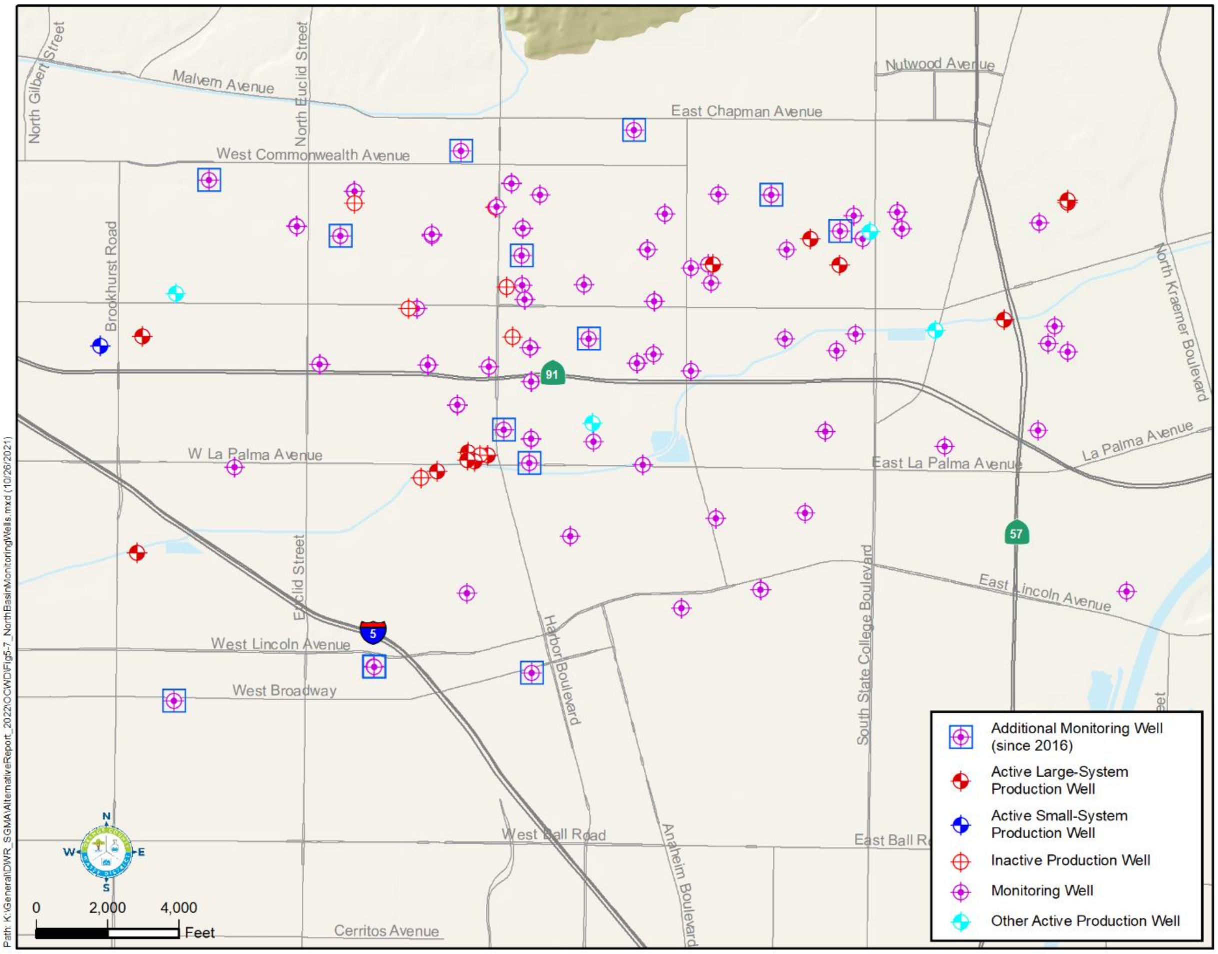


Figure 5-7: North Basin Groundwater Protection Program Monitoring Wells

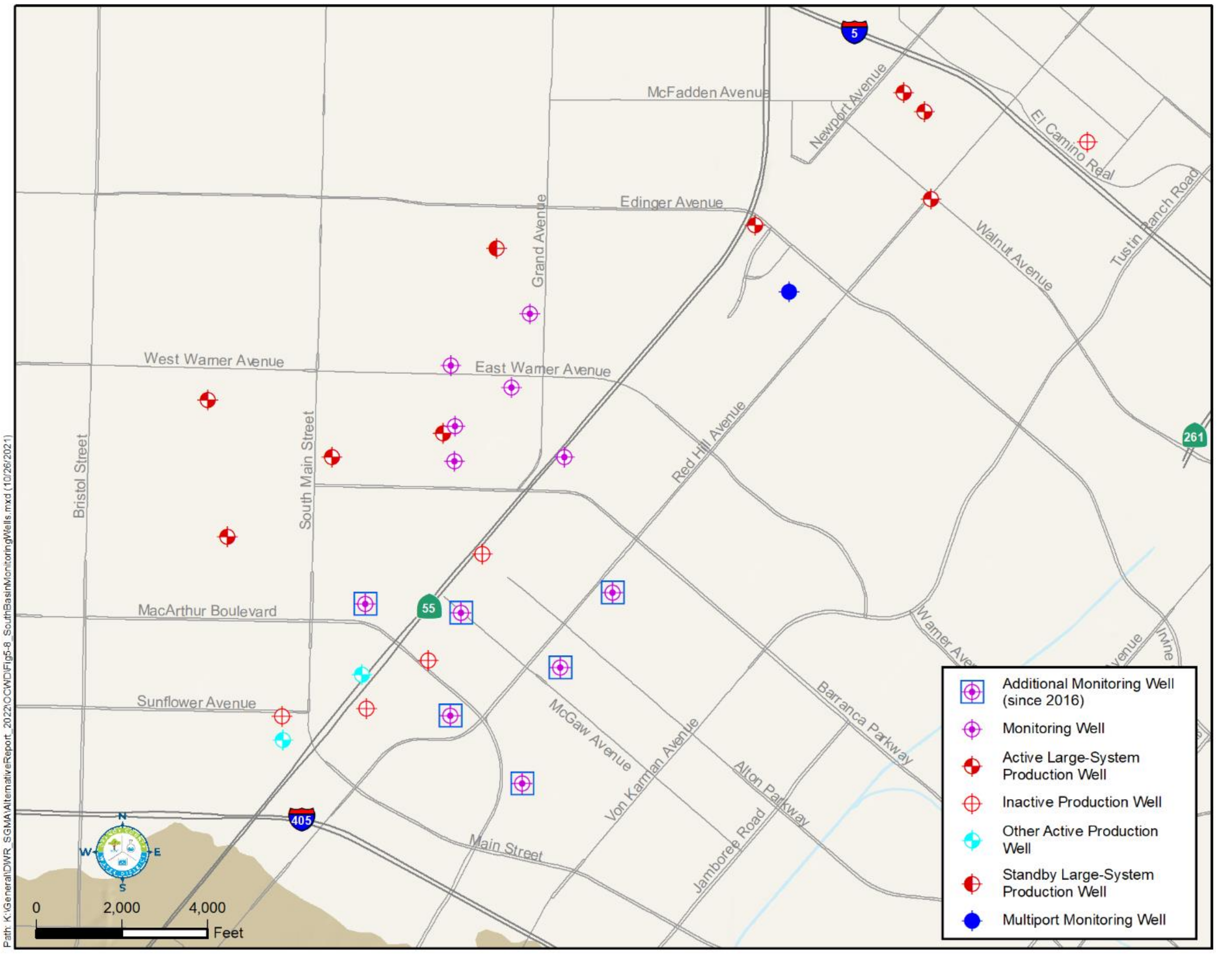


Figure 5-8: South Basin Groundwater Protection Program Monitoring Wells

5.2.4 Coastal Area Monitoring

OCWD operates and maintains a network of coastal area monitoring wells that provide water level and water quality data that allow staff to evaluate the performance of seawater intrusion barriers and to identify potential intrusion in coastal areas. The monitoring well network has been expanded and improved over time based on new information and a greater understanding of the basin hydrogeology.

Approximately 200 monitoring and production well sites are monitored for groundwater levels and quality within a 4- to 5- mile area from the coast, generally seaward or south of the 405 freeway, as shown in Figure 5-9. The monitoring wells are largely located in the coastal gaps as well as on the coastal mesas. The mesas are not impermeable features; rather, the marine deposition Pleistocene aquifers extend beneath the mesas to the basin production wells and provide potential avenues for seawater intrusion.

OCWD conducts the groundwater monitoring for the majority of the monitoring wells with the exception of the Alamitos Barrier monitoring wells. The Alamitos Seawater Intrusion Barrier is located along the border of Los Angeles and Orange counties and is jointly owned by OCWD and Los Angeles County Public Works (LACPW). LACPW operates, maintains, and samples Alamitos Barrier monitoring and injection wells, including those owned by OCWD located within Orange County. Through an interagency cooperative agreement dating to 1964, operational costs and data are shared between the two agencies with a joint report on the status of the barrier prepared on an annual basis.

Most of the monitoring wells shown in Figure 5-9 are owned by OCWD and are either single-point or nested. Single-point monitoring wells have one screened interval in one targeted aquifer zone, while nested wells have multiple (2 to 6) casings within the same borehole, with each casing screened in a separate aquifer zone at a discrete depth. A handful of OCWD monitoring wells in the coastal area are Westbay multi-port type, having only one well casing but with multiple monitoring ports each separated by inflatable packers. Therefore, although there are approximately 200 monitoring and production well sites in the coastal groundwater monitoring program, there are over 430 individual sampling points.

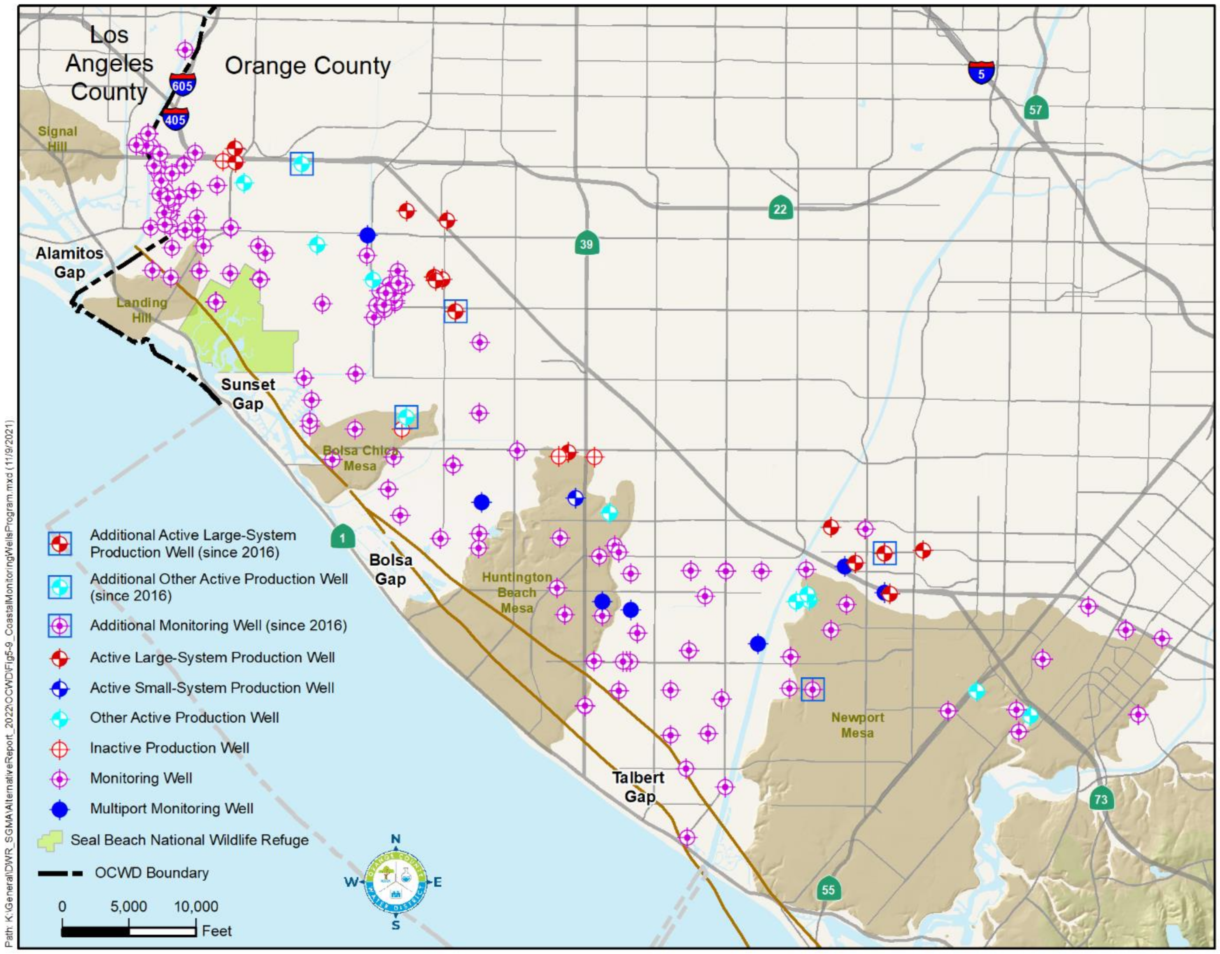


Figure 5-9: Seawater Intrusion Monitoring Wells

In addition to OCWD monitoring wells, there are a few privately owned monitoring wells and active municipal production wells included in OCWD's coastal monitoring program. For example, in Sunset Gap there are a few monitoring wells owned by The Boeing Company (Boeing) related to a shallow VOC plume in the area; Boeing monitors these wells twice a year (groundwater levels and VOCs), and OCWD obtains split samples with Boeing for seawater intrusion monitoring. The retail water agency production wells in the coastal monitoring program include three wells inland of the Alamitos Barrier (City of Seal Beach and Golden State Water Company) and three wells just inland of Sunset Gap (City of Huntington Beach). A complete list of all wells in the coastal groundwater monitoring program, along with their screened interval depths, was presented in Appendix A of the 2017 Alternative.

Groundwater levels are measured bi-monthly (every 2 months) at the majority of coastal monitoring wells and nearly all of the coastal monitoring wells are sampled semi-annually (March and September) for key groundwater quality parameters to assess seawater intrusion and barrier operations. Key groundwater quality parameters analyzed for the coastal monitoring program include chloride, bromide, and electrical conductivity (EC), which is a surrogate for TDS. The EC is typically measured both in the field at the time of sampling and in the laboratory.

Dissolved chloride concentrations and EC are used both to track seawater intrusion and to trace the injection of purified recycled water at the barriers, especially the Talbert Barrier in which the injection supply consists of 100 percent recycled water having a much lower salinity signal than native fresh groundwater. Chloride is considered to be a good conservative intrinsic tracer since it is relatively unaffected by sorption- and chemical-, or biological reactions in the subsurface. Bromide concentrations in brackish groundwater samples are valuable to help determine the origin or source of intrusion by evaluating the chloride to bromide ratio. Chloride to bromide ratios in the range of 280-300 in brackish coastal samples suggest relatively young active intrusion from the ocean or water body connected to the ocean, whereas lower ratios may indicate intrusion from past oil brine disposal or an influence of very old connate water from the original marine depositional process when these coastal aquifers were first formed.

5.3 SURFACE WATER AND RECYCLED WATER MONITORING

Surface water from the Santa Ana River is a major source of recharge supply for the groundwater basin. As a result, the quality of the surface water has a significant influence on groundwater quality. Therefore, characterizing the quality of the river and its effect on the basin is necessary to verify the sustainability of continued use of river water for recharge and to safeguard a high-quality drinking water supply for Orange County. Several on-going programs monitor the condition of Santa Ana River water. OCWD monitoring sites along the river and its tributaries are shown in Figure 5-10.

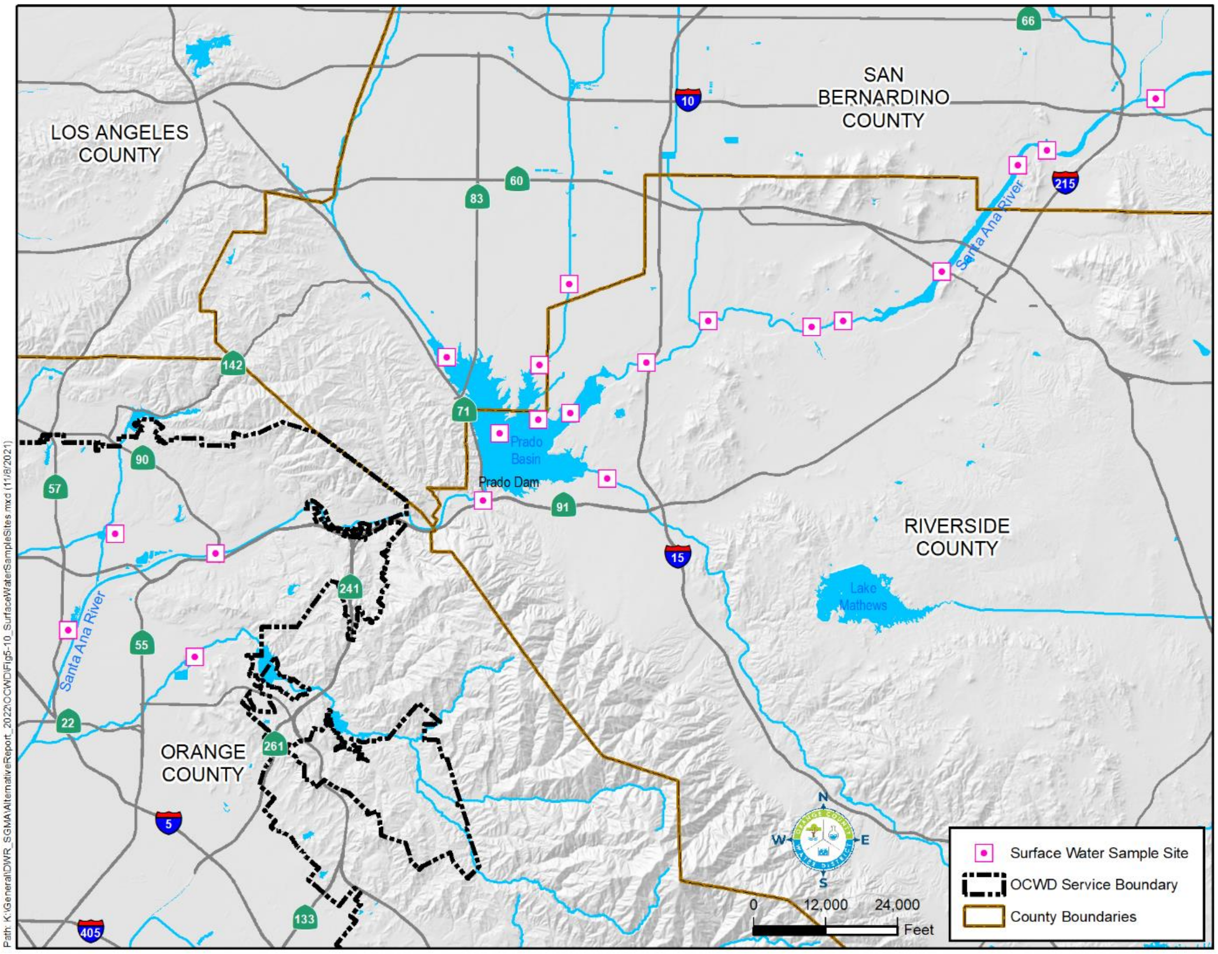


Figure 5-10**:** Surface Water Monitoring Locations

5.3.1 Surface Water Monitoring Programs

The surface water monitoring programs include:

- Santa Ana River Monitoring (SARMON) Program
- The Basin Monitoring Program Task Force (Task Force)
- Santa Ana River Watermaster
- Emerging constituents
- Imported water from MWD

Detailed descriptions of each program are contained in the 2017 Alternative.

Within the last five years, additional work has been done by the watershed-wide Emerging Constituents Monitoring Task Force administered by the Santa Ana Watershed Project Authority (SAWPA). This group was formed in 2010 to characterize emerging constituents in 1) municipal wastewater effluents, 2) the Santa Ana River at various locations, and 3) imported water. Three years of testing (2011-2013) were completed as directed by the Regional Water Board (R8-

2009-0071). OCWD monitored two sites twice a year on the Santa Ana River for this program. The SAWPA testing program was resumed voluntarily 2019, with the addition of PFAS monitoring; the program was not continued in 2020 and has been functionally replaced by the statewide PFAS Investigation Orders issued to upper watershed wastewater dischargers.

OCWD monitors for Constituents of Emerging Concern (CECs), including PFAS, at two surface water sites quarterly on the Santa Ana River and at various locations within District recharge facilities below Prado Dam. Samples are analyzed for pharmaceuticals, endocrine disruptors and other emerging constituents such as personal care products, food additives, and pesticides.

5.3.2 Recycled Water Monitoring

Use and monitoring of GWRS water is regulated by the Regional Water Board and DDW. Performance of the GWRS is monitored on a routine basis. Monitoring wells to monitor and track GWRS water are located adjacent to surface recharge basins located in Anaheim, downgradient of Mid-Basin Injection wells, and near the injection wells of the Talbert Seawater Barrier as shown on Figure 5-11. Additional details on recycled water monitoring and reporting are presented in the 2017 Alternative. Similar monitoring is performed at the WRD-owned Leo J. Vander Lans Advanced Water Treatment Facility that supplies recycled water to the Alamitos Seawater Barrier for injection.

In March 2020, OCWD's Mid-Basin Injection (MBI) Project went on-line. This project started in April 2015 with the operation of a demonstration well (MBI-1). The MBI Project is located in the city of Santa Ana, primarily at Centennial Park and injects up to 10 million gallons of GWRS water a day into the Principal Aquifer and includes four new injection wells, MBI-2, 3, 4, and 5. Additionally, a total of four nested monitoring wells were installed as part of the MBI Project to track the quality and movement of injection water prior to reaching down gradient production wells. Nested wells SAR-10 and -11 were installed downgradient of MBI-1. To track the movement of GWRS water from the four new injection wells, SAR -12 and -13 were constructed (see Figure 5-11).

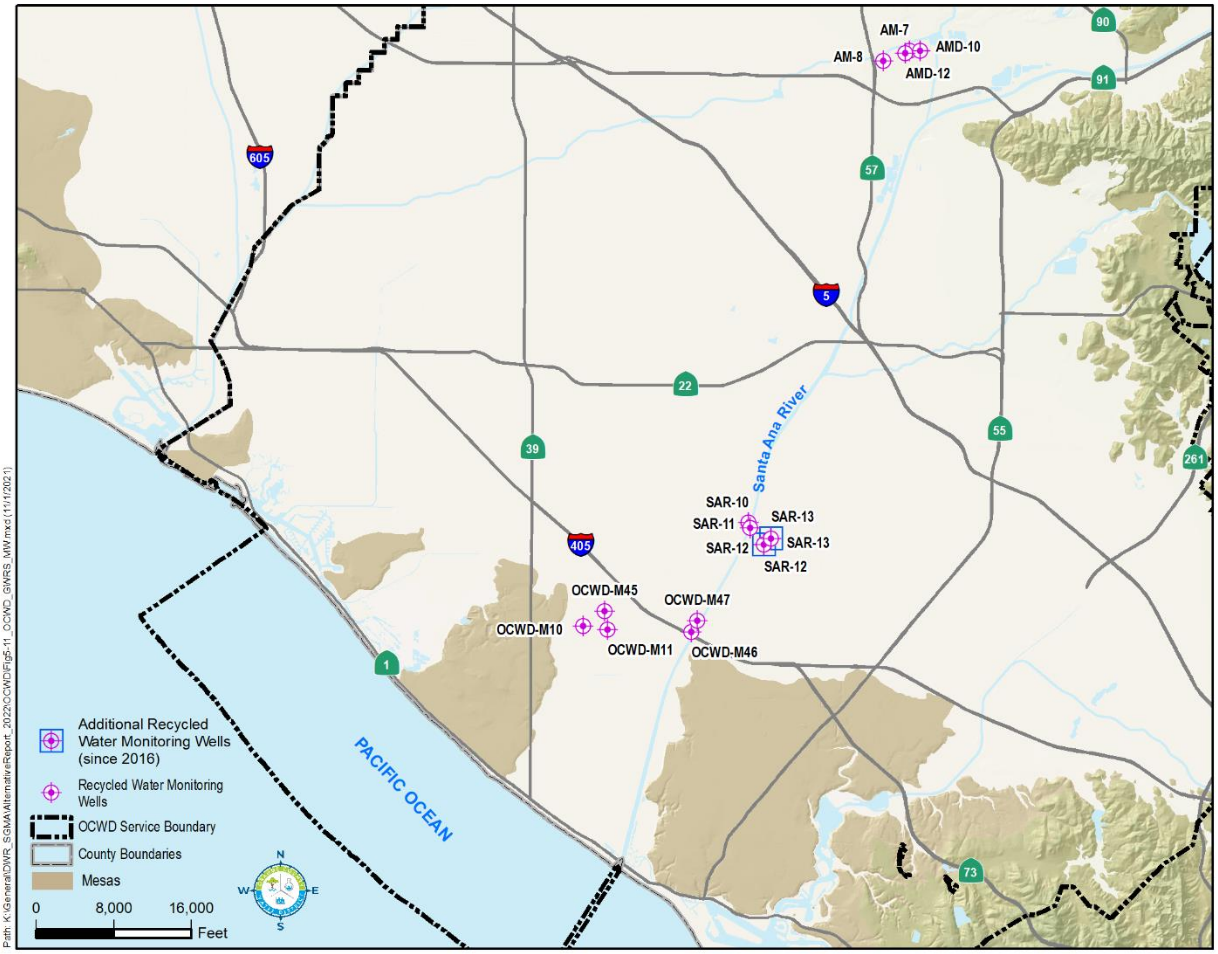


Figure 5-11: Recycled Water Monitoring Wells

SECTION 6 WATER RESOURCE MANAGEMENT PROGRAMS

6.1 LAND USE ELEMENTS RELATED TO BASIN MANAGEMENT

The OCWD Management Area is highly urbanized as shown on Figure 3-4. Monitoring potential impacts from proposed new land uses and planning for future development are key management activities essential for sustainable management of the groundwater basin.

OCWD monitors, reviews and comments on local land use plans and environmental documents such as environmental impact reports, notices of preparation, amendments to local general plans and specific plans, proposed zoning changes, draft water quality management plans, and other land development plans. District staff also review draft National Pollution Discharge Elimination System and waste discharge permits issued by the Regional Water Board. The proposed projects and programs may have elements that could cause short- or long-term water quality impacts to source water used for groundwater replenishment or have the potential to degrade groundwater resources. Monitoring and reviewing waste discharge permits provides OCWD with insight on activities in the watershed that could affect water quality.

The majority of the basin’s land area is located in a highly urbanized setting and requires tailored water supply protection strategies. Reviewing and commenting on stormwater permits and waste discharge permits adopted by the Regional Water Board for the portions of Orange, Riverside and San Bernardino counties that are within the Santa Ana River watershed are conducted by OCWD on a routine basis. These permits can affect the quality of water in the Santa Ana River and other water bodies, thereby impacting groundwater quality in the basin.

OCWD works with local agencies having oversight responsibilities on the handling, use and storage of hazardous materials; underground tank permitting; well abandonment programs; septic tank upgrades; and drainage issues. Participating in basin planning activities of the Regional Water Board and serving on technical advisory committees and task forces related to water quality are also valuable activities to protect water quality.

6.1.1 Summary of Plans Related to Basin Management

The 2017 Alternative presented a comprehensive list of plans related to basin management, including:

- Municipal Stormwater Permit
- The OC Plan which is the combined North Orange County Integrated Regional Water Management Plan (IRWM), Central Orange County IRWM, and Coastal Watershed Management Plan
- OWOW 2.0 Plan which is the IRWM Plan for the Santa Ana Watershed

- Municipal Water District of Orange County (MWDOC) 2020 Regional Urban Water Management Plan
- Municipal Water District of Orange County (MWDOC) 2016 Orange County Reliability Study

6.1.2 Land Use Development and Water Demands and Supply

Water demands within the OCWD Management Area between WY1989-90 and 2020-21 have fluctuated between approximately 367,000 and 526,000 acre-feet per year but have leveled off in the past few years to approximately 400,000 acre-feet per year as shown in Figure 1-5.

Since its founding, OCWD has grown in area from 162,676 to 243,968 acres and has experienced an increase in population from approximately 120,000 to 2.5 million people. OCWD has employed groundwater management techniques to increase the annual yield from the basin including operating over 1,000 wetted acres of infiltration basins. Annual groundwater production increased from approximately 150,000 acre-feet in the mid-1950s to a high of over 366,000 acre-feet in WY2007-08. OCWD strives to maximize production from the basin through maximizing recharge of the groundwater basin. The basin is managed within the established groundwater storage operating range independently of total regional water demands as total water demands are met by a combination of groundwater and imported water.

6.1.3 Well Construction, Management, and Closure

Well construction, management and closure are regulated by various state agencies. To comply with federal Safe Drinking Water Act requirements regarding the protection of drinking water sources, the DDW created the Drinking Water Source Assessment and Protection (DWSAP) program. Water suppliers must submit a DWSAP report as part of the drinking water well permitting process and have it approved before providing a new source of water from a new well. OCWD provides technical support to groundwater producers in the preparation of these reports.

Well construction ordinances adopted and implemented by the Orange County Health Care Agency (OCHCA) and certain municipalities follow state well construction standards established to protect water quality under California Water Code Section 231. Cities within OCWD boundaries that have local well construction ordinances and manage well construction within their local jurisdictions include the cities of Anaheim, Fountain Valley, Buena Park, and Orange. To provide guidance and policy recommendations on these ordinances, the County of Orange established the Well Standards Advisory Board in the early 1970s. The five-member appointed Board includes OCWD's Chief Hydrogeologist. Recommendations of the Board are used by the OCHCA and municipalities to enforce well construction ordinances within their jurisdictions.

A well is considered abandoned when the owner has permanently discontinued its use, or it is in such a condition that it can no longer be used for its intended purpose. This often occurs when wells have been forgotten by the owner, were not disclosed to a new property owner, or when the owner is unknown.

A properly destroyed and sealed well has been filled so that it cannot produce water or act as a vertical conduit for the movement of groundwater. In cases where a well is paved over or under a structure and can no longer be accessed it is considered destroyed but not properly sealed. Many of these wells may not be able to be properly closed due to overlying structures, landscaping or pavement. Some of them may pose a threat to water quality because they can be conduits for contaminant movement as well as physical hazards to humans and/or animals.

OCWD supports and encourages efforts to properly destroy abandoned wells. As part of routine monitoring of the groundwater basin, OCWD will investigate on a case-by-case basis any location where data suggests that an abandoned well may be present and may be threatening water quality. When an abandoned well is found to be a significant threat to the quality of groundwater, OCWD will work with OCHCA and the well owner, when appropriate, to properly destroy the well.

The City of Anaheim has a well destruction policy and has an annual budget to destroy one or two wells per year. The funds are used when an abandoned well is determined to be a public nuisance or needs to be destroyed to allow development of the site. The city's well permit program requires all well owners to destroy their wells when they are no longer needed. When grant funding becomes available, the city uses the funds to destroy wells where a responsible party has not been determined and where the well was previously owned by a defunct water consortium.

Information on the status of wells is kept within OCWD's Water Resource Management System data base. Since the 2017 Alternative was submitted, a total of 15 production wells were properly destroyed and sealed. During this same period, a total of 9 new production wells were constructed.

6.2 GROUNDWATER QUALITY PROTECTION AND MANAGEMENT

OCWD has a number of policies and programs to project groundwater quality. The list of programs below is described in detail in the 2017 Alternative.

- OCWD Groundwater Protection Policy (2014)
- Various Salinity Management Programs
    - Seawater Intrusion Barriers
    - Coastal Pumping Transfer Program
    - Groundwater Replenishment System
    - Septic Systems
    - Nitrogen and Selenium Management Program
    - Groundwater Desalters and Inland Empire Brine Line and Non-Reclaimable Waste Line
    - Basin Monitoring Program Task Force
    - Salinity Management and imported Water Workgroup
    - Nitrate Management Program

6.2.1 Regulation and Management of Contaminants

A variety of federal, state, county and local agencies have jurisdiction over the regulation and management of hazardous substances and the remediation of contaminated groundwater supplies. OCWD does not have regulatory authority to require responsible parties to clean up pollutants that have contaminated groundwater. In some cases, OCWD has pursued legal action against entities that are responsible for contaminating the groundwater basin to recover OCWD's remediation costs or to compel those entities to implement remedies. OCWD also coordinates and cooperates with regulatory oversight agencies that investigate sources of contamination. OCWD efforts to assess the potential threat to public health and the environment from contamination in the Santa Ana River Watershed and within the County of Orange include:

- Reviewing ongoing groundwater cleanup site investigations and commenting on the findings, conclusions, and technical merits of progress reports
- Providing knowledge and expertise to assess contaminated sites and evaluating the merits of proposed remedial activities
- Conducting third-party groundwater split samples at contaminated sites to assist regulatory agencies in evaluating progress of groundwater cleanup and/or providing confirmation data of the areal extent of contamination

The following is a list of potential contaminants of greatest concern for basin water quality management. More details on these are presented in the 2017 Alternative.

- Per- and polyfluorinated Alkyl Substances (PFAS)
- Methyl Tertiary Butyl Ether (MTBE)
- Volatile Organic Compounds (VOCs)
- N-Nitrosodimethylamine (NDMA)
- 1,4-Dioxane
- Constituents of Emerging Concern (CECs)

As new chemicals become of scientific interest or are regulated, the OCWD laboratory develops the analytical capability and becomes certified in the approved method to process compliance samples. In 2019, the District's lab became the first public agency laboratory in the state of California to achieve state certification to analyze PFAS in drinking water. The District has invested over $1 million in monitoring equipment to test for PFAS and other CECs.

OCWD is committed to (1) track new compounds of concern; (2) research chemical occurrence and treatment; (3) communicate closely with the DDW on prioritizing investigation and guidance; (4) coordinate with OC San, upper watershed wastewater dischargers and regulatory agencies to identify sources and reduce contaminant releases; and (5) inform the groundwater producers on emerging issues.

6.3 RECYCLED WATER PRODUCTION

6.3.1 Overview

The Groundwater Replenishment System (GWRS) is a joint project built by OCWD and OC San that began operating in 2008. Secondary treated wastewater that otherwise would be discharged to the Pacific Ocean is purified using a three-step process to produce high-quality water used to control seawater intrusion and recharge the basin. As shown on Figure 6-1, the system includes four major components (1) the Advanced Water Purification Facility (AWPF), (2) the Talbert Seawater Intrusion Barrier, (3) Mid-Basin Injection wells, and (4) four dedicated recharge basins.

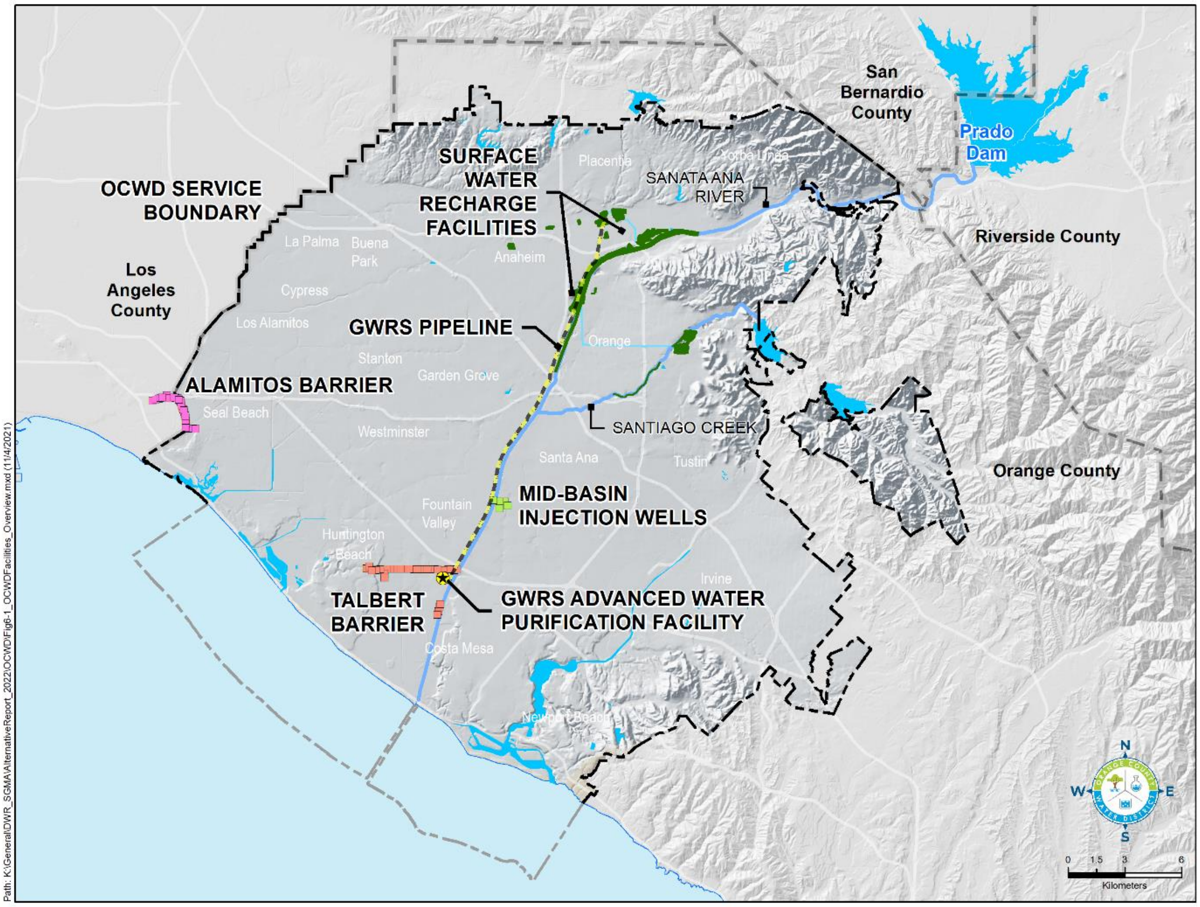


Figure 6-1: Groundwater Replenishment System

6.4 FINAL EXPANSION

The GWRS Final Expansion (GWRSFE) Project began in 2019 with a budget of $310 million. It is the third and final phase of the project to build-out capacity of the GWRS facility that treats secondary effluent from OC San to drinking water standards for groundwater replenishment. As discussed above, the GWRS first began operating in 2008 producing 70 mgd and in 2015, it underwent a 30 mgd expansion. When the Final Expansion is completed in 2023, the plant will have the capacity to produce 130 mgd.

In order to produce 130 mgd, additional treated wastewater from the OC San is required. This additional water will come from OC San's Treatment Plant 2, which is located in the city of Huntington Beach approximately 3.5 miles south of the GWRS. Since the current GWRS facility only receives influent from OC San's Plant No. 1, new secondary effluent conveyance facilities are required at OC San' Plant No. 2 to convey the secondary effluent to GWRS. These conveyance facilities include an effluent pump station, two flow equalization tanks and rehabilitation of an existing pipeline.

In order for secondary effluent from OC San's Plant No. 2 to be recycled by GWRS, Santa Ana Regional Interceptor (SARI) flows must be segregated. Currently, SARI flows are not permitted to be recycled through GWRS due to the industrial and treatment facility discharges that currently flow in the SARI pipeline. Therefore, in addition to the conveyance facilities, modifications will be made to OC San Plant No. 2 headworks facilities to segregate the SARI flows and treat these flows separately for discharge to the ocean outfall. This project is referred to as the Plant No. 2 Headworks Modification Project. In addition to the Plant No. 2 Headworks Modification Project, an upgrade to OC San's Plant No. 2 water pump station is required to feed the headworks with reclaimable water. This Plant Water Pump Station Project is also considered part of the complete GWRSFE Project. An overview of the sites and the project locations of the GWRSFE are shown in Figure 6-2.

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Figure 6-2: GWRS Final Expansion Overview

The GWRSFE is anticipated to be completed and operational in 2023. Once completed, the GWRS will recycle 100 percent of OC San's reclaimable sources and produce enough water to meet the needs of over one million people.

6.5 CONJUNCTIVE USE PROGRAMS

The conjunctive use of surface and groundwater has been the foundation of OCWD's basin management strategy since it was formed in 1933. OCWD Managed Aquifer Recharge (MAR) program began in 1936 when it began purchasing portions of the Santa Ana River channel, eventually acquiring six miles of the channel in Orange County, in order to maximize the recharge of river water to the basin.

Recharge of imported water began in 1949 when OCWD began purchasing Colorado River water from MWD. In 1958, OCWD purchased and excavated a 64-acre site one mile north of the Santa Ana River to create Anaheim Lake, OCWD's first recharge basin. Today OCWD operates a network of 25 facilities that recharge an average of over 230,000 acre-feet per year.

OCWD has developed a diverse recharge portfolio including water from the Santa Ana River and tributaries, imported water, and recycled water supplied by the GWRS. The basin also receives natural recharge (also called incidental recharge) from precipitation and subsurface inflow.

6.5.1 Sources of Recharge Water Supplies

Water supplies used to recharge the groundwater basin are listed in Table 6-1. Figure 6-3 shows the historical recharge by source from 1936 to 2021. Table 4-1 presents the annual recharge by source for WY2016-17 to 2020-21.

Santa Ana River

Water from the Santa Ana River is a primary source of water used to recharge the groundwater basin. OCWD diverts river water into recharge facilities where the water percolates into the groundwater basin. Recharge facilities are capable of recharging all of the base flow. Both the Santa Ana River base flow and storm flow vary from year to year. The volume of storm water that can be recharged into the basin is highlight dependent on the amount and timing of precipitation in the upper watershed, which is highly variable. OCWD has water rights to all storm flows and base flows that reach Prado Dam. When storm flows exceed the capacity of the diversion facilities, river water reaches the ocean, and this portion is lost as a water supply.

Santiago Creek

Santiago Creek is the primary drainage for the northwest portion of the Santa Ana Mountains and ultimately drains into the Santa Ana River. OCWD captures and recharges water in Santiago Creek that flows into the Santiago Recharge Basins. During dry periods, the Santiago basins are used to recharge Santa Ana River flows which are pumped to the basins.

Table 6-1: Sources of Recharge Water Supplies

SUPPLY SOURCES AND DESCRIPTION			RECHARGE LOCATION
Santa Ana River	Base Flow	Perennial flows from the upper watershed in Santa Ana River; predominately treated wastewater discharges	Santa Ana River, recharge basins, and Santiago Creek
	Storm Flow	Precipitation from upper watershed flowing in Santa Ana River through Prado Dam	Santa Ana River, recharge basins, and Santiago Creek
Santiago Creek	Storm Flow / Santa Ana River	Storm flows in Santiago Creek and Santa Ana River water pumped from Burris Basin via Santiago Pipeline	Santiago Creek, Santa Ana River, recharge basins
Incidental Recharge	Precipitation and subsurface inflow	Precipitation and runoff from Orange County foothills, subsurface inflow from basin boundaries	Basin-wide
Recycled Water	Groundwater Replenishment System	Advanced treated wastewater produced at GWRS plant in Fountain Valley	Injected into Talbert Barrier and Mid-Basin Injection Wells, recharged in Kraemer, Miller, La Palma and Miraloma basins
	Water Replenishment District of Southern CA	Water purified at the Leo J. Vander Lans Treatment Facility in Long Beach	Injected into Alamitos Barrier
Imported Water	Untreated	State Water Project and Colorado River Aqueduct	Various recharge basins
	Treated	State Water Project and Colorado River Aqueduct treated at MWD Diemer Water Treatment Plant	Injected into Alamitos Barrier

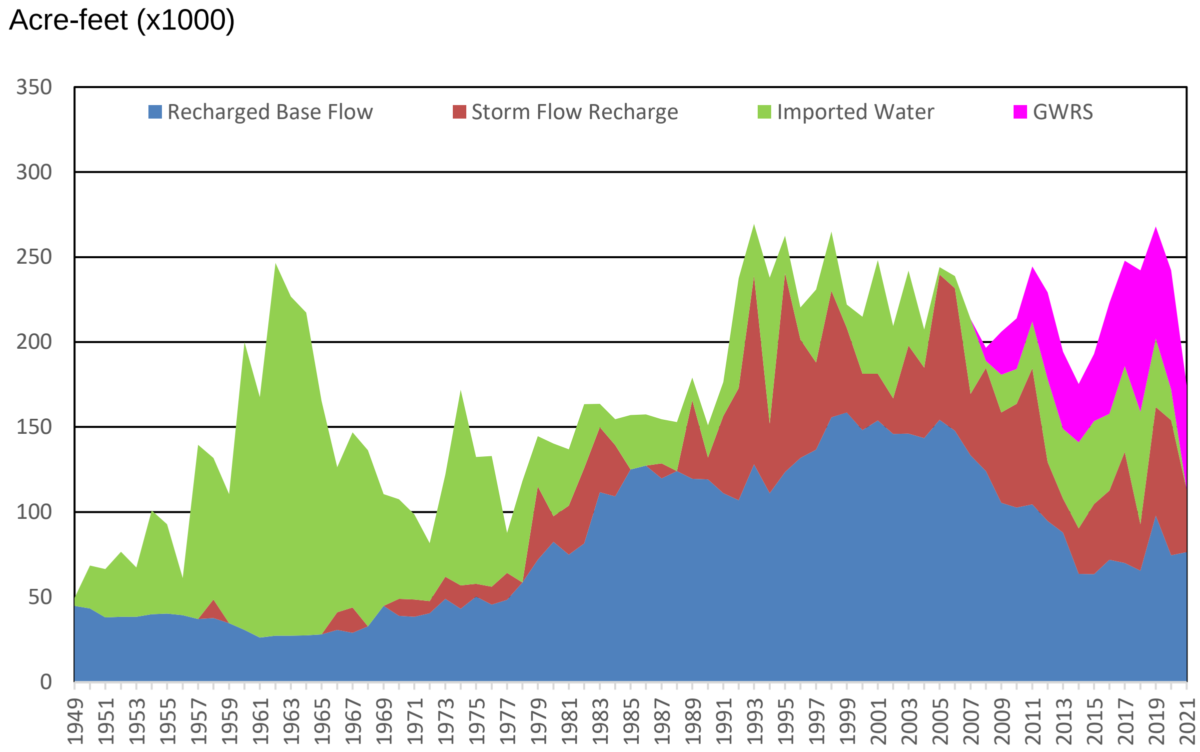


Figure 6-3: Historical Recharge in Surface Water Recharge System

Incidental Recharge

Incidental recharge is comprised of subsurface inflow from the local hills and mountains, infiltration of precipitation and irrigation water, recharge in small flood control channels, and groundwater underflow to and from Los Angeles County and the ocean. Since the amount of incidental recharge cannot be directly measured, it is also referred to as unmeasured recharge. Each year, an estimate is made of the amount of net incidental recharge based on OCWD's annual groundwater storage calculation. In general, since the Central Basin in Los Angeles County is usually operated at a lower level than the Orange County basin, there is usually a net flow of water out of the Orange County basin to the Central Basin. This outflow is subtracted from the total incidental recharge to get the net incidental recharge to the basin, which is the value reported in this document.

Recycled Water

The basin receives two sources of recycled water for recharge. The primary source is the GWRS, which currently has the capacity to produce 103,000 acre-feet per year of recycled water. This will be increasing to 134,000 acre-feet per year, when the GWRS Final Expansion is complete in 2023. Recycled water from the GWRS is percolated in the surface water system and injected into the Talbert Seawater Barrier, and the Mid-Basin Injection wells. Operation of GWRS is explained in detail in Section 5.

The second source of recycled water is the Leo J. Vander Lans Treatment Facility which supplies water to the Alamitos Seawater Barrier. The capacity of the Vander Lans Treatment

Facility was expanded from 3 mgd to 8 mgd but has generally not operated above 4 mgd for extended periods of time for various reasons. WRD is working on increasing this facility's online performance. A portion of the water recharged in the Alamitos Barrier recharges the Orange County Groundwater Basin with the remainder recharging the Central Basin in Los Angeles County.

Imported Water

OCWD purchases imported water for recharge from the Municipal Water District of Orange County (MWDOC), which is a member agency of MWD. Untreated imported water can be delivered to the surface water recharge system in multiple locations, including Anaheim Lake (OC-28/28A), Santa Ana River (OC-11), Irvine Lake (OC-13A), and San Antonio Creek near the City of Upland (OC-59). These locations are shown in Figure 6-4. Connections OC-28, OC-11 and OC-13A supply OCWD with Colorado River Aqueduct water. Connection OC-59 supplies OCWD with State Water Project water, and OC-28A (co-located with OC-28) supplies OCWD with a variable blend of water from these two sources.

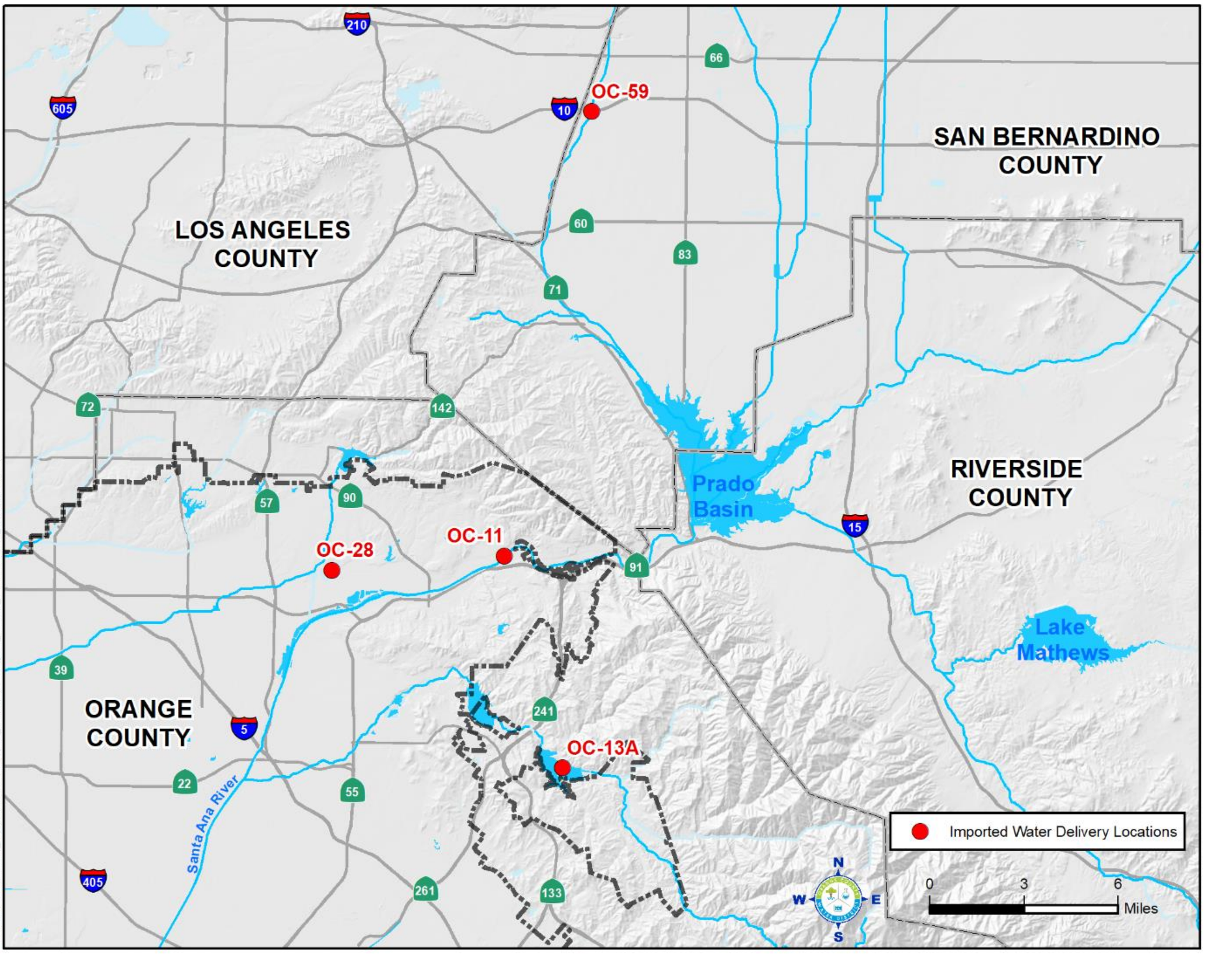


Figure 6-4: Locations of Imported Water Deliveries

6.5.2 Surface Water Recharge Facilities

OCWD operates a network of 25 surface water facilities located adjacent to the Santa Ana River in the City of Anaheim and Santiago Creek in the City of Orange as shown in Figure 6-5. The system has a total storage capacity of over 25,000 acre-feet. OCWD carefully tracks the amount of water being recharged in each facility on a daily basis.

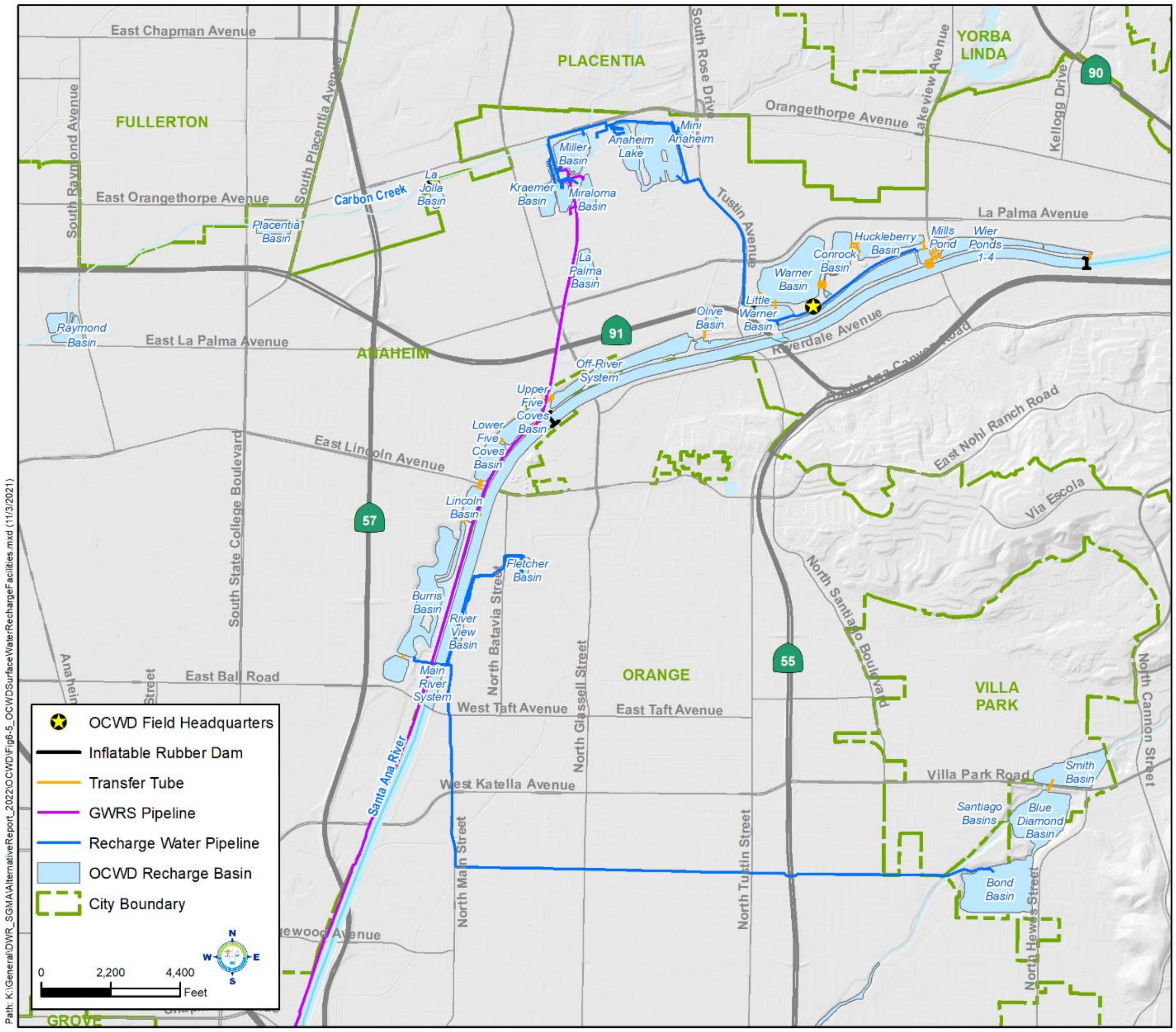


Figure 6-5: OCWD Surface Water Recharge Facilities

Three full-time hydrographers control and monitor the recharge system. These hydrographers and other OCWD staff prepare a monthly *Water Resources Summary Report*, which lists the source and volume for each recharge water supply, provides an estimate of the amount of water percolated in each recharge basin, documents total groundwater production from the basin, and estimates the change in groundwater storage. The report also estimates the amount of incidental recharge, evaporation and losses to the ocean – essentially a monthly water budget accounting. The monthly figures are compiled to determine yearly recharge and production totals and used in the year-end determination of groundwater storage change.

6.6 MANAGEMENT OF SEAWATER INTRUSION

In the coastal area of Orange County, the primary source of saline groundwater is seawater intrusion into the groundwater basin through permeable sediments underlying topographic lowlands or gaps between the erosional remnants or mesas of the Newport-Inglewood Uplift. Areas susceptible to intrusion are the Talbert, Bolsa, Sunset, and Alamitos gaps as shown in Figure 3-26.

Seawater intrusion in the Talbert Gap area began as early as the 1920s as the previously flowing artesian conditions within the shallow Talbert aquifer were gradually lowered until groundwater levels declined below sea level due to unrestricted agricultural pumping. By the 1930s and 1940s, seawater had advanced more than one mile inland within the Talbert Gap, forcing the closure of municipal supply wells owned and operated by the cities of Newport Beach and Laguna Beach due to elevated salinity.

Seawater intrusion became a critical problem in the 1950s. Overdraft of the basin caused water levels to drop as much as 40 feet below sea level. By the mid-1960s seawater had intruded nearly four miles inland within the Talbert Gap. Intrusion was also observed in the Alamitos Gap area along the Orange County/Los Angeles County border. During the 1950s and 1960s seawater intrusion investigations in coastal Orange County were conducted by the USGS, DWR and OCWD to define the nature and extent of the problem. During this time, OCWD slowed seawater intrusion by filling the basin with imported Colorado River water in the Anaheim Forebay area, thus reducing the overdraft throughout the basin and raising coastal groundwater levels (DWR, 1966).

Largely based on the 1966 DWR study, OCWD constructed the initial Talbert Seawater Intrusion Barrier in 1975 with 23 injection well sites. In 1965, a line of injection wells was constructed across the Alamitos Gap to form a subsurface freshwater hydraulic barrier. The Alamitos and Talbert barriers control seawater intrusion in their respective gaps by injecting fresh water into a series of multi-depth wells targeting each individual aquifer zone that is susceptible to seawater intrusion. The pressure mound resulting from this injection minimizes seawater intrusion through these gaps into the basin.

Both the Alamitos and Talbert barriers have been expanded and improved periodically and have allowed the basin to be operated more flexibly as a storage reservoir with an operating range of 500,000 acre-feet below full condition.

In July 2014, the OCWD Board of Directors adopted a Seawater Intrusion Prevention Policy that contained the following tenets:

- Prevent degradation of the quality of the groundwater basin from seawater intrusion
- Effectively operate and evaluate the performance of the seawater barrier facilities

- Adequately identify and track trends in seawater intrusion in susceptible coastal areas and evaluate and act upon this information, as needed, to protect the groundwater basin

6.6.1 Talbert Seawater Intrusion Barrier

The Talbert Barrier consists of 36 injection well sites, shown in Figure 3-26, with the primary alignment along Ellis Avenue approximately four miles inland from the ocean. Barrier injection raises groundwater levels in the immediate vicinity and thus creates a groundwater mound that acts as a hydraulic barrier to seawater that would otherwise migrate inland toward areas of groundwater production.

From 1975 until 2008, a blend of deep well water, imported water and recycled water from the former Water Factory 21 was injected into the barrier. In 2008, GWRS recycled water became the primary supply used for the injection wells, with a small and intermittent portion of the supply from potable imported water delivered via the City of Huntington Beach at the OC-44 turnout and potable water delivered by the City of Fountain Valley (a blend of groundwater and imported water). Since approval by the Regional Water Board in 2009, OCWD uses recycled water for all of the injection well supply at the Talbert Barrier.

Prior to GWRS, barrier capacity averaged approximately 15 mgd but now averages approximately 30 mgd with a typical seasonal range of 20 to nearly 40 mgd. Doubling the injection capacity was necessary to prevent seawater intrusion as groundwater production increased and was made possible by construction of additional injection wells and pipelines, superior water quality (GWRS water), and improved barrier operations, such as more frequent backwashing and rehabilitation. Barrier injection rates are adjusted based on overall basin storage conditions and seasonally varying coastal water levels. Therefore, injection is typically lower in the winter months and higher in the summer when increased coastal production causes lower coastal groundwater levels. Approximately 85 to 90 percent of barrier injection is typically targeted into the shallow and intermediate aquifer zones for seawater intrusion control on an annual basis, while the other 10 to 15 percent goes into the deeper Main aquifer zone primarily for basin replenishment. Based on the much steeper hydraulic gradient inland toward pumping depressions (relative to that toward the coast), OCWD estimates that approximately 95 percent of the water injected at the Talbert Barrier flows inland to replenish the basin, with the remainder ultimately flowing to the ocean as subsurface outflow.

6.6.2 Alamitos Seawater Intrusion Barrier

The Alamitos Barrier Project was initially constructed in 1964 and went into operation in 1965 to create a freshwater pressure ridge to prevent seawater intrusion from migrating through the Alamitos Gap into the Central Basin of Los Angeles County and the Orange County groundwater basin. The barrier alignment straddles the Los Angeles-Orange County line and spans approximately 1.8 miles across the Alamitos Gap from Bixby Ranch Hill in the City of Long Beach to the vicinity of Landing Hill in the City of Seal Beach.

Under the terms of the 1964 Agreement for Cooperative Implementation of the Alamitos Barrier Project (1964 Agreement), the barrier facilities are co-owned by OCWD and the Los Angeles County Flood Control District (LACFCD, a division of LACPW) and currently include 58 injection wells and 238 active monitoring wells as shown in Figure 3-26. The barrier is operated and maintained by LACPW under the direction of the Alamitos Barrier Joint Management Committee (JMC), whose membership includes OCWD, LACPW, WRD, City of Long Beach, and Golden State Water Company.

The barrier has been incrementally expanded over time to include the construction of additional injection and monitoring wells. Since the initial 14 injection wells were constructed in 1964, an additional 44 injection wells have been installed over eight phases of well construction. Most recently in 2018, with the addition of 17 new injection wells at 8 locations to control breaches through the barrier where well spacing was too large and injection capacity too small.

Similar to the Talbert Barrier, the Alamitos Barrier consists of both nested and cluster-type injection wells screened discretely in each aquifer zone in order to control the injection rate and injection pressure into each targeted aquifer zone independently since each aquifer zone has different physical characteristics and groundwater levels. In addition, there are a couple “dual-point” injection wells that consist of only one well casing, but two different screened interval depths separated inside the well by an inflatable packer and two separate injection drop pipes.

SECTION 7 NOTICE AND COMMUNICATION

7.1 DESCRIPTION OF GROUNDWATER USERS

The local agencies that produce the majority of the groundwater from the basin are listed in Table 7-1 with geographic boundaries shown in Figure 3-3. OCWD meets monthly with 19 major water retail agencies, referred to as the groundwater producers, to discuss and evaluate basin management issues and proposed projects and work cooperatively among the agencies in the OCWD Management Area.

Table 7-1: Major Groundwater Producers

<table>
<tr><th colspan="6">CITIES</th></tr>
<tr><td colspan="2">Anaheim</td><td colspan="2">Huntington Beach</td><td colspan="2">Santa Ana</td></tr>
<tr><td colspan="2">Buena Park</td><td colspan="2">La Palma</td><td colspan="2">Seal Beach</td></tr>
<tr><td colspan="2">Fountain Valley</td><td colspan="2">Newport Beach</td><td colspan="2">Tustin</td></tr>
<tr><td colspan="2">Fullerton</td><td colspan="2">Orange</td><td colspan="2">Westminster</td></tr>
<tr><td colspan="2">Garden Grove</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><th colspan="6">WATER DISTRICTS AND WATER COMPANIES</th></tr>
<tr><td colspan="3">East Orange County Water District</td><td colspan="3">Mesa Water District</td></tr>
<tr><td colspan="3">Golden State Water Company</td><td colspan="3">Serrano Water District</td></tr>
<tr><td colspan="3">Irvine Ranch Water District</td><td colspan="3">Yorba Linda Water District</td></tr>
</table>

The monthly meeting with OCWD staff and the groundwater producers provides a forum for the groundwater producers to provide their input to OCWD on important issues such as:

- Setting the Basin Production Percentage (BPP) each year
- Reviewing the merits of proposed capital improvement projects
- Purchasing imported water to recharge the groundwater basin
- Reviewing water quality data and regulations
- Maintaining and monitoring basin water quality
- Budgeting, replenishment assessment and considering other important policy decisions

7.2 PUBLIC PARTICIPATION

On September 30, 2021, OCWD sent a letter via email to all of the Basin 8-1 agencies to inform them that the 2017 Alternative was being updated and would be available for review and comment. No comments were received by any of the agencies contacted.

A draft of the 2022 Update was presented to the OCWD Board and posted on the OCWD website on November 18, 2021, to allow for public review and comment. The final 2022 Update was presented to the OCWD Board on December 15, 2021. At this board meeting, a resolution was adopted to support the submission of the 2022 Update to DWR.

7.3 COMMUNICATION PLAN

Proactive community outreach and public education are central to OCWD. The 2017 Alternative provides detailed information on OCWD's communication plan.

SECTION 8 SUSTAINABLE BASIN MANAGEMENT

8.1 SUSTAINABILITY GOAL

The sustainability goal for the OCWD Management Area is as follows:

> Continue to manage the groundwater basin to prevent basin conditions that would lead to significant and unreasonable undesirable results as defined by California Water Code Section 10721(x).

Existing monitoring and management programs in place today enable OCWD to sustainably manage the groundwater basin. Since its formation in 1933, OCWD has developed a managed aquifer recharge program, constructed hundreds of monitoring wells, developed water quality monitoring programs, constructed a large surface water recharge system, installed seawater intrusion barriers, and managed the volume of groundwater production through a scientifically based understanding of the basin's sustainable yield and the use of financial incentives. Continued successful protection of the groundwater basin requires that OCWD's management of the basin be able to adapt to changing conditions affecting the groundwater basin. The following sections describe the sustainable basin management for each of the undesirable results as defined in the California Water Code, Section 10721(x).

SECTION 9 SUSTAINABLE MANAGEMENT RELATED TO GROUNDWATER LEVELS

9.1 HISTORY/SUMMARY

OCWD manages the basin for long-term sustainability by maximizing recharge of the basin and managing basin production within sustainable levels. This section will discuss the relationship between groundwater elevations and sustainable groundwater management.

Groundwater elevations over the last twenty years exhibit short-term changes and long-term (multi-year) trends see Figures 3-10 through 3-13). Short-term elevation changes typically reflect seasonal variations in pumping and recharge, while multi-year trends reflect the effects of extended periods of above- or below-average precipitation and/or availability of imported water.

Groundwater elevation is monitored at over 1,000 individual measuring points, including key wells formerly designated under the CASGEM program which has been superseded by annual reporting required under SGMA. OCWD will be reporting water level data for the basin except for the La Habra-Brea Management Area.

In general, groundwater elevations in the Shallow Aquifer system show less amplitude than those in the underlying Principal and Deep Aquifer systems due to the higher degree of pumping and confinement of the Principal and Deep Aquifer systems. Because approximately 95 percent of all production occurs from wells screened within the Principal Aquifer system, groundwater elevations within this system are typically lower than those in the overlying Shallow Aquifer system and, in some areas, the underlying Deep Aquifer system. Vertical hydraulic gradients created by pumping and recharge drive groundwater into the Principal Aquifer system from the overlying Shallow Aquifer system and, to a lesser extent, from the Deep Aquifer system.

Long-term data demonstrates that groundwater elevations in the basin have exhibited multi-year cyclical patterns and have not experienced chronic lowering due to OCWD's management approach of maintaining basin storage within the established operating range. As a result, the undesirable effect of “chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply” is not occurring in the OCWD Management Area and is not expected to occur in the future as OCWD continues to manage the basin as described in this report.

9.2 MONITORING OF GROUNDWATER LEVELS FOR SUSTAINABILITY

As explained in Section 3.2, OCWD monitors water levels at over 1,000 individual measuring points on a monthly or bi-monthly basis to evaluate the effects of pumping, recharge or injection operations. Additional monitoring is conducted as needed in the vicinity of OCWD's recharge facilities, seawater barriers and areas of special investigation where drawdown, water quality impacts or contaminants are of concern.

Groundwater elevation contour maps for the Shallow, Principal and Deep Aquifers are prepared annually and are scanned and digitized into OCWD's GIS database. Figures 3-5, 3-6, and 3-7 show the groundwater elevation contours for June 2021 for all three basin aquifers. The changes in groundwater elevations for the three aquifers are also calculated on an annual basis. The water level changes for each of the three aquifers for June 2020 to June 2021 are shown in Figures 9-1, 9-2 and 9-3.

9.3 MANAGEMENT OF GROUNDWATER LEVELS FOR SUSTAINABILITY

For each of the three major aquifer systems, GIS mapping is used to multiply the water level changes by a grid of aquifer storage properties from OCWD's calibrated groundwater flow model. This results in a storage change volume for each of the three aquifer layers which are totaled to provide a net annual storage change for the basin. Thus, measurements of groundwater elevations are ultimately used to calculate total basin storage levels each year.

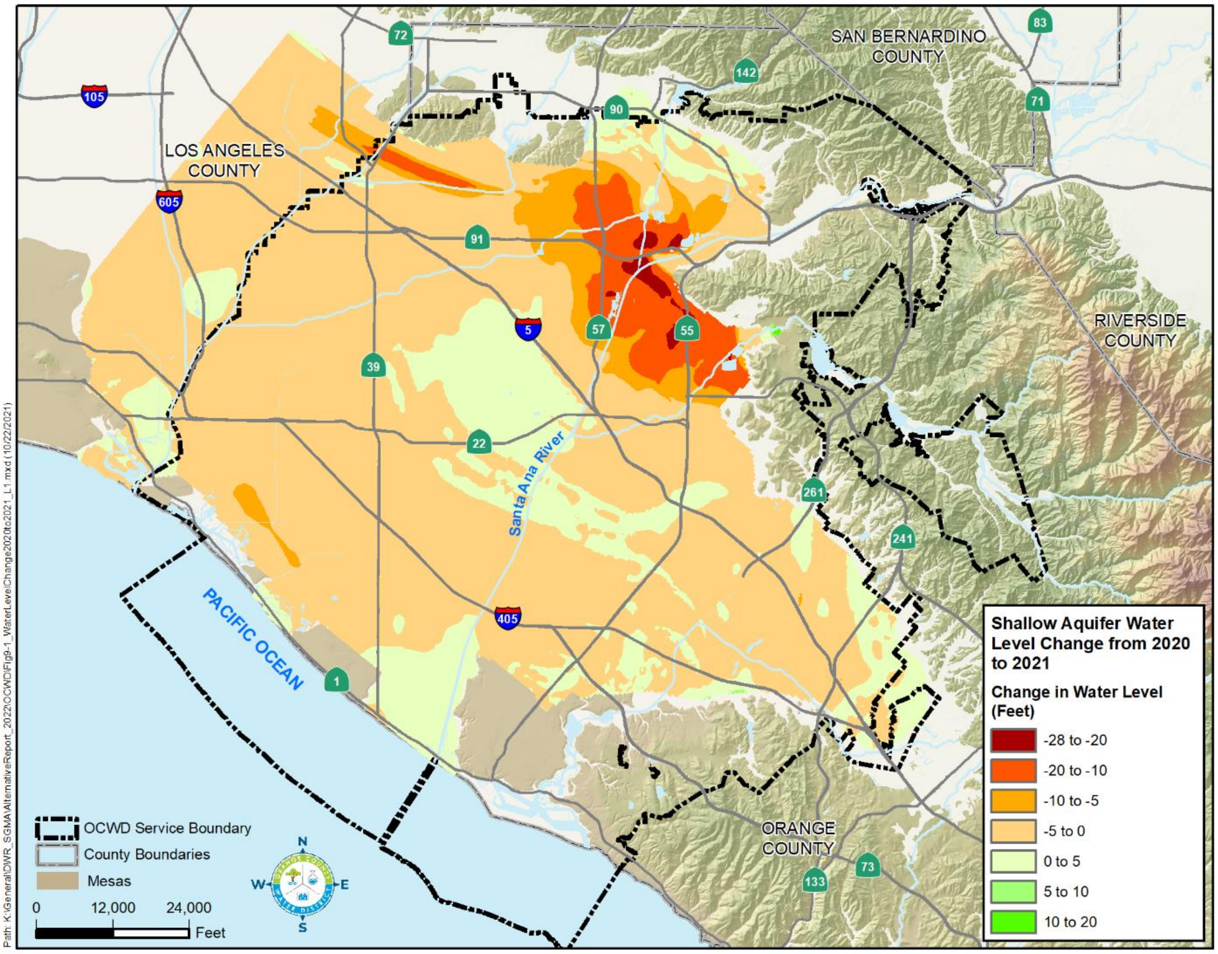


Figure 9-1: Shallow Aquifer Water Level Change, June 2020 to June 2021

In determining the operating range for groundwater storage levels, OCWD considered the potential negative impacts that could occur due to unreasonable and chronic lowering of groundwater elevations. These potential negative impacts include increased costs for groundwater producers to pump groundwater, decreased yield in production wells, increased risk of land subsidence, and increased risk of seawater intrusion.

Monitoring and management of groundwater elevations in the OCWD Management Area is most important in the coastal areas in order to protect groundwater basin water quality from seawater intrusion. Management programs that enable long-term sustainable basin management related to groundwater elevations in the coastal areas include the operation of the Alamitos and Talbert Seawater Intrusion Barriers and the Coastal Pumping Transfer Program.

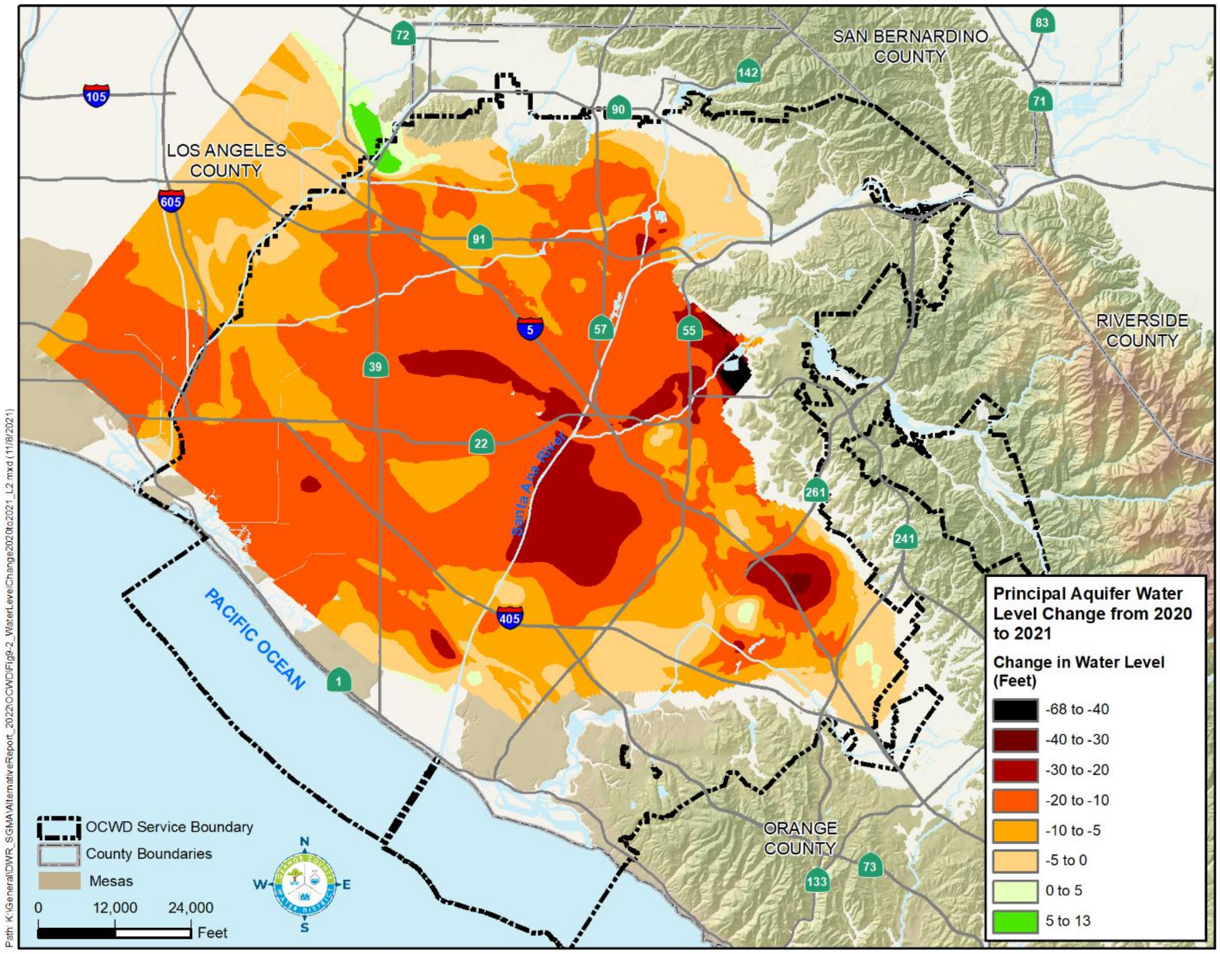


Figure 9-2: Principal Aquifer Water Level Change, June 2020 to June 2021

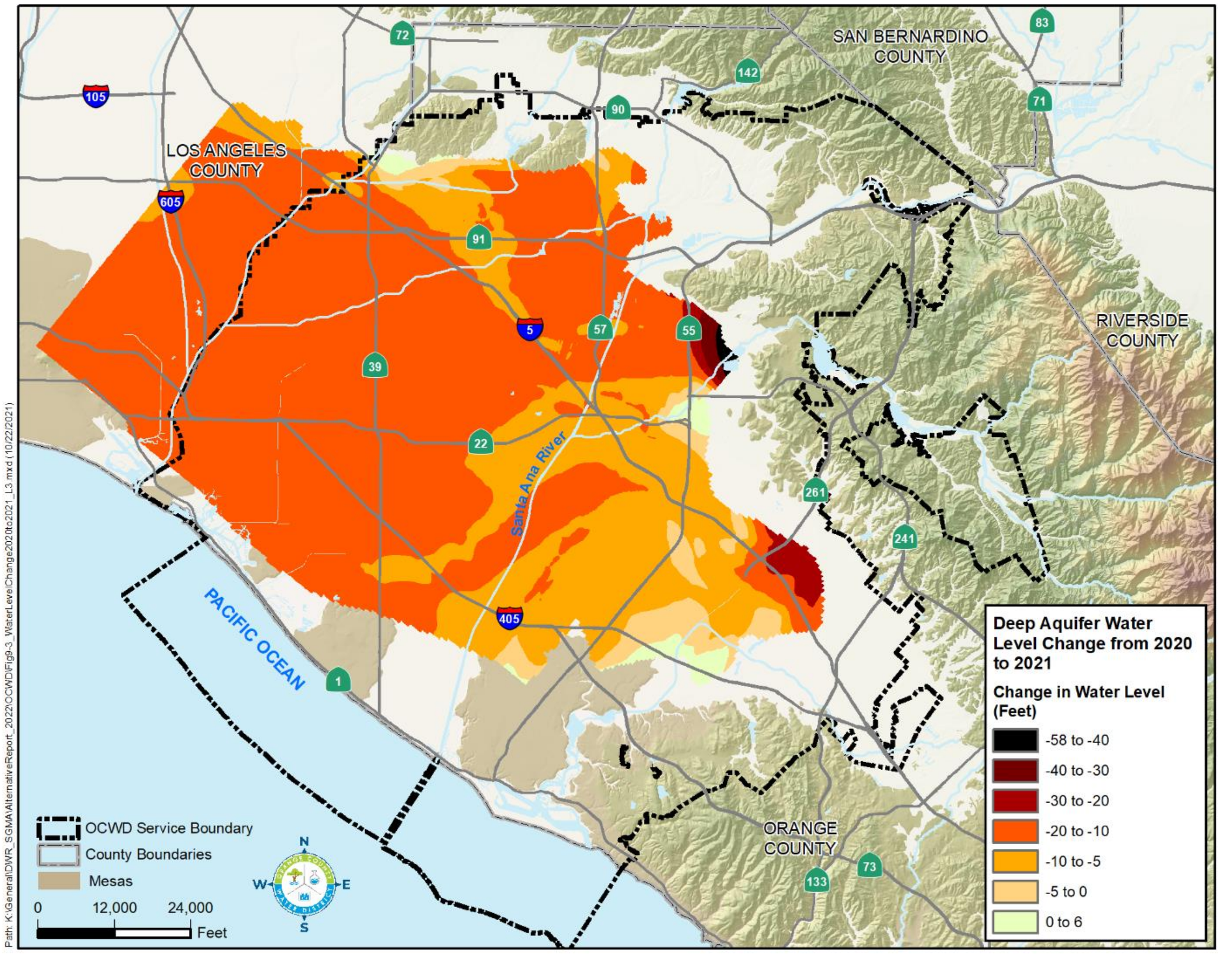


Figure 9-3: Deep Aquifer Water Level Change, June 2020 to June 2021

9.4 DEFINITION OF SIGNIFICANT AND UNREASONABLE LOWERING OF GROUNDWATER LEVELS

OCWD closely monitors groundwater levels in the three major aquifer systems (Shallow, Principal and Deep) for a number of purposes including determination of groundwater storage within the basin. OCWD uses groundwater storage conditions to manage the basin sustainably by keeping storage levels within an operating range up to 500,000 acre-feet below full condition. Significant and unreasonable reduction of groundwater in storage could occur in the event that the volume of groundwater in storage fell below the 500,000 acre-feet below full condition for an extended period of time. If OCWD were to consider an operating range below 500,000 acre-feet from full condition, additional analysis and monitoring would be needed.

9.5 DETERMINATION OF MINIMUM THRESHOLD

The minimum threshold for significant and unreasonable reduction in groundwater levels is reached when the storage volume of the groundwater basin falls below the operating range of up to 500,000 acre-feet below full condition for an extended period of time.

SECTION 10 SUSTAINABLE MANAGEMENT RELATED TO BASIN STORAGE

10.1 HISTORY

Within the Orange County Groundwater Basin, there is an estimated 66 million acre-feet of water in storage (OCWD, 2007). In spite of the large amount of stored water, there is a comparatively narrow operating range within which the basin can be safely operated.

The operating range of the basin is considered to be the maximum allowable storage range over the long-term without incurring detrimental impacts. The upper limit of the operating range is defined by the full basin condition. Although it may be physically possible to fill the basin higher than this full condition, it could lead to detrimental impacts such as percolation reductions in recharge facilities and increased risk of shallow groundwater seepage in low-lying coastal areas.

The lower limit of the operating range is considered to be 500,000 acre-feet below full condition. Although it may be considered to be acceptable to allow the basin to decline below 500,000 acre-feet below full condition for brief periods due to severe drought conditions and lack of imported water for basin recharge, it is not considered to be an acceptable management practice to intentionally manage the basin for sustained periods at this lower limit for the following reasons:

- Increased risk of seawater intrusion
- Increased risk of land subsidence
- Depletion of water in storage available for future drought conditions
- Some wells potentially becoming inoperable due to lower groundwater levels
- Increased costs to pump groundwater for groundwater users
- Increased potential for upwelling of amber-colored groundwater from the Deep Aquifer

It is important to note that detrimental impacts do not suddenly happen when storage levels fall to 500,000 or more acre-feet below full condition; rather, they occur incrementally, or the potential for their occurrence grows as the basin declines to lower levels. OCWD has used the basin model computer simulations to evaluate the potential for detrimental impacts if storage were to fall to 700,000 acre-feet from full. Basin model runs at 700,000 acre-feet below full condition indicates the potential for increased seawater intrusion and considerably more production wells being impacted by low pumping levels. Thus, a reduction of up to 700,000 acre-feet of groundwater in storage is only considered acceptable during an extreme emergency, such as a disruption in imported water supplies due to an earthquake. Negative or adverse impacts that are considered when establishing the operating range include chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the long-term, increased seawater intrusion, significant and unreasonable land subsidence that substantially interferes with surface land uses, and increased pumping costs.

The current policy of maintaining a groundwater storage level of up to 500,000 acre-feet below full was established based on completion of a comprehensive hydrogeological study of the basin in 2007 (OCWD, 2007).

The basin's storage level is quantified based on a benchmark defined as the full basin condition. Although the groundwater basin rarely reaches the full basin condition, basin storage has fluctuated within the operating range for many decades. OCWD manages groundwater pumping such that it is sustainable over the long term; however, in any given year pumping may exceed recharge or vice versa. Thus, the amount of groundwater stored in or withdrawn from the basin varies from year to year and often goes through multi-year cycles of emptying and filling, which generally correlates with state-wide and/or local precipitation patterns.

Each year OCWD calculates the volume of groundwater storage change from a theoretical "full" benchmark condition based on a calculation using changes in groundwater elevations in each of the three major aquifer systems and aquifer storage coefficients. This calculation is checked against an annual water budget that accounts for all production, measured recharge, and estimated unmeasured recharge. The amount of available or unfilled storage from the theoretical full condition from WY1958-59 to 2020-21 is shown in Figure 1-3.

Maintaining the basin storage condition on a long-term basis within this operating range allows for long-term sustainable management of the basin without experiencing undesirable effects. Short-term excursions from the operating range due to extreme drought or other factors are not expected to cause adverse impacts but would need to be monitored closely and be of limited duration. In the California Water Plan Update 2013 (DWR, 2014) this manner of groundwater basin management is described as follows:

> "Change in groundwater storage is the difference in stored groundwater volume between two time periods…However, declining storage over a period characterized by average hydrologic conditions does not necessarily mean that the basin is being managed unsustainably or is subject to conditions of overdraft. Utilization of groundwater in storage during years of diminishing surface water supply, followed by active recharge of the aquifer when surface water or other alternative supplies become available, is a recognized and acceptable approach to conjunctive water management." (p. SC-77)

10.2 CALCULATION OF GROUNDWATER STORAGE LEVELS

The estimated historical minimum storage level of 500,000 to 700,000 acre-feet below full condition occurred in 1956-57 (DWR, 1967; OCWD, 2003). Since this time, the basin storage fluctuated within the operating range reaching a full condition in 1969 and 1983.

OCWD uses two methods to calculate the storage condition of the basin: (1) water budget method and (2) three-layer storage change method. The water budget method is simply an accounting of the inflows to the basin and outflows. This data is collected and compiled on a monthly basis. Estimates of unmeasured or incidental recharge are used based on a statistical relationship between historical local precipitation and calculated unmeasured recharge. Unmeasured recharge is trued up at the end of the year with the final reports of inflows and outflows and basin storage change (based on groundwater level changes). This method produces a monthly estimate of the change in groundwater storage and allows for real-time decision making with respect to managing the basin.

In 2007, OCWD instituted a new three-layer change in storage method for calculating the amount of groundwater in storage (OCWD, 2007). The three-layer method involves creating groundwater elevation contour maps for each of the three aquifer layers (Shallow, Principal and Deep aquifers) for conditions at the end of June of each year. Prior to this time, groundwater storage was determined based on a single groundwater elevation map that was essentially a composite of the Shallow and Principal aquifers.

10.3 SUSTAINABLE MANAGEMENT PROGRAMS

10.3.1 Basin Operating Range

Each year OCWD assesses current basin storage and projected water supply availability as factors in establishing how much groundwater can be pumped from the basin for the following year. If basin storage approaches or falls within the lower end of the established operating range, issues that are evaluated when considering the management of the basin include the current status of seawater intrusion protective measures, monitoring of ground surface elevations to assess the risk of land subsidence, inflow of amber-colored water or poor quality groundwater into the Principal Aquifer from underlying or overlying aquifers, and the number of shallow production wells that would become affected by lower groundwater levels. On the other hand, when operating the basin near the higher end of the storage range, considerations include the potential to increase groundwater pumping, purchase less imported replenishment water, and the potential for more groundwater outflow to Los Angeles County.

10.3.2 Balancing Production and Recharge

Over the long-term, the basin must be maintained in an approximate balance to ensure the long-term viability of basin water supplies. In a given year, water withdrawals may exceed water recharged as long as over the course of a number of years this is balanced by years where water recharged exceeds withdrawals. Levels of total basin production and total water recharged since WY1999-00 are shown in Figure 1-4.

10.3.3 Managing Basin Pumping

The primary mechanisms used by OCWD to manage pumping are the Basin Production Percentage (BPP) and the Basin Equity Assessment (BEA). The ability to assess the BPP and the BEA were provided to OCWD through an amendment to the OCWD Act in 1969. Section 31.5 of the OCWD Act empowers the Board to annually establish the BPP, defined as:

> "…the ratio that all water to be produced from groundwater supplies with the district bears to all water to be produced by persons and operators within the District from supplemental sources and from groundwater within the District during the ensuing water year."

In other words, the BPP is a percentage of each Producer's water supply (supplemental and groundwater sources) that comes from groundwater pumped from the basin. The BPP is set uniformly for all groundwater producers. Groundwater production at or below the BPP is assessed the Replenishment Assessment (RA). Production above the BPP is charged the RA plus the Basin Equity Assessment (BEA). The BEA is set by the Board and is presently calculated so that the cost of groundwater production above the BPP is equivalent to the cost of purchasing imported potable supplies. This approach serves to discourage, but not eliminate, production above the BPP. In practice, groundwater producers rarely pump in excess of the BPP as doing so triggers a requirement to pay the BEA, thereby eliminating any cost savings that a pumper might obtain by pumping an amount in excess of the BPP. Collection of the BEA provides funds for OCWD to purchase additional replenishment water (where determined appropriate by OCWD). If necessary, the BEA can be increased to further discourage production above the BPP.

The BPP is set after evaluating groundwater storage conditions, availability of recharge water supplies and basin management objectives. OCWD's goal is to set the BPP as high as possible to allow groundwater producers to sustainably maximize pumping and reduce their overall water supply cost.

To change the BPP, the Board of Directors must hold a public hearing. Raising or lowering the BPP allows OCWD to manage the amount of pumping from the basin. The BPP is lowered when basin conditions necessitate a decrease in pumping. A lower BPP results in the need for groundwater producers to purchase additional, more expensive imported water.

The methodology for setting the BPP and OCWD polices related to the BPP are described further in the 2017 Alternative.

Table 10-1 shows the management actions to be used to guide OCWD in setting the BPP. As the BPP is annually set in April for the following fiscal year (but may be changed throughout the year), the projected change in basin storage would be estimated for the end of that fiscal year (as of June 30), given various assumptions of basin pumping, inflows and outflows. Maintaining some available storage space in the basin allows for maximizing surface water recharge when such supplies are available, especially in relatively wet years. By keeping the basin relatively full during wet years and for as long as possible in years with near-normal recharge, the maximum amount of groundwater could be maintained in storage for future drought conditions. During dry hydrologic years when less water would be available for recharge, the BPP could be lowered to maintain groundwater storage levels.

At the beginning of 2015, OCWD committed to purchase 650,000 acre-feet of imported water to recharge the basin over a ten-year time period. This amount of imported water for recharge into the basin will help maintain the BPP and assist in managing the basin storage level within the operating range. OCWD works to maintain a Water Reserve Fund to purchase imported water from MWD. Each year, a specific amount of money is budgeted to purchase imported water and, if water is not available from MWD, the funds are carried over to the next year in the Water Reserve Fund.

Table 10-1: Management Actions based on Change in Groundwater Storage

Available Storage Space (amount below full basin condition)	Basin Management Actions to Consider
Less than 100,000 acre-feet	Raise BPP
100,000 to 300,000 acre-feet	Maintain and/or raise BPP towards 75% goal
300,000 to 350,000 acre-feet	Seek additional supplies to refill basin and/or lower the BPP
Greater than 350,000 acre-feet	Seek additional supplies to refill basin & lower the BPP

Basin Production Limitation

Another management tool that enables OCWD to sustainably manage the basin is the Basin Production Limitation. Section 31.5(g)(7) of the OCWD Act authorizes limitations on production and the setting of surcharges when those limits are exceeded. This provision can be used when it is necessary to shift pumping from one area of the basin to another. An example of this is the Coastal Pumping Transfer Program, which shifts pumping from the coastal area to inland to minimize seawater intrusion, when necessary.

10.3.4 Supply Management Strategies

One of OCWD's basin management objectives is to maximize groundwater recharge. This is achieved through increasing the efficiency of and expanding OCWD's recharge facilities and the supply of recharge water. Construction and operation of the GWRS has provided a substantial increase in supply of water available to recharge the basin. Additional OCWD supply management programs include developing increased stormwater capture programs behind Prado Dam in cooperation with the U.S. Army Corps of Engineers, encouraging and participating in water conservation efforts, and working with MWD and the Municipal Water District of Orange County in developing and conducting other supply augmentation projects and strategies.

10.4 DEVELOPING NEW LOCAL WATER RESOURCES POLICY

In July 2020, the District adopted a policy called the Developing New Local Water Resources Policy to acknowledge that the local multi-billion-dollar economy and 2.5 million citizens that rely on groundwater as their primary water supply require a reliable, sustainable and economical water source to remain healthy and strong. It further acknowledges that the imported water that is purchased annually to meet the needs of the groundwater producers is becoming uncertain as environmental, agricultural, and urban interests maneuver to obtain a greater share and is susceptible to impacts from climate change. The Policy contains the following tenets:

- The District recognizes the impacts of climate change and their ability to disrupt predictions of future local water supplies for the District's service territory
- The District will evaluate and undertake economical and environmentally sensitive projects and programs to work towards the goal of ensuring adequate water supplies are always available to its service territory
- The types of projects that will be evaluated include: (1) Maximizing Santa Ana River base and storm flow capture, (2) Increasing water conservation, (3) Increasing water recycling, (4) Improving the reliability of imported water supplies, (5) Brackish water desalination, (6) weather modification/cloud seeding; and (7) Seawater desalination

Conjunctive Use and Water Transfers

By agreement with OCWD, MWD established a Conjunctive Use Project (CUP) in the OCWD Management Area by purchasing the right to store up to 66,000 acre-feet of water in the groundwater basin until 2028. OCWD used the funds provided by MWD to improve basin management facilities including the construction of eight new production wells for water retail agencies and new injection wells for the Talbert Barrier. Under the agreement, MWD may request that stored water be extracted up to a maximum of 22,000 acre-feet each year.

OCWD reviews opportunities for additional conjunctive use projects that would store water in the basin and potentially in other groundwater basins. Additionally, OCWD reviews opportunities for water transfers that could provide additional sources of recharge water. Such projects are evaluated carefully with respect to their impact on available storage, reliability and cost effectiveness.

10.4.1 Water Demands

Water demands within the OCWD Management Area for WY2016-17 to 2020-21 averaged 400,000 acre-feet per year (Figure 6-1). Total demand includes the use of groundwater, surface water from Santiago Creek and Irvine Lake, recycled water, and imported water.

Projected Water Demands

OCWD estimated future total water demands (including recycled water) within the OCWD Management Area to be approximately 431,000 acre-feet per year in 2050. This is based on a water demand study jointly funded by OCWD and MWDOC. This study was undertaken to assist the 19 major groundwater producers in the development of their 2020 Urban Water Management Plans. Water Demands within the OCWD Management Area was determined by summing the 19 producer future estimates and water produced by private, mutual water company, and irrigation wells.

Drought Management

During a drought, flexibility to manage pumping from the basin becomes increasingly important. The OCWD Management Area may experience a decline in the supply of recharge water (local supply of Santa Ana River water and net incidental recharge) of 55,000 acre-feet per year or more during drought.

Provided that the basin has available water in storage within the established operating range, this stored water provides a valuable water supply asset during drought conditions. Ensuring that the basin can provide a buffer against drought conditions requires:

- Maintaining sufficient water in storage that can be pumped out in time of need; and
- Possessing a plan to recover basin storage following the drought, including having a reserve account with sufficient funds to purchase replenishment water.

A sufficient supply of stored groundwater provides a safe and reliable buffer to manage for drought periods. If the basin, for example, has an available storage level of 150,000 acre-feet and can be drawn down to 500,000 acre-feet without irreparable seawater intrusion, a supply of 350,000 acre-feet is available for increased production. In a hypothetical five-year drought, an additional 70,000 acre-feet per year may be produced from the basin for five years without jeopardizing the long-term health of the basin. In addition to reducing pumping when the basin is at lower storage levels, planning for refilling the basin is important. Approaches for refilling the basin are described in Table 10-2.

10.5 DEFINITION OF SIGNIFICANT AND UNREASONABLE REDUCTION OF GROUNDWATER STORAGE

OCWD manages the groundwater basin to maintain groundwater storage levels within an operating range of up to 500,000 acre-feet below the full condition. Significant and unreasonable reduction of groundwater in storage would occur when the volume of groundwater in storage fell below the 500,000 acre-feet below full condition for an extended period of time. If OCWD were to consider an operating range below 500,000 acre-feet additional analysis and monitoring would be needed.

Table 10-2: Approaches to Refilling the Basin

APPROACH	DISCUSSION
Decrease Total Water Demands	• Increase water conservation and water-use efficiency measures
Decrease BPP	• Allows groundwater levels to recover rapidly • Decreases revenue to the OCWD • Increases water cost for groundwater producers • Does not require additional recharge facilities • Dependent upon other sources of water (e.g., imported water) being available to substitute for reduced groundwater pumping
Increase Recharge	• Dependent on increased supply of recharge water • Replenishment could be in the form of in-lieu water (additional imported water delivered to groundwater producers instead of groundwater pumping) • Water transfers and exchanges could be utilized to provide the increased supply of recharge water • May be dependent on building and maintaining excess recharge capacity (which may be underutilized in non-drought years)
Combination of the Above	• A combination of the approaches provides flexibility and a range of options for refilling the basin

10.6 DETERMINATION OF MINIMUM THRESHOLDS

The minimum threshold for significant and unreasonable reduction in groundwater in storage is reached when the storage volume of the groundwater basin falls below the operating range of up to 500,000 acre-feet below full condition for an extended period of time.

SECTION 11 SUSTAINABLE MANAGEMENT RELATED TO WATER QUALITY

OCWD has extensive monitoring and management programs in place to protect the groundwater basin from significant and unreasonable degradation of water quality including migration of contaminant plumes that impair water supplies. These programs include monitoring, remediation of contaminated groundwater, and recharging high-quality recycled water. This section describes sustainable basin management related to the water quality programs and projects instituted to prevent degradation of water quality and to remediate water quality problems in the OCWD Management Area.

11.1 SALINITY MANAGEMENT

Management of salt and nitrate concentrations in groundwater is important to maintaining the long-term sustainable use of groundwater supplies. OCWD also operates the Prado Wetlands to remove nitrate from Santa Ana River (SAR) water that is recharged into the groundwater basin. These efforts help provide high-quality groundwater to water users in Orange County.

In 2020, OCWD completed an evaluation of future TDS and nitrate concentrations in the Orange and Irvine Management Zones (OCWD, 2020). Figure 3-16 shows the areal extent of these zones, which are not to be confused with the OCWD Management Area that is the subject of this report. The 2020 update is similar to an analysis conducted in 2016 (OCWD, 2016) and involved using a model to evaluate the effects of different basin management scenarios on TDS and nitrate concentrations over the next 30 years. One of the key outputs of the model is the calculated ambient TDS and nitrate concentrations for groundwater in the Orange and Irvine Management Zones. The model-calculated ambient concentration represents a volume-weighted average value for the Shallow and Principal Aquifers. The report was prepared to meet regulatory requirements of the Regional Water Board as part of the watershed-wide salt and nutrient management plan.

Data and information used for this analysis included:

- Quantity and quality of water recharged through surface recharge facilities and injection wells
- Quantity and quality of unmeasured recharge, such as percolation of irrigation water into the groundwater basin
- Measurements of groundwater pumping
- Estimates of groundwater outflow from the Orange Management Zone

The most significant change from the prior analysis is the impact of the GWRS Final Expansion, which increases the volume of low-TDS recycled water recharged by 30,000 acre-feet per year. Because OCWD is obtaining the additional water from OC San Plant No. 2, the overall TDS of the recycled water generated increases slightly from 60 mg/L to 86 mg/L.

The quantity and quality of water recharged in the model for the Baseline Scenario are shown in Table 11-1.

Table 11-1: Baseline Projected Future Salt Inflows

Source of Water Recharge	Volume (acre-feet/yr)	TDS Conc. (mg/L)	Mass (tons/yr)
Deep percolation of precipitation*	6,500	100	900
Percolation of applied water*	9,000	1,900	23,200
Subsurface inflow*	44,500	1,290	78,200
SAR base flow	52,000	700	49,500
SAR storm flow	50,000	200	13,600
Recycled water (GWRS)	133,000	86	15,600
Alamitos Barrier	2,500	350	950
MWD imported water	0	0	0
Total	297,000	449	181,200

*Component of unmeasured recharge

The Baseline Scenario assumes that no imported water is used for recharge for the 30-year period and is utilized to compare with other model runs and determine how changing model inputs affect the predicted concentration. The projected trend for TDS for the Baseline declines from the current ambient groundwater concentration of 603 mg/L to 569 mg/L in 30 years as shown in Figure 11-1. Seven additional scenarios were run to model different quantities of recharge source water. The projected 30-year TDS for these scenarios range from 559 mg/L to 580 mg/L. This shows the tremendous impact of low-TDS GWRS water in lowering the overall salinity in the basin over time regardless of how much water is obtained from other recharge sources, such as higher TDS imported water.

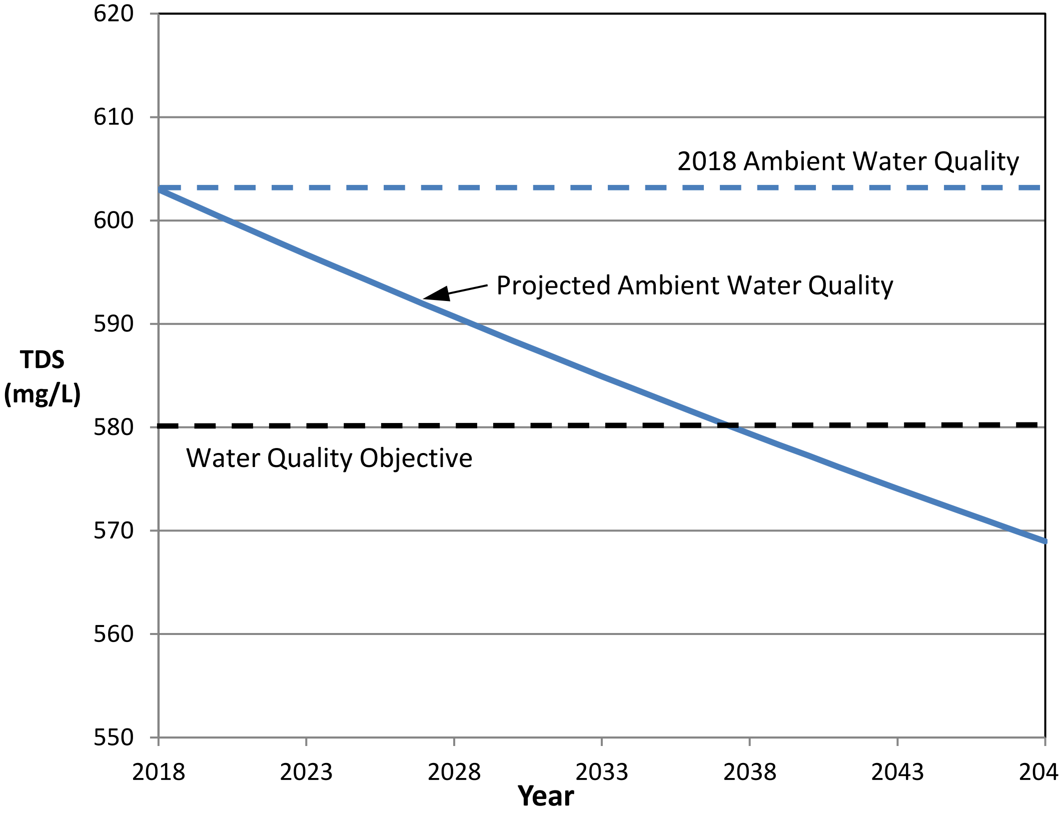


Figure 11-1: Estimated TDS Concentration in Base Case for 30-year Period

With regards to nitrate, the approach used to estimate future nitrate concentrations was similar to the approached used for TDS projections. The nitrate (as nitrogen, N) concentration for each inflow component was estimated using available data. Table 11-2 summarizes the inflow terms and their nitrate-N concentrations for the Baseline Scenario.

The flow-weighted average nitrate (as N) concentration for all inflows to the management zone is 2.3 mg/L. The initial concentration was set at 2.95 mg/L (based on the current ambient concentration for the most recent 20-year period).

Since the inflow concentration is less than the initial concentration, the estimated future nitrate (as N) concentration gradually decreases. For the Baseline Scenario, the ambient nitrate (as N) concentration is projected to decrease from 2.95 mg/L to 2.8 mg/L over the course of 30 years. Again, as with TDS, the impact of recharging large volumes of high quality GWRS water lowers nitrate concentrations in basin groundwater over time.

Table 11-2: Baseline Future Nitrate (as N) Inflows

Inflow	Volume (Acre-Feet/yr)	Nitrate-N Conc.(mg/L)	Mass (tons/yr)
Deep percolation of precipitation*	6,500	1	9
Percolation of applied water*	9,000	10	122
SAR base flow	52,000	3.6	255
SAR storm flow	50,000	1.3	88
Imported water recharge	0	0	0
Recycled water recharge (GWRS)	133,000	1.0	181
Subsurface inflow*	44,500	4.2	253
Alamitos Barrier	2,000	1.4	4
Total	297,000	2.3	657

*component of unmeasured recharge

11.2 GROUNDWATER QUALITY IMPROVEMENT PROJECTS

This section describes specific projects that improve groundwater quality by removing TDS, nitrate, VOCs and other constituents, including PFAS. The locations of these projects, except for PFAS, are shown in Figure 11-2. PFAS projects are located at specific groundwater producer wells.

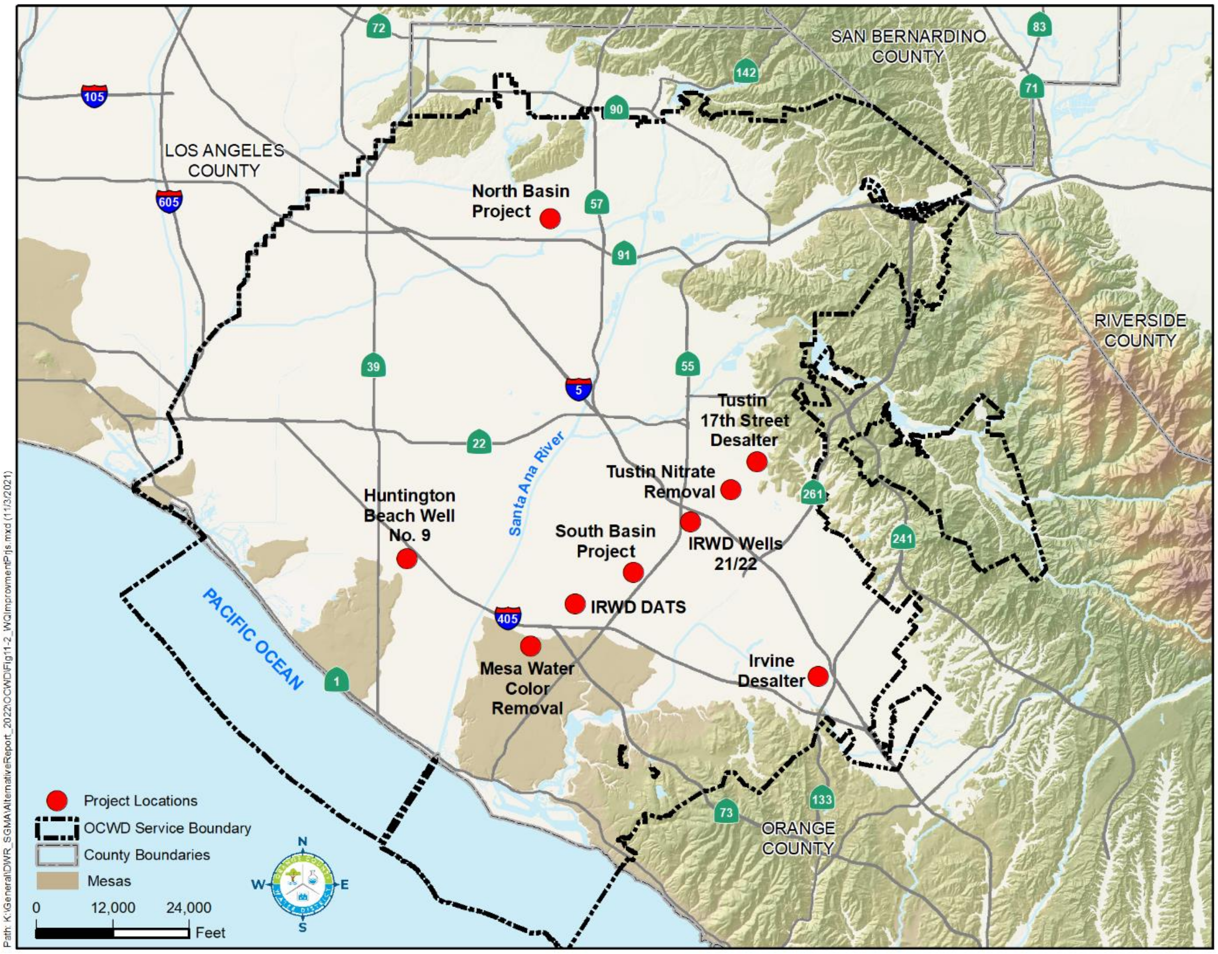


Figure 11-2: Water Quality Improvement Projects and Programs

North Basin Groundwater Protection Program

The U.S. Environmental Protection Agency (USEPA) is taking the lead to remediate a VOC plume in the North Basin area of the groundwater basin as shown in Figure 11-3. Groundwater contamination is primarily found in the Shallow Aquifer, which is generally less than 200 feet deep; however, VOC-impacted groundwater has migrated downward into the Principal Aquifer tapped by production wells. The contamination continues to migrate both laterally and vertically threatening downgradient production wells operated by the cities of Fullerton and Anaheim and other agencies. OCWD is conducting a remedial investigation/feasibility study under USEPA oversight to evaluate and develop effective remedies to address the contamination under the National Contingency Plan (NCP) process. In September 2020 the USEPA included the North Basin site on the National Priorities (Superfund) List.

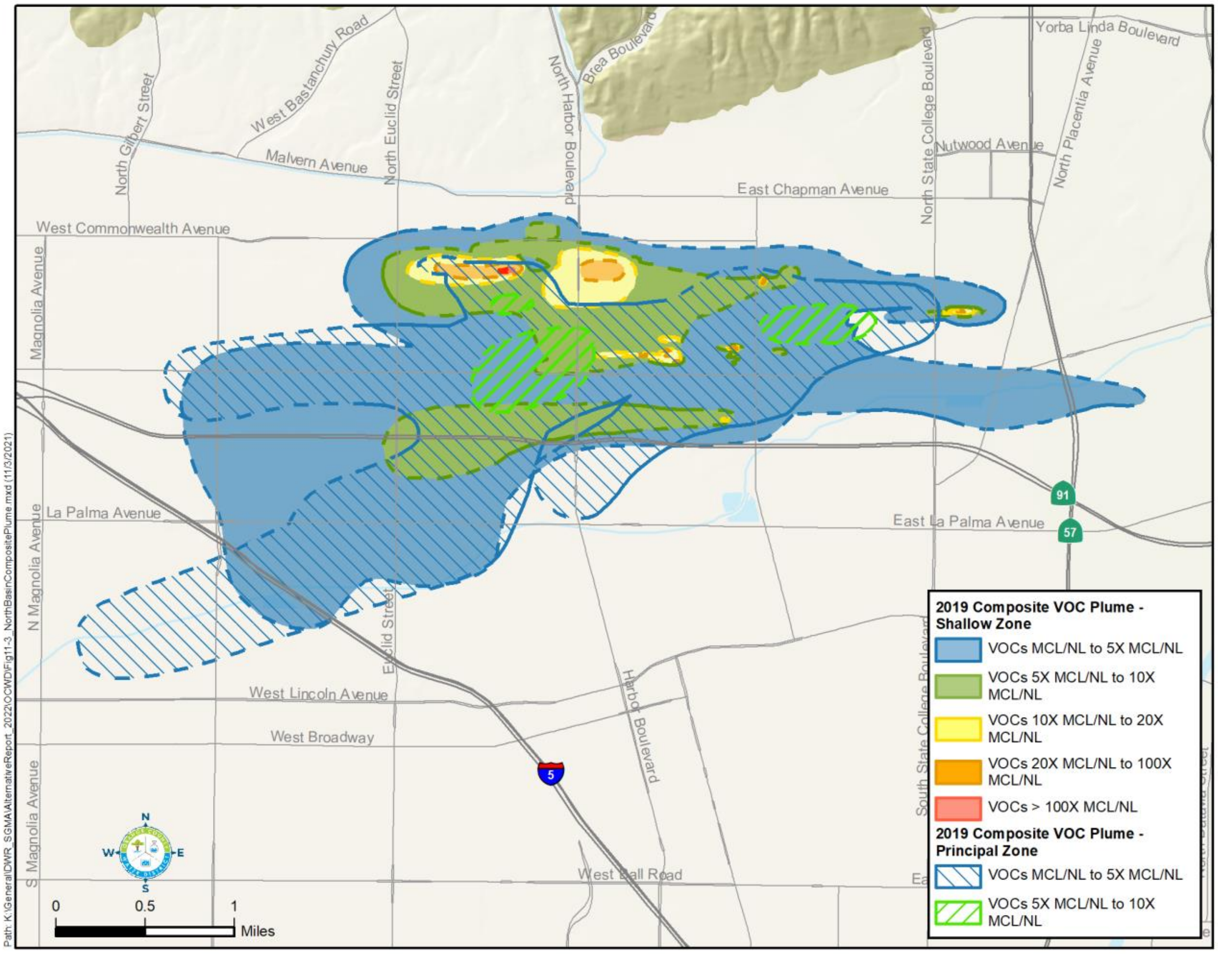


Figure 11-3: North Basin Groundwater VOC Plume

South Basin Groundwater Protection Program

Groundwater contaminated with VOCs and perchlorate in the South Basin area of the groundwater basin is shown in Figure 11-4. Elevated concentrations of perchloroethylene (PCE), trichloroethylene (TCE), and perchlorate were detected in Irvine Ranch Water District's Well No. 3, located in Santa Ana. OCWD's remedial investigation has resulted in the delineation of an approximately 2-mile long comingled contaminant plume. With the remedial investigation complete, OCWD is proceeding with a feasibility study to evaluate and develop remedial measures in cooperation with regulatory agencies and stakeholders following the NCP process. In tandem with OCWD's remediation program to address off-site contamination, the Regional Water Board and DTSC are overseeing investigation and remediation activities at the contaminant source sites.

MTBE Remediation

In 2003, OCWD filed suit against numerous oil and petroleum-related companies that produce, refine, distribute, market, and sell MTBE and other oxygenates. The suit seeks funding from these responsible parties to pay for the investigation, monitoring and removal of oxygenates from the basin. Most of the major defendants have settled the litigation with OCWD, and funds from these settlements have been set aside for use at such time as treatment is required at drinking water wells.

Treatment technologies used to remove MTBE from groundwater include granular activated carbon or advanced oxidation. Depending upon site-specific requirements, a treatment train of two or more technologies in series may be appropriate (i.e., use one technology to remove the bulk of MTBE and a follow-up technology to polish the effluent water stream).

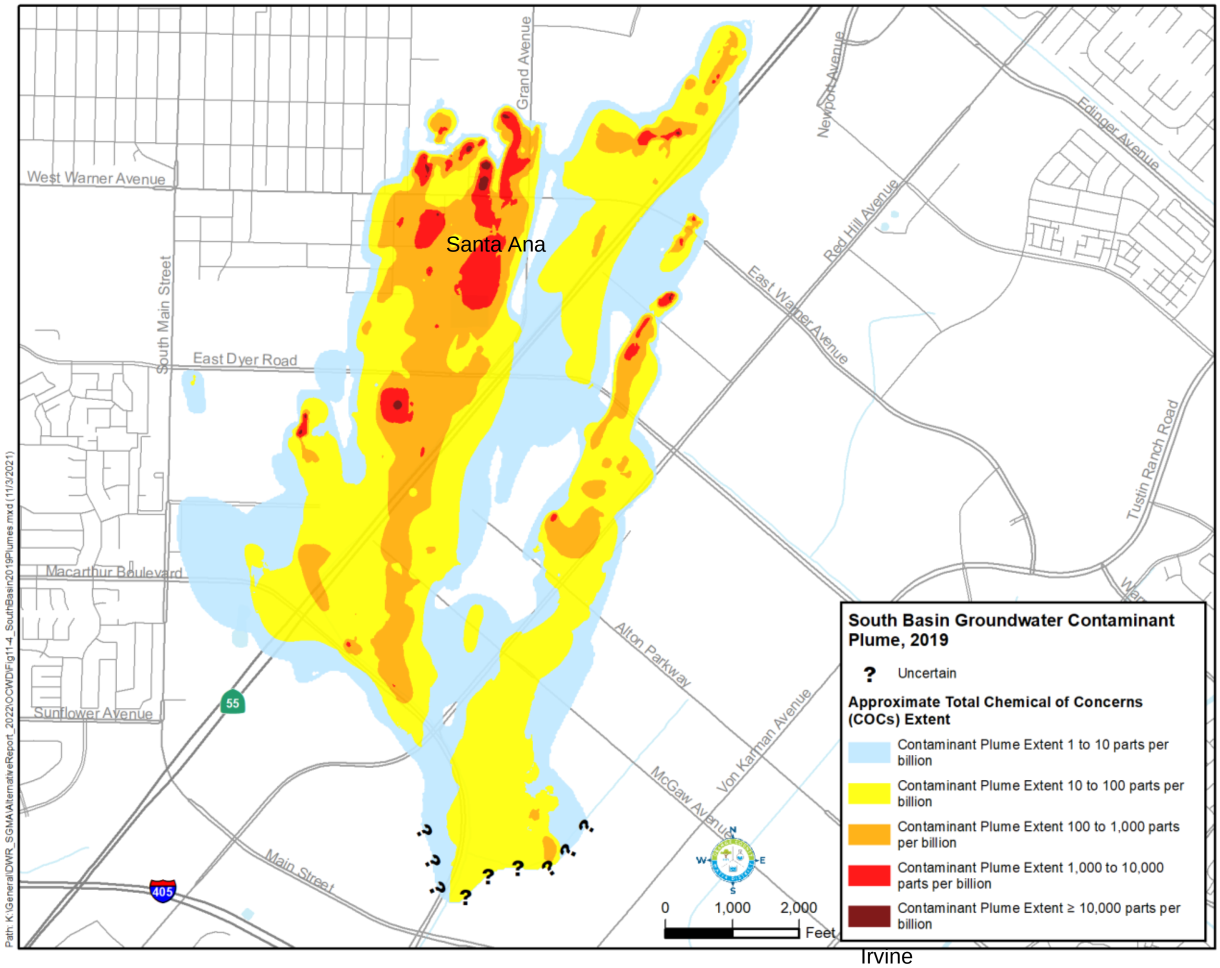


Figure 11-4: South Basin Groundwater Contaminant Plume

Irvine Desalter

The Irvine Desalter was built in response to elevated TDS and nitrate and the discovery in 1985 of VOCs beneath the former El Toro Marine Air Corps Station and the central area of Irvine. A plume of TCE migrated off base and impacted the groundwater basin. In 1990 the USEPA placed the site on the National Priorities List. Irvine Ranch Water District and OCWD cooperated with the U.S. Department of Navy in building production wells, pipelines and two treatment plants, both of which are now owned and managed by IRWD. Operating since 2007, the two plants remove VOCs by air-stripping and vapor-phase carbon adsorption with the treated water used for irrigation and recycled water purposes. A third plant treats groundwater outside the plume to remove excess nitrate and TDS concentrations using reverse osmosis (RO) membranes for drinking water purposes. Combined production of the Irvine Desalter wells is approximately 8,000 acre-feet per year. OCWD provides a financial subsidy to IRWD in the form of a BEA exemption to help offset the treatment costs.

Tustin Desalters

Tustin's Main Street Treatment Plant has operated since 1989 to reduce nitrate levels from the groundwater produced by Tustin's Main Street Wells Nos. 3 and 4. The groundwater undergoes either RO or ion exchange treatment. The RO membranes and ion exchange units operate in a parallel treatment train. Approximately 1 mgd is bypassed and blended with the treatment plant product water to produce up to 2 mgd or 2,000 acre-feet per year.

The Tustin Seventeenth Street Desalter began operation in 1996 to reduce high nitrate and TDS concentrations from the groundwater pumped by Tustin's Seventeenth Street Wells Nos. 2 and 4 and Tustin's Newport Well. The desalter utilizes two RO membrane trains to treat the groundwater. The treatment capacity of each RO train is 1 mgd. Approximately 1 mgd is bypassed and blended with the RO product water to produce up to 3 mgd or 3,000 acre-feet per year. OCWD provides a financial subsidy to the City of Tustin in the form of a BEA exemption to help offset the treatment costs.

Irvine Ranch Water District Wells 21 and 22

Water produced by IRWD Wells 21 and 22 contain nitrate (as N) at levels exceeding the primary MCL of 10 mg/L. TDS concentrations range from 650-740 mg/L, which is above the secondary MCL of 500 mg/L. Because of the elevated nitrate, TDS, and hardness concentrations, IRWD constructed a RO treatment facility to reduce concentrations in the water before conveying to the potable supply distribution system. Operation of the treatment facility provides 6,300 acre-feet per year of drinking water and benefits the groundwater basin by reducing the spread of impaired groundwater to other portions of the basin. OCWD provides a financial subsidy to IRWD in the form of a BEA exemption to help offset the treatment costs.

Amber-Colored Groundwater

Amber-colored water is found in the Deep Aquifer (600 to 2,000 feet below ground surface). Natural organic material from ancient, buried plant and wood material gives the water an amber tint and a sulfur odor. Although this water is of high quality, its color and odor produce negative aesthetic qualities that require treatment before use as drinking water.

Two facilities currently treat colored groundwater in Orange County for potable supply. In 2001, Mesa Water District opened its Colored Water Treatment Facility capable of treating 5.8 mgd. This facility was replaced in 2012 by the 8.6-mgd Mesa Water Reliability Facility that uses nano-filtration membranes to remove color. OCWD provides a financial subsidy to Mesa Water District in the form of a BEA exemption to help offset the treatment costs. The second facility is the Deep Aquifer Treatment System (DATS), a treatment facility owned and operated by the IRWD since 2002 that uses nano-filtration membranes. This facility purifies 7.4 mgd of amber-colored water.

PFAS Treatment Systems

In 2020 OCWD as the groundwater basin manager, executed a multi-party agreement with the impacted groundwater producers to fund and construct the necessary treatment systems for production wells impacted by PFAS compounds. The PFAS treatment projects include the design, permitting, construction, and operation of PFAS treatment systems for impacted production wells. Each well treatment system will be evaluated for use with granular activated carbon (GAC), ion exchange (IX), or an alternative novel sorbent for the removal of PFAS compounds. These treatment systems utilize vessels in a lead-lag configuration to remove PFOA and PFOS to less than 2 ppt, the current laboratory detection limit. These PFAS treatment systems are designed to ensure the groundwater supplied by producer wells can be served in compliance with current and future PFAS regulations. The groundwater producers will own the treatment systems once they are completed; with financial assistance from OCWD, the groundwater producers will operate and maintain the new treatment systems once they are constructed.

To minimize alternative water supply expenses and provide maximum protection to the public water supply, OCWD initiated design, permitting, and construction of the PFAS treatment projects on a schedule that allows rapid deployment of treatment systems. As of September 2021, construction contracts have been awarded for treatment systems for production wells owned by the cities of Orange (Phase 1) and Garden Grove, Serrano Water District, and Yorba Linda Water District. The City of Anaheim has also awarded a design-build contact (Phase A) for 8 impacted wells, that will be reimbursed by OCWD. The City of Fullerton’s well KIM-1A treatment system has been completed and is in operation. Additional construction contracts are anticipated to be awarded for impacted wells operated by the cities of Fullerton (Main Plant), Orange (Phase 2), Santa Ana, and Tustin; Irvine Ranch Water District; and East Orange County Water District by early 2022. OCWD expects the treatment systems to be constructed for the approximately 60 impacted wells within the next 2 to 3 years. Figure 11-5 shows locations of wells affected by and to be treated for PFAS.

As monitoring continues and additional wells are anticipated to be taken off-line due to PFAS detections reported at or near the current RL (or future MCL), OCWD will continue to partner with the affected groundwater producers and take action to design and construct necessary treatment systems to bring the impacted wells back online as quickly as possible.

Groundwater production in WY2020-21 was expected to be approximately 325,000 acre-feet but declined to 282,000 acre-feet primarily due to PFAS-impacted wells being turned off around February 2020. OCWD projects groundwater production to be approximately 250,000 acre-feet in WY2021-22 due to the currently idled wells and additional wells being impacted by PFAS and turned off. As PFAS treatment systems are constructed, OCWD expects total annual groundwater production to increase back to levels similar to years prior to PFAS impacts.

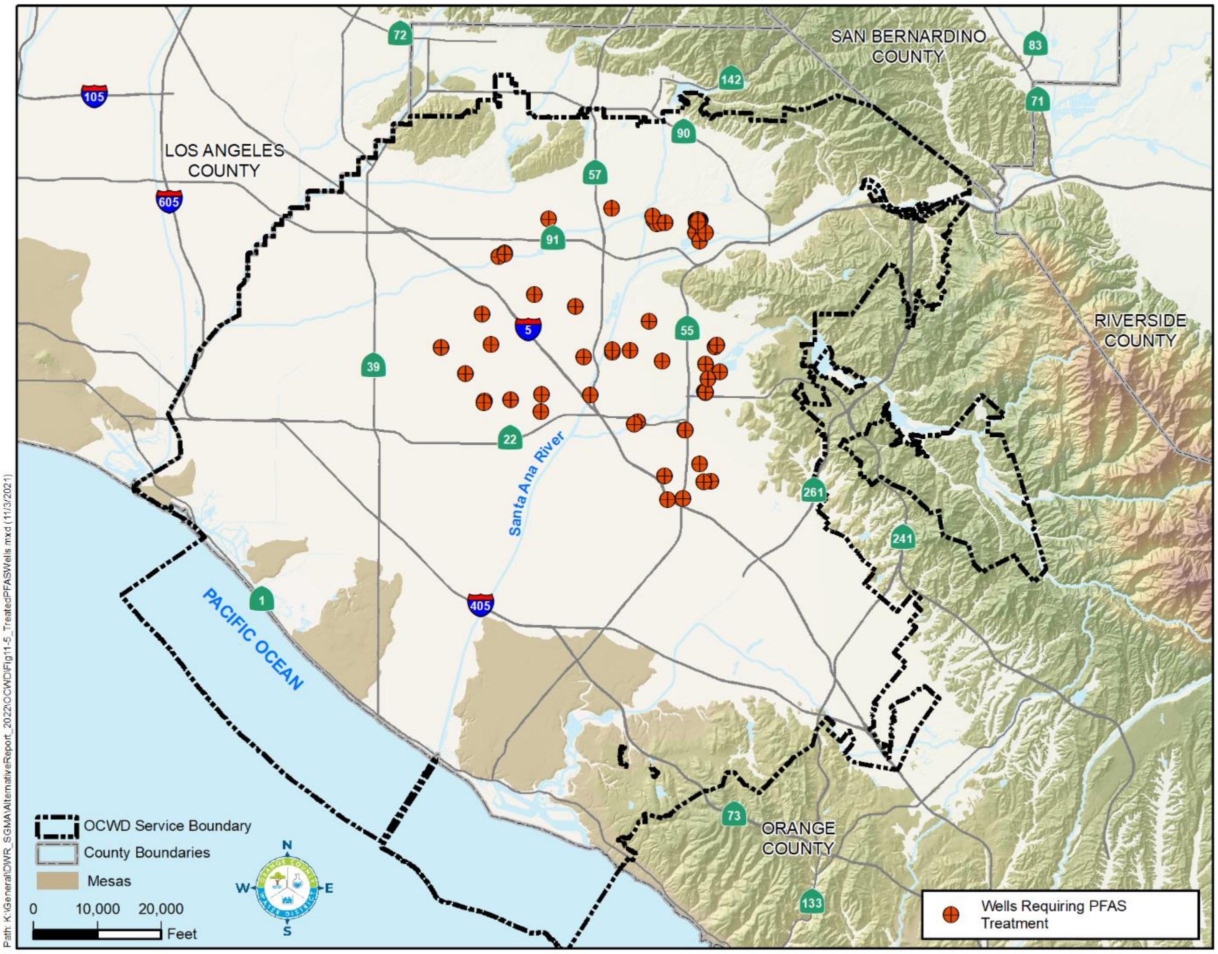


Figure 11-5: Production Wells to be Treated to Remove PFAS

BEA Exemption for Water Quality Improvement Projects

In some cases, OCWD encourages the pumping of groundwater that does not meet drinking water standards in order to protect water quality. This is achieved by using a financial incentive called the Basin Equity Assessment (BEA) Exemption. The benefits to the basin include promoting beneficial uses of poor-quality groundwater and reducing or preventing the spread of poor-quality groundwater into non-degraded aquifer zones.

OCWD uses a partial or total exemption of the BEA to compensate a qualified participating groundwater producer for the costs of treating poor-quality groundwater. These costs typically include capital, interest and operations and maintenance (O&M) costs for the treatment facilities.

Using this approach, OCWD has exempted all or a portion of the BEA for pumping and treating groundwater for removal of nitrates, TDS, VOCs, and other contaminants. Water quality improvement projects that currently are receiving BEA exemptions are listed in Table 11-3.

Table 11-3: Summary of BEA Exemption Projects

Project Name	Project Description	BEA Exemption Approved	Average 5-Year Pumping (afy)	Max Production Above BPP (afy)	OCWD BEA Subsidy
Irvine Desalter	Remove nitrates, TDS, and VOCs	2001	6,990	10,000	Exemption
Tustin Desalter	Remove nitrates and TDS	1998	2,240	3,500	Exemption
Tustin Nitrate Removal	Remove nitrates	1998	170	1,000	Exemption
Mesa Water Colored Water Removal	Remove color	2011	4,605	8,700	Exemption
IRWD Wells No. 21 and 22	Remove nitrates	2012	2,420	7,000	Exemption
Huntington Beach Well No. 9	Remove odor	2018	1,680 (3 yrs)	3,000	Partial exemption

DEFINITION OF SIGNIFICANT AND UNREASONABLE DEGRADATION OF WATER QUALITY

Three elements must be considered when evaluating the impact of groundwater quality degradation with regard to SGMA undesirable results.

The first element is considering the causal nexus between groundwater management activities and groundwater quality. For example, groundwater contamination due to improper handling of toxic materials impacts groundwater quality; however, this water quality degradation is not caused by groundwater management activities.

The second element is the beneficial uses of the groundwater and water quality regulations, such as MCLs and other potable water quality requirements.

The third element that must be considered is the volume of groundwater impacted by quality degradation. If small volumes are negatively affected that do not materially affect the overall use of the aquifer or basin for its existing beneficial uses, then this would not represent a significant and unreasonable degradation of water quality. However, if the impacted volume grows, then it could reach a level that it becomes significant and unreasonable.

When considering all three elements, “significant and unreasonable degradation of water quality” is defined as degradation of groundwater quality attributable to groundwater production or recharge practices in the OCWD Management Area and to the extent that a significant volume of groundwater becomes unusable for its designated beneficial uses.

11.4 DETERMINATION OF MINIMUM THRESHOLDS

The minimum thresholds for groundwater quality are exceedances of MCLs or other applicable regulatory limits that are directly attributable to groundwater management actions in the OCWD Management Area that prevent the use of groundwater for its designated beneficial uses.

SECTION 12 SUSTAINABLE MANAGEMENT RELATED TO SEAWATER INTRUSION

In the coastal area of the Orange County groundwater basin, the primary source of saline groundwater is seawater intrusion through permeable aquifer sediments underlying topographic lowlands or gaps between the erosional remnants or mesas of the Newport-Inglewood Uplift. The susceptible locations from north to south are the Alamitos, Sunset, Bolsa, and Talbert gaps as shown in Figure 3-20.

OCWD's policy regarding control of seawater intrusion is implemented through a comprehensive program that includes operating seawater intrusion barriers, monitoring and evaluating barrier performance, monitoring and evaluating susceptible coastal areas, and coastal groundwater management. These programs enable OCWD to sustainably manage groundwater conditions in the basin in order to prevent significant and unreasonable seawater intrusion.

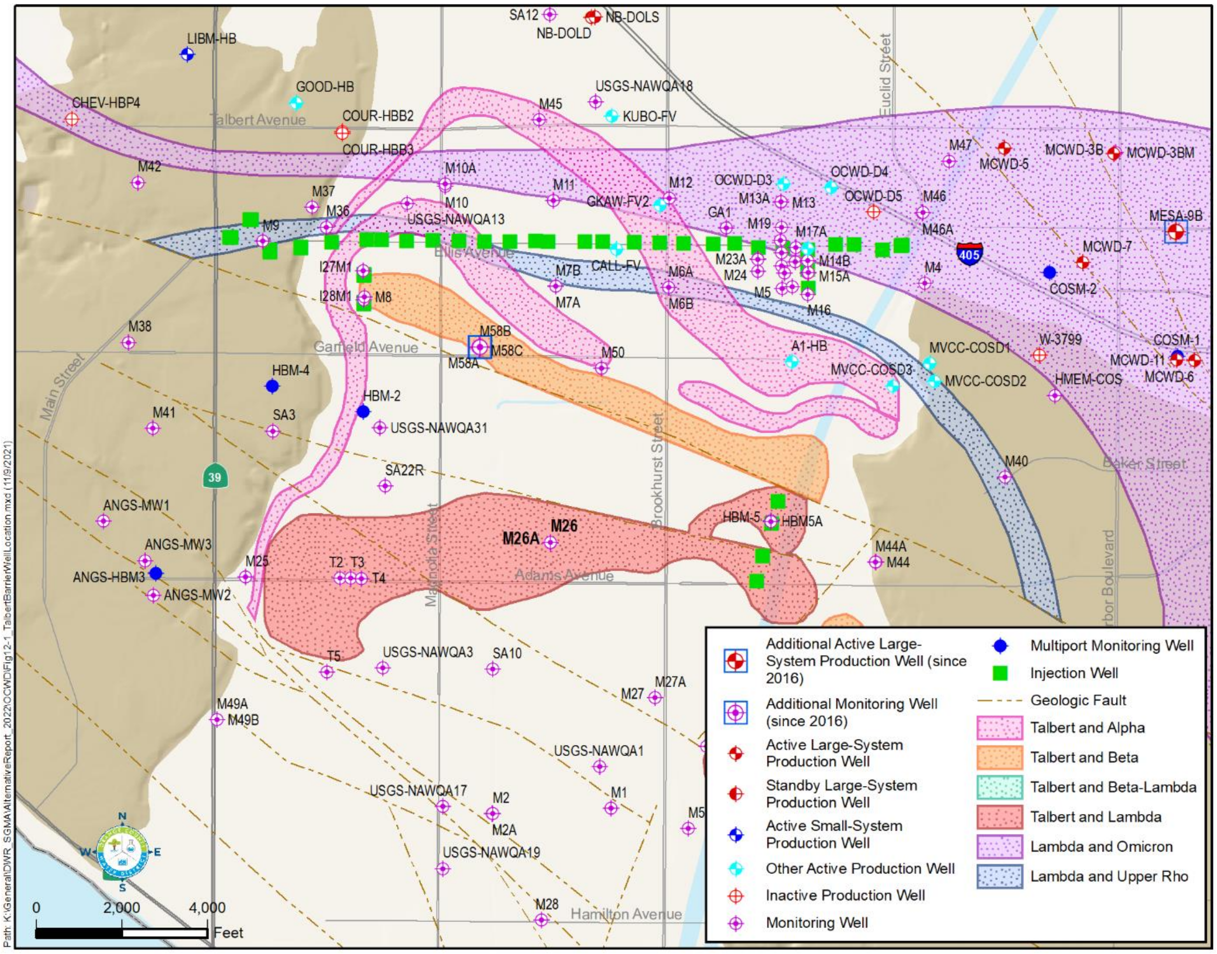
12.1 TALBERT GAP

The Talbert Gap, also referred to as the Santa Ana Gap, is shown in Figure 12-1. The furthest seaward mergence zone between the Talbert and Lambda aquifers in the vicinity of Adams Avenue is a primary pathway by which seawater can potentially migrate inland and downward within the Talbert Gap.

OCWD monitoring well M26 is a key monitoring well for evaluating barrier injection requirements versus seawater intrusion potential and is used to assess whether protective groundwater elevations are being achieved in the Talbert Gap. The well is strategically located seaward of the barrier in the middle of the Talbert Gap and is screened within the merged Talbert and Lambda aquifers (see Figure 12-2). At the location of well M26, the protective groundwater elevation is approximately 3.5 feet above mean sea level (msl), as explained below.

The protective groundwater elevation is based on the Ghyben-Herzberg relation (Ghyben, 1888; Herzberg, 1901; Freeze and Cherry, 1979, pp. 375-376), which takes into account the depth of the Talbert aquifer at a given location along with the density difference between saline and fresh groundwater. Using this relation, for every 40 feet that the bottom of the aquifer is below sea level, there should be about one foot of head of fresh water above sea level to overcome the density effect of seawater. In the case of well M26, the bottom of the merged Talbert-Lambda aquifer is approximately 140 feet below sea level. Therefore, the freshwater head (protective elevation) should be approximately 140 feet divided by 40 which equals 3.5 feet above sea level. Achieving this protective elevation at well M26 is OCWD's goal to prevent brackish water in the Talbert aquifer from migrating down into the Lambda aquifer that is tapped by inland production wells.

Figure 12-2 shows the historical interrelationship between coastal groundwater production, Talbert Barrier injection, and groundwater elevations at well M26 from 2008 to 2021. This figure shows that groundwater elevations at well M26 have consistently been maintained at or above protective elevations since 2010 with the exception of brief periods related to GWRS shutdowns.



⊕	Additional Active Large-System Production Well (since 2016)	●	Multiport Monitoring Well
⊕	Additional Monitoring Well (since 2016)	🟩	Injection Well
◆	Active Large-System Production Well	- - -	Geologic Fault
◆	Standby Large-System Production Well	▨	Talbert and Alpha
◆	Active Small-System Production Well	▨	Talbert and Beta
◆	Other Active Production Well	▨	Talbert and Beta-Lambda
⊕	Inactive Production Well	▨	Talbert and Lambda
⊕	Monitoring Well	▨	Lambda and Omicron
		▨	Lambda and Upper Rho

Figure 12-1: Talbert Gap – Seawater Intrusion Barrier

Figure 12-3 shows the 250 mg/L chloride concentration contour in the Talbert and Bolsa gaps and adjacent mesas for 1993, 1998, 2008, and 2020. The 250 mg/L chloride contour is used to delineate the inland extent of intrusion because this is above ambient (non-intruded) groundwater quality and is equal to the secondary drinking water standard. Native fresh groundwater in this area typically has a chloride concentration well below 100 mg/L, while the GWRS injection supply has a chloride concentration of approximately 10 mg/L. This figure shows that the 250 mg/L chloride contour has remained relatively unchanged from 2008 to 2020, indicating that the barrier and other basin management programs are keeping seawater intrusion from taking place.

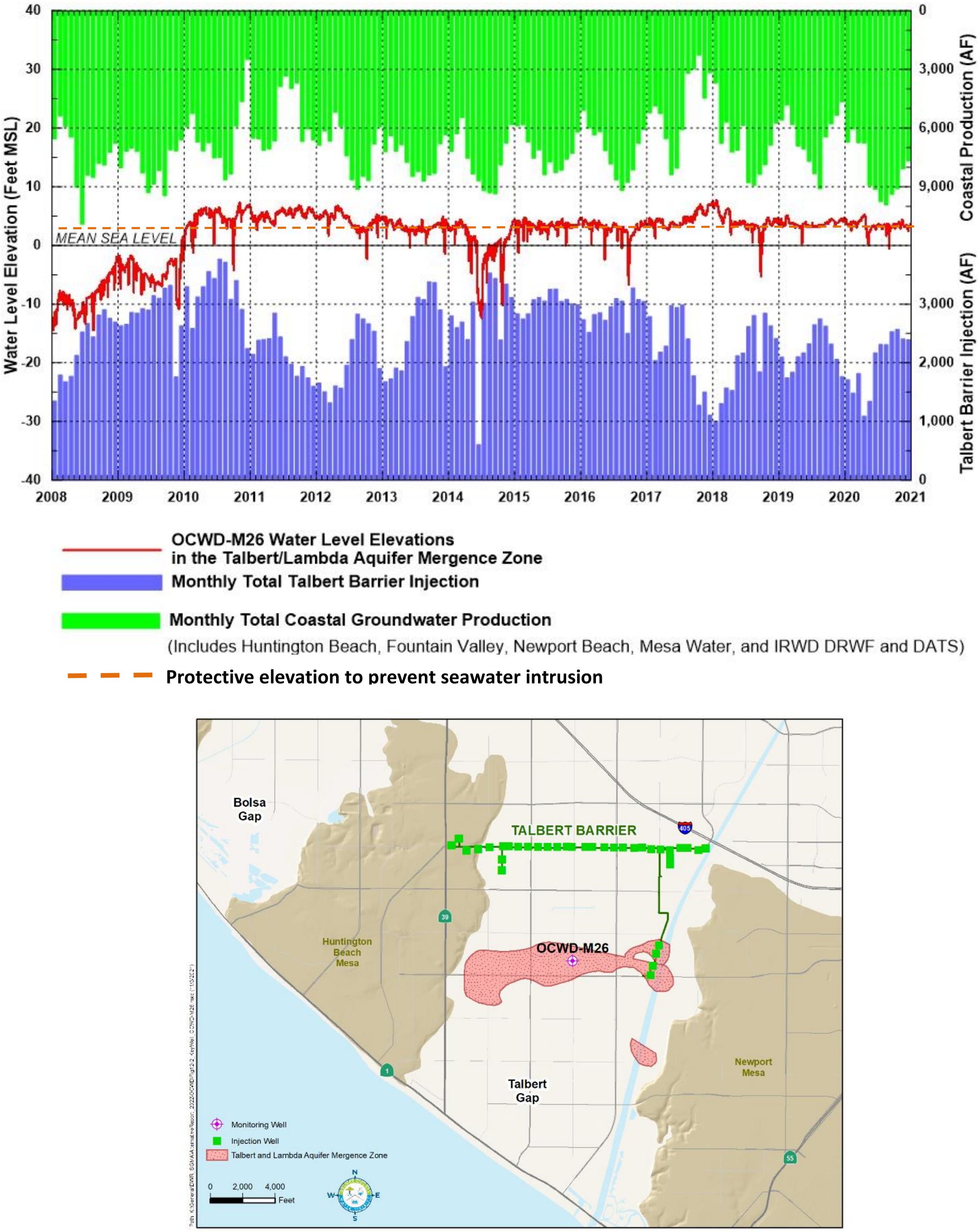


Figure 12-2: Key Well OCWD-M26 Groundwater Levels, Talbert Barrier Injection, and Coastal Pumping

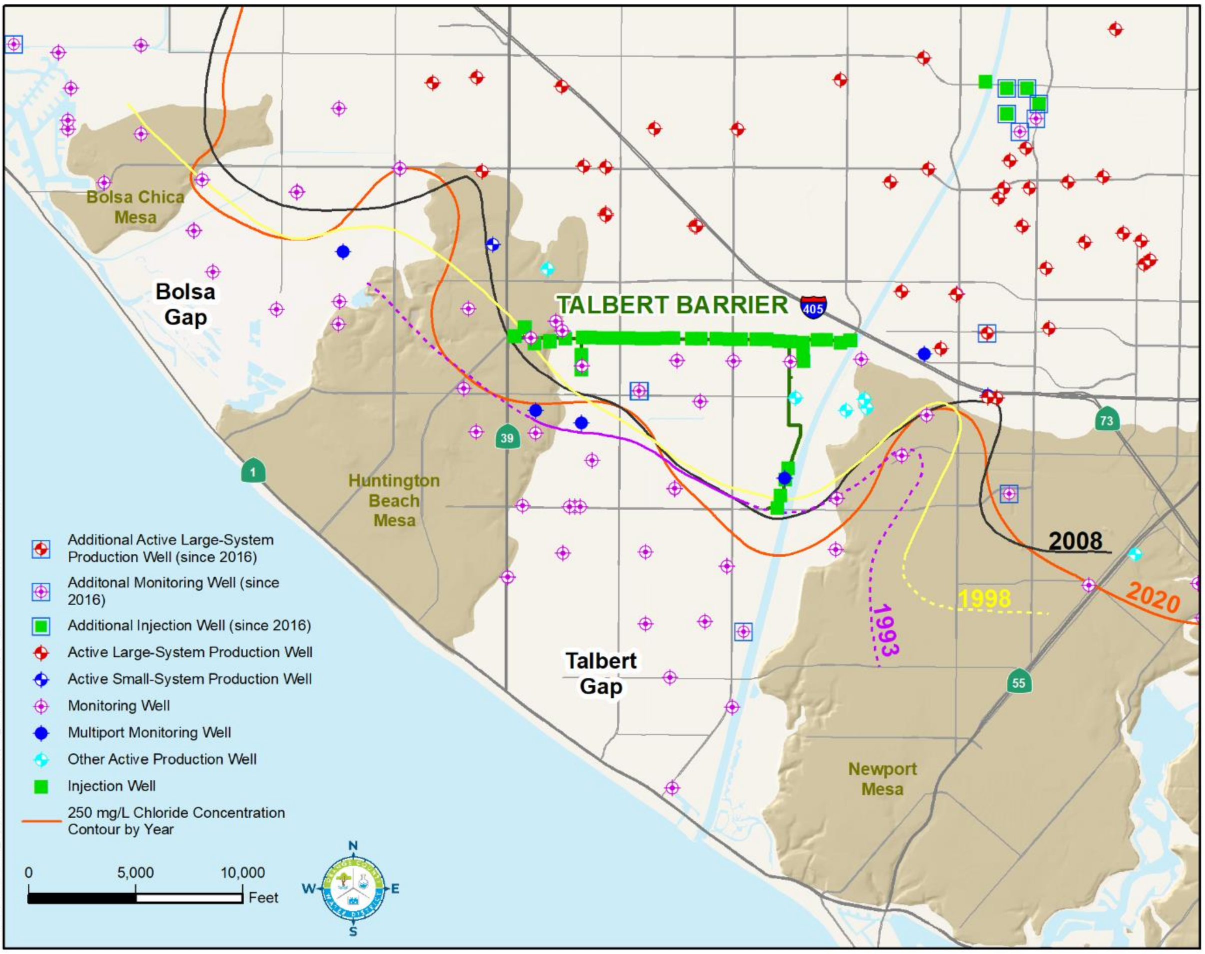


Figure 12-3: Talbert Gap 250 mg/L Chloride Concentration Contours for Selected Years

12.1.1 Talbert Barrier Groundwater Model

OCWD has developed a calibrated MODFLOW groundwater model of the Talbert Barrier and surrounding area (Talbert Model). In addition to helping to guide the planning, location, and hydraulic effectiveness of the supplemental injection wells for the Talbert Barrier during pre-GWRS planning activities, the Talbert Model was also used to estimate the general groundwater flow paths and subsurface residence time of barrier injection water by using the USGS particle tracking code MODPATH (Pollack, 1994). This modeling work provided the basis for delineating a recycled water retention buffer area surrounding the Talbert Barrier at a distance of 2,000 feet and one-year travel distance. No new drinking water production wells are allowed within this buffer area, as required by the California Department of Public Health requirements contained within the original permit to operate GWRS (RWQCB, 2004; OCWD, 2005). For more information on the Talbert Model, see the 2017 Alternative.

12.2 ALAMITOS GAP

The Alamitos Barrier Project was initially constructed in 1964 and became operational in 1965 to manage seawater intrusion in the Alamitos Gap. The barrier has been expanded over time to include the construction of additional injection and monitoring wells (Figure 12-4).

Similar to the Talbert Barrier, the Alamitos Barrier consists of both nested and cluster-type injection wells screened discretely in each aquifer in order to control the injection rate and injection pressure into each targeted aquifer independently since each aquifer has different physical characteristics and groundwater levels.

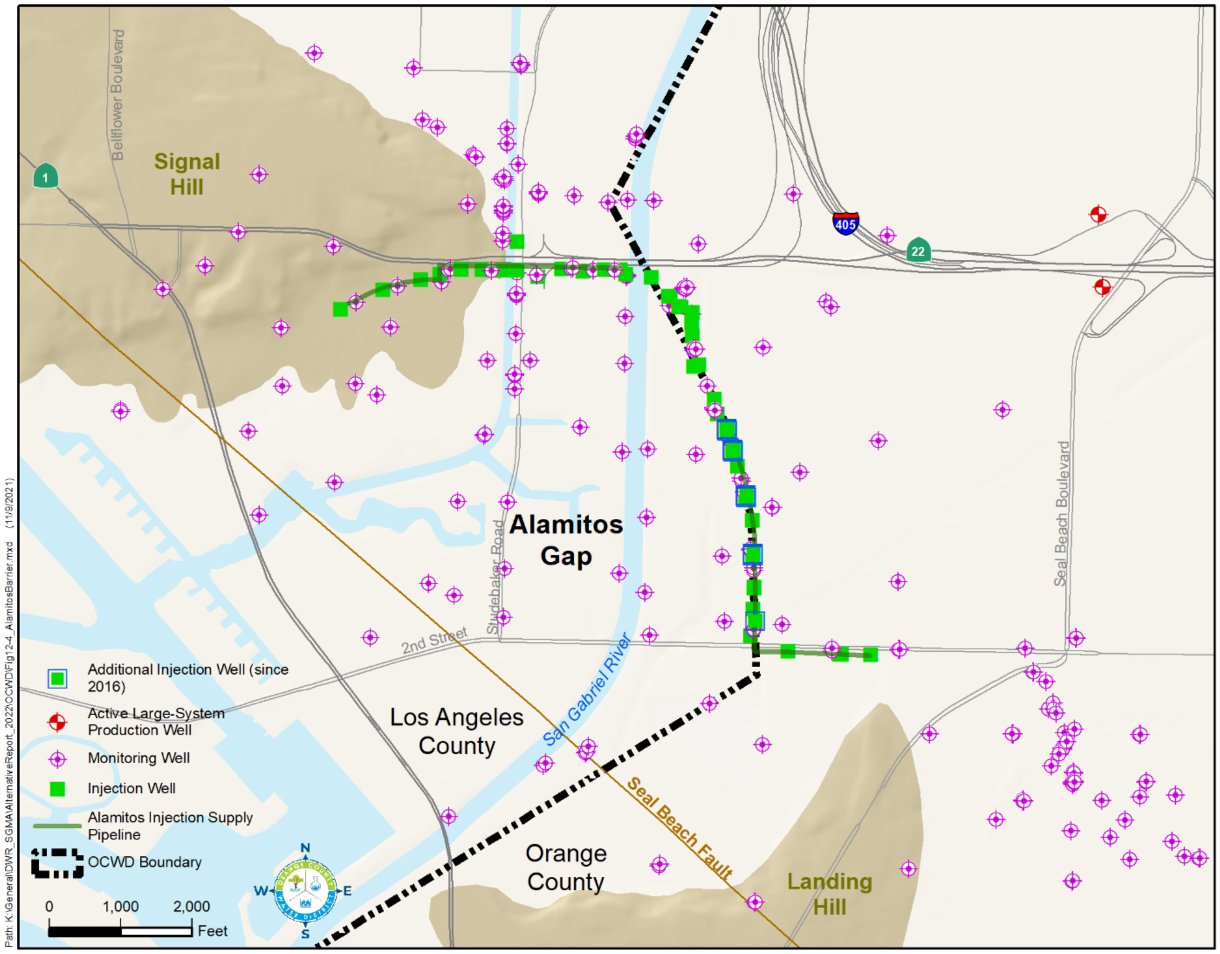


Figure 12-4: Alamitos Gap – Seawater Intrusion Barrier

The pathways for intrusion in Alamitos Gap are similar to the Talbert Gap with the uppermost Recent aquifer connected to the Pacific Ocean. Once seawater migrates inland within the Recent aquifer past the Seal Beach Fault, the brackish water can then migrate downward into the C, B, A, and I aquifers via areas of hydraulic mergence with the Recent aquifer where the intervening low-permeability aquitards are absent. These susceptible Pleistocene aquifers were warped upward by the Newport-Inglewood Fault Zone and then during Recent geologic time were eroded away and subsequently overlain by the Recent aquifer river deposits. The aquifers susceptible to intrusion are generally thinner and finer-grained than their counterparts in Talbert Gap. Therefore, per-well injection capacity in the Alamitos Barrier is about half that of the Talbert Barrier and thus requires more injection wells and denser spacing to achieve sufficient injection for creating a continuous pressure ridge that achieves protective elevations.

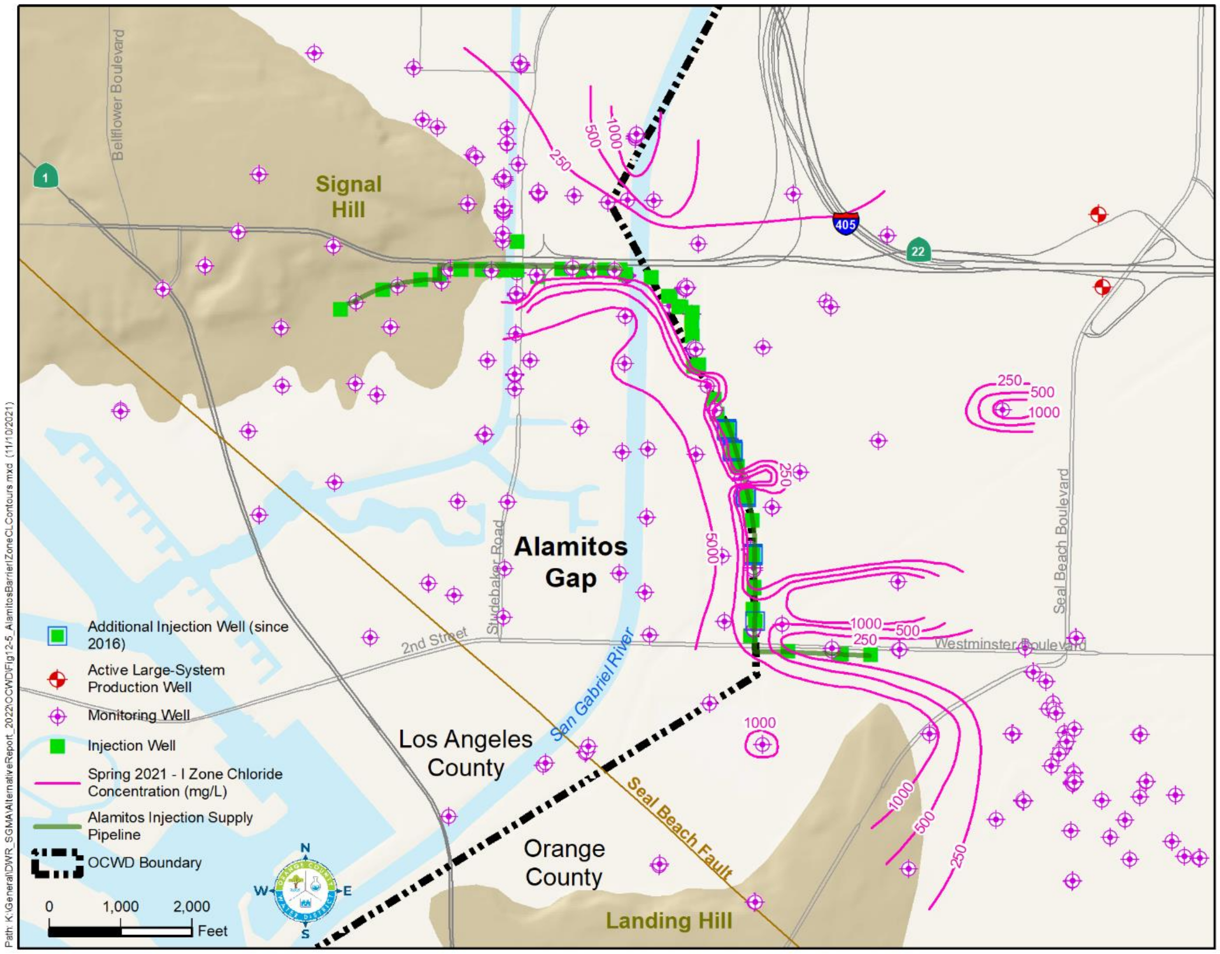


Figure 12-5: Alamitos Gap I Zone Chloride Concentration Contours, 2021

Additional injection wells were constructed as part of the Alamitos Barrier Improvement Project to control the identified breaches through the barrier and to address barrier deficiencies along the north-south reach where injection well spacing was too large and injection well capacity too small. In addition, four monitoring wells and two piezometer were installed to improve monitoring near the barrier. Figure 12-5 shows the extent of chlorine intrusion in the I zone in 2021.

Since the completion of the Alamitos Barrier Improvement Project in 2018, freshwater injection capacity along the north-south barrier alignment has improved with the even distribution of injection flow through the added new wells and water levels along this barrier reach have achieved and maintained protective elevations, a first since the barrier was constructed over 50 years ago.

LACPW continues to operate and maintain the existing and new barrier facilities as OCWD will continue to work alongside LACPW to monitor the water levels and the barrier performance along the stretch affecting Orange County.

12.2.1 Alamitos Barrier Groundwater Model

A transient groundwater flow and solute transport model of the Alamitos Barrier area was developed and calibrated in 2010 by Intera, Inc. with oversight and cost sharing from OCWD, LACPW, and WRD. The model was developed to provide a useful tool to evaluate the existing barrier's effectiveness, determine barrier expansion requirements, evaluate migration of saline intrusion as well as migration of recycled injection water towards production wells for regulatory purposes, and optimize existing barrier operations. For more information on this model, see the 2017 Alternative.

12.3 SUNSET GAP

Sunset Gap was historically considered to be a much lesser seawater intrusion threat compared to the Talbert and Alamitos Gaps. Recent monitoring data, however, indicate that seawater intrusion is occurring in Sunset Gap, as shown schematically in a cross-section in Figure 12-6. Figure 12-7 shows the location of this cross-section.

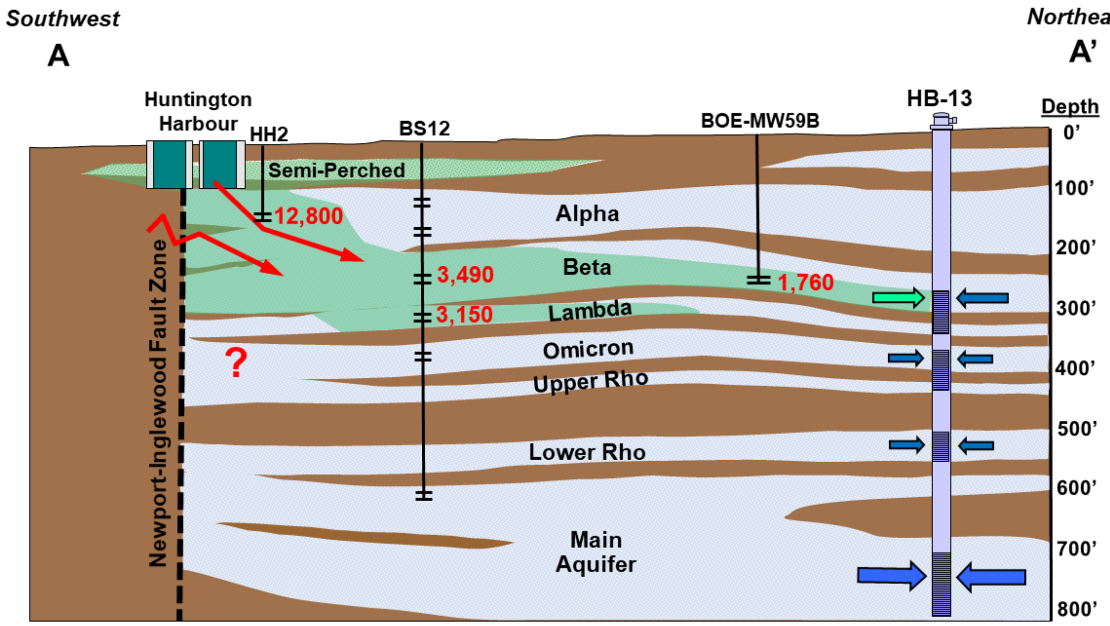


Figure 12-6: Schematic Geologic Cross-Section from Huntington Harbor through Sunset Gap (Fall 2020 Chloride Concentrations, mg/L)

Three potential seawater intrusion source areas appear likely:

- Intrusion from Alamitos Gap south of Alamitos Barrier moving in an easterly direction
- Intrusion moving north-northeasterly from the Huntington Harbor Marina where dredged canals may have breached through the shallow aquitard overlying the shallow-most potable aquifer
- Lateral leakage across the Newport/Inglewood Fault Zone (Seal Beach Fault) in the Landing Hill area in one or more of the Upper Pleistocene aquifers

In the southeast portion of Sunset Gap, dredging associated with construction of the boat canals in Huntington Harbor during the 1960s was the subject of several studies at that time regarding the potential for causing saline intrusion. Conclusions of these studies were inconsistent and inconclusive. Studies done by the USGS (1967) and DWR (1968) found that seawater intrusion into the semi-perched aquifer (generally the uppermost 50 feet) associated with the harbor development was occurring, but this was considered to be of little to no significance due to the lack of beneficial use of this near-surface water-bearing zone.

Approximately 10 years after construction of Huntington Harbor, chloride concentrations began to rise during the mid-1970s at OCWD monitoring well HH2 screened in the shallow-most Pleistocene Alpha aquifer at a depth of 85-95 ft bgs and located just inland of the Bolsa-Fairview Fault in the Huntington Harbor area. The Bolsa-Fairview Fault is the farthest inland branch of the Newport-Inglewood Fault Zone in the area. Chloride concentrations at this well rose steadily over time to very brackish levels today, suggesting an inland gradient and active pathway for inland intrusion.

In 2004, elevated chloride concentrations ranging from 300 to 800 mg/L were discovered at two monitoring wells owned by the Boeing Company (BOE-MW16 and BOE-MW17) screened in the Beta aquifer. OCWD commissioned a geophysical survey in 2010 at the Seal Beach Naval Weapons Station to investigate the extent and depth of intrusion and to help guide the number and location of proposed monitoring wells necessary to sufficiently define the extent of intrusion.

One large system production well (HB-12) was shut down and destroyed due to impacts from advancing intrusion in Sunset Gap. From 2012 to 2016, OCWD constructed seven multi-depth monitoring wells to depths up to 1,000 feet in Sunset Gap to better define the source areas, pathways, and overall inland extent of seawater intrusion as the first step towards identifying feasible remedies.

In 2021, OCWD began a project to install 11 monitoring wells clustered at five locations: one site in Seal Beach (BS25) and four in Huntington Beach (BS23, BS26, BS27 and BS28). Figure 12-7 shows the location of new wells installed in the last five years and the wells being installed in 2021. The multiple wells at each site will allow for the measurement of groundwater levels and collection of groundwater samples for water quality analyses in specific aquifers at different depths. The information from these monitoring wells may be used to determine if the groundwater flow model needs refinement before finalizing recommendations regarding a potential new seawater barrier in Sunset Gap (e.g., locations and number of injection wells and their injection rates).

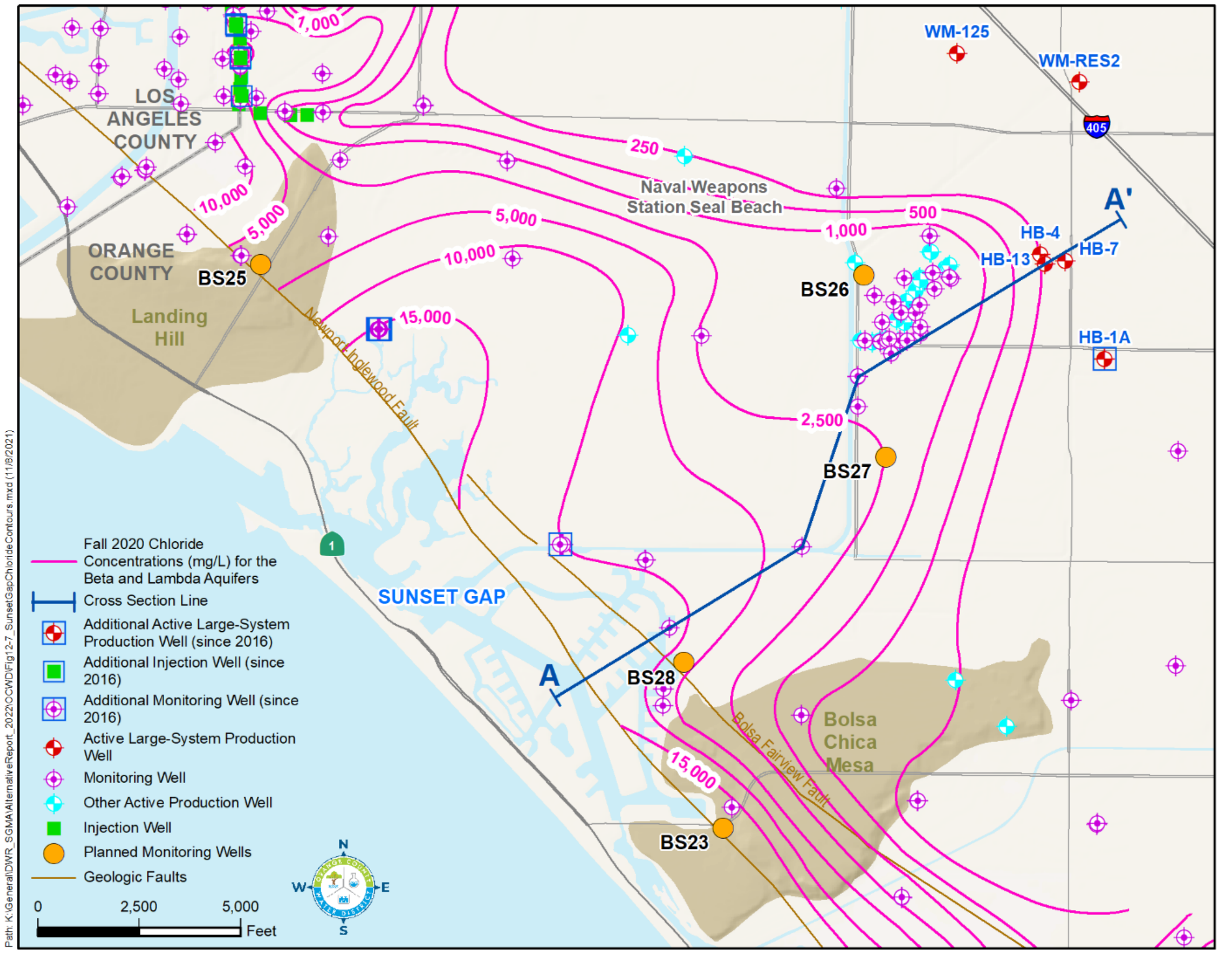


Figure 12-7: Sunset Gap Chloride Concentrations, 2020

12.3.1 Evaluation of Sunset Gap Alternatives

The Alamitos Barrier groundwater flow and transport model was recently updated and expanded to include the Sunset Gap area and thereby utilize data from newer OCWD monitoring wells on the Naval Weapons Station Seal Beach (NWSSB). The Alamitos-Sunset Gap model boundaries are shown in Figure 12-8.

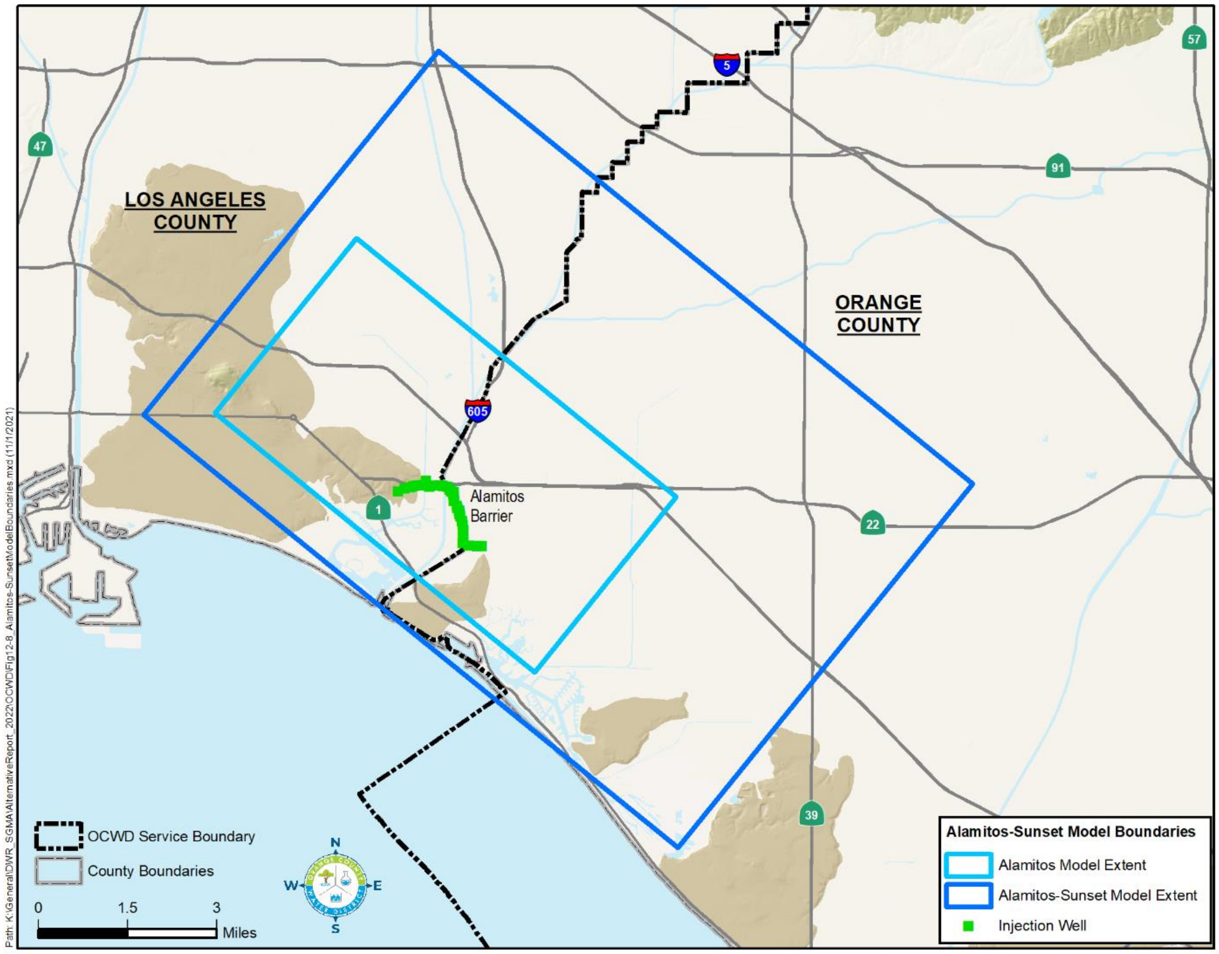


Figure 12-8: Alamitos-Sunset Gap Groundwater Model Boundaries

To date, the calibrated Alamitos-Sunset Gap model has been used to evaluate the effectiveness of five alternatives for a potential seawater intrusion barrier. These and other alternatives will be evaluated with the goal of halting the inland movement of seawater intrusion without significantly raising or lowering groundwater levels in the environmentally sensitive tidal marsh on the NWSSB. The effects, if any, of the simulated alternatives on nearby contaminant plumes will also be evaluated. Other factors to evaluate once the additional predictive scenarios are modeled will include feasibility, constructability, injection water supply, brackish extraction disposal/reuse, and cost.

The number of injection and extraction wells, well spacing, and injection volumes were varied from scenario to scenario to determine the preferred barrier scenario that prevents seawater intrusion by maintaining a seaward gradient without significantly raising or lowering groundwater levels in the environmentally sensitive tidal marsh on the NWSSB. Additionally, the model will run a series of no-barrier predictive scenarios to evaluate the potential maximum future inland extent of seawater intrusion and associated impacts and measures that would likely occur as a result, e.g., groundwater production well loss and/or inland groundwater desalters.

Preliminarily and subject to further analysis, the most favorable approach based on the five predictive scenarios completed so far includes a dual injection/extraction barrier, with an L-shaped injection well alignment around the perimeter of the NWSSB (Figure 12-9). A potential Sunset Gap Barrier Project (SGBP) would be designed to prevent the inland advancement of seawater intrusion near the NWSSB and the Huntington Harbor areas, thus protecting production wells in the cities of Huntington Beach, Seal Beach, and Westminster.

The preliminary favorable injection alignment would include approximately 20 injection well sites spaced approximately 1,500 to 2,000 feet apart (subject to further analysis). Total modeled injection was 13 mgd, with the majority being injected into the Beta and Lambda aquifers.

The preliminary favorable extraction alignment would include three single-point extraction wells screened across the Beta and Lambda aquifers. Total modeled extraction was 3 mgd, or 1 mgd per well. The three potential extraction wells were strategically located just outside (inland) of the Seal Beach National Wildlife Refuge perimeter to provide ample distance from the injection wells while also remaining outside of the NWSSB ordnance areas. Initially, the extracted brackish groundwater would be expected to have a chloride concentration ranging from 5,000 to 15,000 mg/L.

Depending on extracted water disposal/use feasibility and cost, a groundwater treatment plant may be appropriate to remove the high salinity from the groundwater produced by the barrier extraction wells. Reverse osmosis would be the likely treatment process. The technical and economic viability of this supply option would need to be evaluated as part of the future technical work described below.

To provide the injection wells with high-quality fresh water, the several water supply alternatives will be considered, including: (1) Groundwater treatment plant (brackish extraction wells and/or Deep aquifer amber-colored water wells); (2) Satellite wastewater treatment plant; (3) GWRS water via new pipeline; and (4) Imported water.

Future technical analysis that would need to be conducted as part of the feasibility study includes the following:

- Evaluate injection water supply alternatives
- Perform siting study for pipelines and wells
- Evaluate extraction well discharge alternatives
- Identify hydrogeologic data necessary to design, construct, and monitor the performance of barrier facilities
- Develop preliminary project design to support CEQA evaluation
- Estimate staffing needs for barrier operation and maintenance (O&M)
- Provide capital and O&M cost estimate

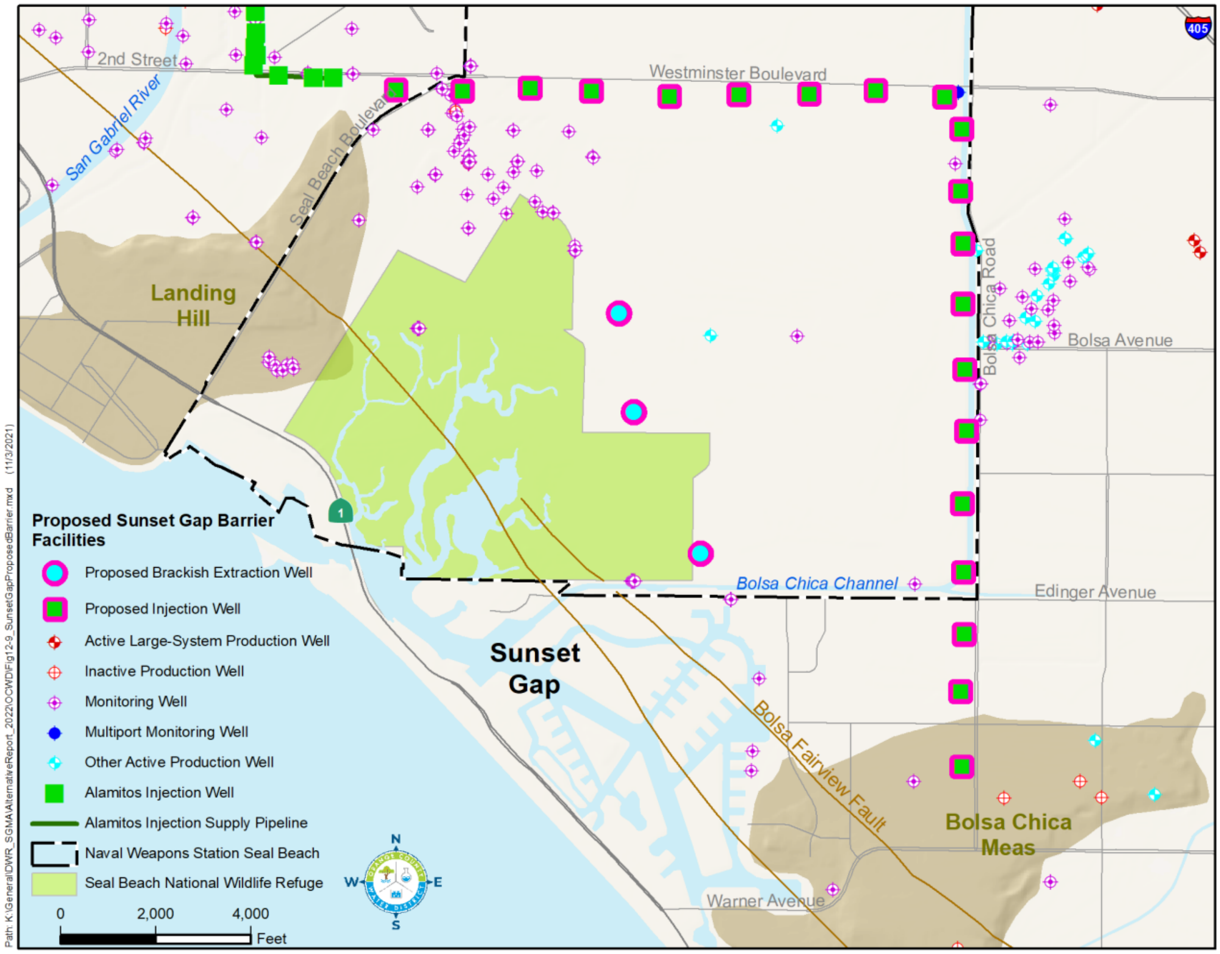


Figure 12-9: Potential Sunset Gap Barrier Project Facilities

12.4 BOLSA GAP

In the Bolsa Gap, seawater intrusion extends approximately 1.3 miles inland from the Pacific Ocean. Groundwater monitoring data show that the highest chloride concentrations in Bolsa Gap have remained seaward of the Bolsa-Fairview Fault, which is the farthest inland branch of the Newport-Inglewood Fault Zone in that area. Therefore, the saline groundwater appears to be largely restricted from migrating inland across the Bolsa-Fairview Fault within the Bolsa aquifer under normal basin conditions, as the Bolsa aquifer zones of mergence with the underlying Pleistocene aquifers are all inland of the Bolsa-Fairview Fault. An area of slightly elevated salinity has existed beneath the Huntington Beach Mesa for many years and is thought to be due to past disposal practices of oil field brines in the early 1900s rather than active seawater intrusion from the ocean. This area of saline groundwater is being pushed westerly into Bolsa Gap due to increased injection at the west end of the Talbert Barrier but is not expected to be a threat to active production wells or groundwater resources.

12.5 NEWPORT MESA

Chloride concentrations in the Beta/Lambda aquifers beneath the Newport Mesa east of the Talbert Gap have either remained stable or decreased over the last 10 years even though groundwater elevations have typically been below sea level in these aquifers in this area. Chloride concentrations in the underlying Main aquifer in this area have either decreased or have remained relatively stable for the last 10 years. A proposed extension of the Talbert Barrier eastward along Adams Avenue onto the Newport Mesa has been preliminarily evaluated and modeled by OCWD staff using the Talbert Model. Such a project would serve to provide insurance against future intrusion in the Beta/Lambda and Main aquifers under lower basin conditions and would thus protect production wells owned by Mesa Water District in addition to replenishing the basin. Based on the stability of chloride concentrations in the Newport Mesa, there is no need to advance this project at this time.

In 2014, OCWD constructed four new multi-depth monitoring wells (M51, M52, M53, MRSH) farther east on the Newport Mesa, as shown on Figure 12-10. These four well sites are now a part of OCWD’s coastal monitoring program for both groundwater levels and seawater intrusion sampling. The East Newport Mesa area is at the southern margin of the groundwater basin, which geologic formations (including the aquifers with them) have been faulted, uplifted, and eroded. It has been a data gap in which the aquifer stratigraphy and groundwater flow patterns were not well understood. To further characterize this complex portion of the basin, OCWD plans to install a multi-depth cluster of monitoring wells east of John Wayne Airport in early 2022.

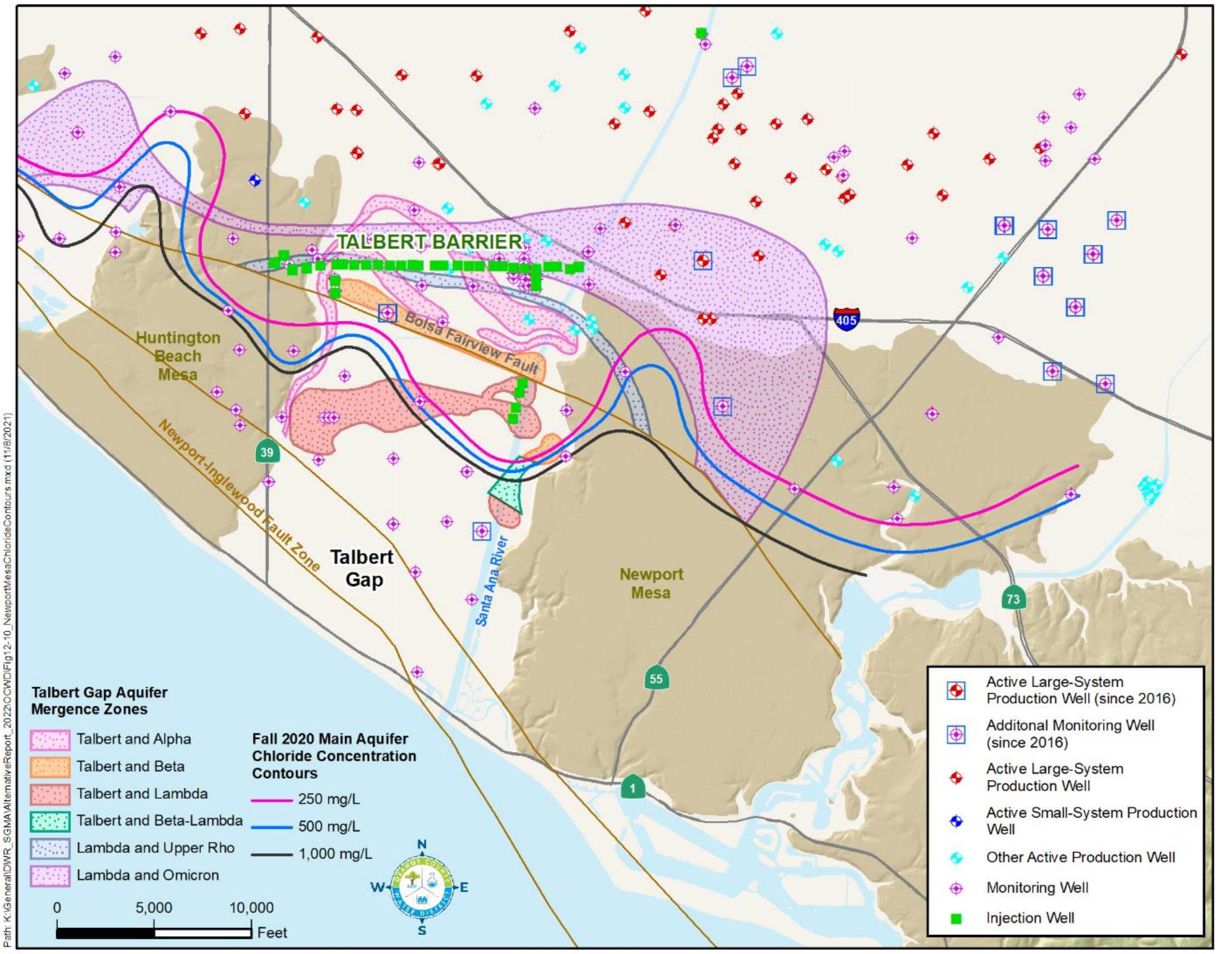


Figure 12-10: Newport Mesa Chloride Contours, 2020

12.6 IMPLEMENTATION OF SEAWATER INTRUSION PREVENTION POLICY

Implementation of OCWD's seawater intrusion prevention policy is summarized below. These programs enable OCWD to continue sustainably managing the groundwater basin to prevent significant and unreasonable seawater intrusion.

12.6.1 Effective Barrier Operations

The effective operation of the Talbert and Alamitos barriers is critical to the protection of the basin aquifers from seawater intrusion. This program includes, but is not limited to, the following activities:

1. Injection of sufficient water quantities combined with other basin management programs, such that protective groundwater elevations are established and maintained, where applicable, based on local hydrogeologic characteristics.
2. Regular maintenance of injection facilities to provide sufficient injection quantities. Such maintenance includes backwashing, redevelopment, and replacement (if necessary) of injection wells and operational fitness checks/repairs of flow meters, pressure reducing valves, and telemetry equipment.
3. Regular communications and coordination between operations, hydrogeology, and engineering staff on barrier operations and activities.
4. Annual reporting on barrier facilities status and operations. The reports include recommendations, as necessary, for barrier improvements to achieve policy objectives.

12.6.2 Barrier Performance Monitoring and Evaluation

Monitoring and evaluating barrier performance provides the basis on which to determine if the barriers are preventing seawater intrusion from occurring. This program consists of the following activities:

1. Semi-annual sampling and testing of designated monitoring wells in the vicinity of the seawater barriers. Testing includes parameters such as TDS, chloride, and electrical conductivity as indicators of seawater intrusion. Wells have been designated to provide adequate spatial coverage, particularly near likely seawater pathways and near the interface between seawater and freshwater.
2. Quarterly water level measurements at designated monitoring wells in the vicinity of the seawater barriers. More frequent measurements will be collected as needed at key locations.
3. Installation of monitoring wells in areas where it is determined that data gaps exist near the seawater barriers that may allow seawater intrusion to go undetected or would otherwise significantly impede the ability to assess barrier performance.
4. Annual evaluation and reporting of barrier performance based on surrounding groundwater level and quality data.

12.6.3 Susceptible Coastal Area Monitoring and Evaluation

This program addresses the assessment and ongoing monitoring of the coastal gaps and other areas that are not currently protected from seawater intrusion by the Talbert and Alamitos barriers. These areas include the Bolsa and Sunset gaps and adjacent mesas. This program includes the following activities:

1. Semi-annual sampling and testing of designated monitoring wells. Testing includes parameters such as TDS, chloride, and electrical conductivity as indicators of seawater

intrusion. Wells have been designated to provide adequate spatial coverage, particularly near likely seawater pathways.

2. Quarterly water level measurements at designated monitoring wells. More frequent measurements will be collected as needed at key locations.
3. Installation of monitoring wells in areas where it is determined that data gaps exist that may allow seawater intrusion to go undetected or would significantly impede the ability to understand the location of and trends in seawater intrusion.
4. Annual evaluation and reporting of the coastal area monitoring program, including recommendations, as needed, for further investigation or other potential actions to address seawater intrusion.

12.6.4 Coastal Groundwater Management

In addition to operating the seawater barriers, OCWD has implemented other basin management activities to lessen the potential for seawater intrusion. These activities have included the Coastal Pumping Transfer Program, Coastal In-Lieu Program, and maintaining basin storage levels within the operating range. Each of these activities shall continue to be considered and implemented as deemed necessary along with other potential actions to complement and enhance the OCWD seawater prevention program.

12.7 DEFINITION OF SIGNIFICANT AND UNREASONABLE SEAWATER INTRUSION

As explained above, OCWD conducts comprehensive programs to protect the groundwater basin from the undesirable effect of significant and unreasonable seawater intrusion. Seawater intrusion in the OCWD Management Area would be considered significant and unreasonable if a significant and continuing reduction in usable storage volume in the groundwater basin occurs as a result of increased salinity due to seawater intrusion.

12.8 DETERMINATION OF MINIMUM THRESHOLDS

The minimum threshold for seawater intrusion that defines an undesirable result is (1) the shutdown of active large system production wells due to seawater-derived salinity, and (2) continuing loss of a significant amount of basin storage due to seawater-derived salinity.

SECTION 13 SUSTAINABLE MANAGEMENT RELATED TO LAND SUBSIDENCE

Management of the groundwater basin by maintaining storage levels within OCWD's established operating range has prevented significant and unreasonable land subsidence that substantially interferes with surface uses. Within the OCWD Management Area there is no evidence of continuing irreversible land subsidence, nor is there evidence that land subsidence has interfered with surface uses. Therefore, the undesirable result of "significant and unreasonable land subsidence that substantially interferes with surface uses" is not present and is not anticipated to occur in the OCWD Management Area in the future.

Subsidence due to changes in groundwater conditions in the Orange County groundwater basin is variable and does not show a pattern of irreversible permanent lowering of the ground surface. Some subsidence may have occurred before OCWD began refilling the groundwater basin in the late 1950s after storage conditions reached a historic low (Morton, et al., 1976); however, the magnitude and scope of this subsidence is uncertain, and it is not clear if this subsidence was permanent. Since this time OCWD has operated the groundwater basin within the established operating range.

More recent data show a consistent pattern of the ground surface rising and falling in tandem with groundwater levels and overall changes in basin groundwater storage. This is referred to as elastic subsidence. Interferometric Synthetic Aperture Radar (InSAR) data collected from satellites and data collected by the Orange County Surveyor (Surveyor) show that ground surface elevations in Orange County both rise and fall in response to groundwater recharge and withdrawals. InSAR data during the period 1993-1999 shows temporary seasonal land surface changes of up to 4.3 inches (total seasonal amplitude from high to low) in the Los Angeles-Orange County area and a net decline of approximately 0.5 inch/year near Santa Ana over the period 1993 to 1999, which happened to coincide with a period of a net decrease in groundwater storage in the basin (Bawden, 2001; 2003).

The 2017 Alternative presented GPS data collected by the Orange County Surveyor's office. These data showed that ground surface elevation changes at selected sites from 2002 to 2014 correlate well with changes in groundwater storage.

Recently, as part of DWR's SGMA technical assistance to provide important SGMA-relevant data to Groundwater Sustainability Agency's (GSAs) for Groundwater Sustainability Plan (GSP) development and implementation, DWR contracted with TRE ALTAMIRA, Inc. to provide vertical displacement estimates derived from InSAR data that are collected by the European Space Agency (ESA) Sentinel-1A satellite.

The DWR-commissioned dataset represents measurements of vertical ground surface displacement in more than 200 of the high-use and populated groundwater basins across the California between January 2015 and October 2020. InSAR data coverage began in late 2014 for parts of California, and coverage for the entire study area began on June 13, 2015. Included in this dataset are point data that represent average vertical displacement values for 100 square meter areas, as well as GIS rasters that were interpolated from the point data; rasters for total vertical displacement relative to June 13, 2015, and rasters for annual vertical displacement rates with earlier coverage for some areas, both in monthly time steps. The level of accuracy is approximately 0.05 feet.

To show subsidence in Basin 8-1, OCWD used the used a layer showing the total land subsidence since the start of the InSAR data on 6/13/2015 and ending on 7/1/2020, which corresponds to the end of the OCWD water year. The GIS layer used was: https://gis.water.ca.gov/arcgisimg/rest/services/SAR/Vertical_Displacement_TRE_ALTAMIRA_v2020_Total_Since_20150613_20200701/ImageServer

Figure 13-1 shows the total land displacement in Basin 8-1 from June 2015 to July 2020. During this time period as shown on Figure 1-3, basin storage increased from 381,000 acre-feet below full conditions to 200,000 acre-feet below full conditions; that is, basin storage increased by 181,000 acre-feet. In addition to increasing groundwater levels, this rise in groundwater storage manifests itself as a rise in ground surface elevation over much of the basin, particularly in the center of the basin where there was as much as 0.15 feet of rise.

A localized area of downward (negative) displacement was observed in Tustin centered around production well T-ED. This is a relatively new well that came on-line in October 2016. Due to pumping of this well, water levels in the Principal Aquifer in the vicinity of the well declined by approximately 60 feet from June 2015 to July 2020. The small decline in ground surface in the vicinity of this well is not surprising given that it is a new well and the relatively fine-grained nature of the aquifer sediments in the area. As with other locations in the basin, we expect the impact of this well to stabilize with future displacements expected to be small.

Finally, there is little potential for future widespread permanent, irreversible subsidence given OCWD's commitment to sustainable groundwater management and policy of maintaining groundwater storage levels within a specified operating range. Nevertheless, OCWD will continue to review InSAR data and other data sources to evaluate ground surface fluctuations within OCWD's service area. If irreversible subsidence was found to occur in a localized area in relation to groundwater pumping patterns or groundwater storage conditions, OCWD would coordinate with local officials to investigate and develop an approach to address the subsidence. This could include OCWD managing the basin at higher groundwater storage levels.

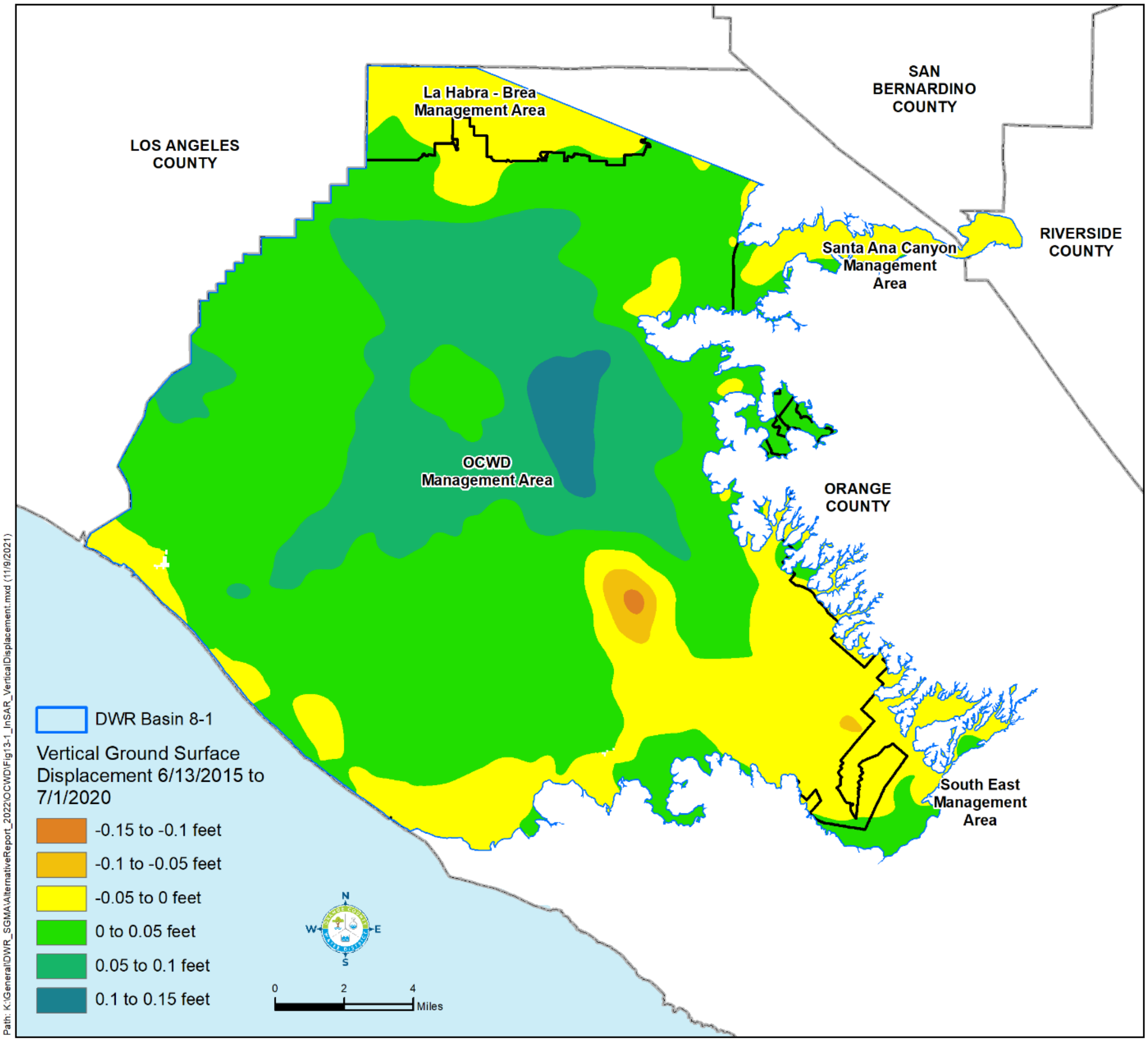


Figure 13-1: Total Vertical Ground Surface Displacement from June 2015 to July 2020

13.1 DEFINITION OF SIGNIFICANT AND UNREASONABLE LAND SUBSIDENCE THAT SUBSTANTIALLY INTERFERES WITH SURFACE USES

As stated above, data indicates that there is no inelastic land subsidence within the OCWD Management Area due to changes in groundwater elevation or groundwater storage levels. Land subsidence would be considered to be significant and unreasonable if ground surface elevation changes are determined to be inelastic over a significant period of time, these elevation changes are attributed to declines in groundwater storage, and these changes are likely to significantly interfere with surface uses.

13.2 DETERMINATION OF MINIMUM THRESHOLDS

The minimum threshold for land subsidence that defines an undesirable result is a sustained lowering of ground surface elevation that is attributable to lowering of groundwater storage in the basin and is likely to significantly interfere with surface uses.

SECTION 14 SUSTAINABLE MANAGEMENT RELATED TO GROUNDWATER DEPLETIONS IMPACTING SURFACE WATER

There are no surface water bodies within the OCWD Management Area that are interconnected and dependent on groundwater basin conditions. Therefore, the undesirable result of "depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water due to groundwater conditions occurring throughout the basin" is not present and in the future is not anticipated to occur in the OCWD Management Area due to OCWD's management programs.

The two main surface water sources in Orange County are the Santa Ana River and Santiago Creek. The Santa Ana River in Orange County flows through a highly urbanized environment. Flood protection infrastructure has constrained the flow of the river with engineered levees along most of its course. Santiago Creek, a major tributary of the Santa Ana River, is the primary drainage for the northwest portion of the Santa Ana Mountains. Under natural conditions, the creek is ephemeral, with dry conditions predominant during most of the year. Additional information on these sources can be found in the 2017 Alternative.

SECTION 15 PROTOCOLS FOR MODIFYING MONITORING PROGRAMS

Protocols that trigger a change in a monitoring program include:

- a recommendation by the GWRS Independent Advisory Panel for resampling or increased monitoring of a particular constituent of concern;
- a recommendation by the Independent Advisory Panel that reviews OCWD use of Santa Ana River water for groundwater recharge and related water quality;
- a change in regulation or anticipation of a change in regulation;
- a constituent in a sample approaches or exceeds a regulatory water quality limit or Maximum Contaminant Level, notification level, or first-time detection of a constituent;
- the computer program built by OCWD to validate water quality data prior to transfer to the WRMS data base flags a variation in historical data that may indicate a statistically significant change in water quality;
- analysis of water quality trends conducted by water quality, hydrogeology, or recycled water production staff indicate a need to change monitoring; or
- OCWD initiates a special study, such as quantifying the removal of contaminants using treatment wetlands or testing the infiltration rate of a proposed new recharge basins.

SECTION 16 EVALUATION OF POTENTIAL PROJECTS

As described in the 2017 Alternative, OCWD regularly evaluates potential projects, conducts studies and prepares reports and plans (e.g., Long Term Facilities Plan) to continue to sustainably manage the groundwater basin and advance the mission of OCWD. Described below are a few of the key projects and activities OCWD has undertaken over the last five years.

Key activities/projects that were completed in the last five years include:

- Four deep mid-basin injection wells were constructed in Santa Ana (MBI wells). The wells are injecting approximately 8-10 mgd of GWRS water into the center of the basin where groundwater levels tend to be the lowest.
- Alamitos Barrier Improvement Project: 17 new injection wells were constructed at the Alamitos Seawater Barrier to reduce the spacing between wells to improve barrier performance. The additional 1.4-mgd of injection capacity has raised water levels near or at protective elevations.
- Shallow geophysical exploration of the Lower Off-River Channel to characterize the shallow subsurface sediments. This data will be useful in assessing whether or not it is feasible to remove areas of fine-grained sediments to increase facility recharge rates.
- Continued testing of the Riverbed Filtration System (RFS), which is a shallow underdrain system designed to filter SAR water prior to delivery to a recharge basin. Testing conducted thus far shows it has the potential to double the capacity of a receiving basin. Work is also ongoing on how to potentially expand the RFS to the main SAR channel.
- Geophysical evaluation of deeper sediments in the lower SAR to assess the potential of installing a horizonal collector well (e.g., Ranney well) that would be used for recharge of GWRS water. Modeling was also conducted to assess the potential recharge capacity of a “Ranney” type well.

Key activities/projects that are underway include:

- Final expansion of the GWRS to 130 mgd capacity. This is scheduled to be complete in 2023. This project will provide OCWD 30 mgd of new water supply.
- Construction of water treatment facilities at production wells currently impacted by PFAS is ongoing. This is scheduled to be complete by 2024.
- Continued assessment of potential seawater intrusion in the Sunset Gap, including installation of additional monitoring wells, modeling, and feasibility studies.
- Completion of the Integrated Santa Ana River Watershed Model (ISARM), which is the integration of several surface and groundwater models in the upper SAR watershed above Prado Dam. This model will assist OCWD and other upper SAR

watershed stakeholders in determining potential future SAR flows arriving at Prado Dam and the potential impact of future projects on these flows.

- A study to examine the use of Forecast Informed Reservoir Operations (FIRO) at Prado Dam. A Preliminary Viability Assessment (PVA) was completed in July 2021, which showed that FIRO is viable at Prado Dam and able to provide an average of up to 7,000 acre-feet of water depending on how much water can be temporarily impounded (Ralph et al., 2021). Work on the Final Viability Assessment (FVA) is underway and scheduled for completion in mid-2023. In parallel to the FVA is work with the US Army Corps of Engineers to test FIRO at Prado Dam (through a minor deviation from the approved Water Control Plan) for a five-year period, starting in fall 2023.

Future anticipated activities and projects:

- Additional treatment systems may need to be constructed on production wells based on water quality results or changes in regulations.
- Projects may need to be constructed to improve water quality during recharge, such as sorbents to remove contaminants during recharge.
- Projects may needed to facilitate implementation of FIRO at Prado Dam or at Santiago Basins.
- Additional groundwater monitoring wells may need to be constructed to fill data gaps, including the Sunset Gap, and other areas in the basin.
- Design and construction of a potential seawater barrier at the Sunset Gap.
- Implementation of a groundwater contamination remedy in the South Basin area.

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Irvine Ranch
WATER DISTRICT

Five Year Update to:
Basin 8-1 Alternative
South East Management Area

CERTIFIED HYDROGEOLOGIST
THOMAS E.
HARDER
No: 588
STATE OF CALIFORNIA

Thomas Harder

Prepared for the Department of Water Resources, pursuant to Water Code §10733.6(b)(3)

January 1, 2022

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Tables

SECTION 1. EXECUTIVE SUMMARY

The South East Management Area is located in the south east portion of the Coastal Plain of Orange County Groundwater Basin (Basin 8-1). The South East Management Area consists of several small, fringe areas south east of the Orange County Water District (OCWD) Management Area. These areas fall within the boundaries of the Irvine Ranch Water District (IRWD), El Toro Water District (ETWD) and the City of Orange service areas. Figure 1-1 shows the IRWD, ETWD and City of Orange areas within the boundaries of the South East Management Area along with the OCWD Management Area.

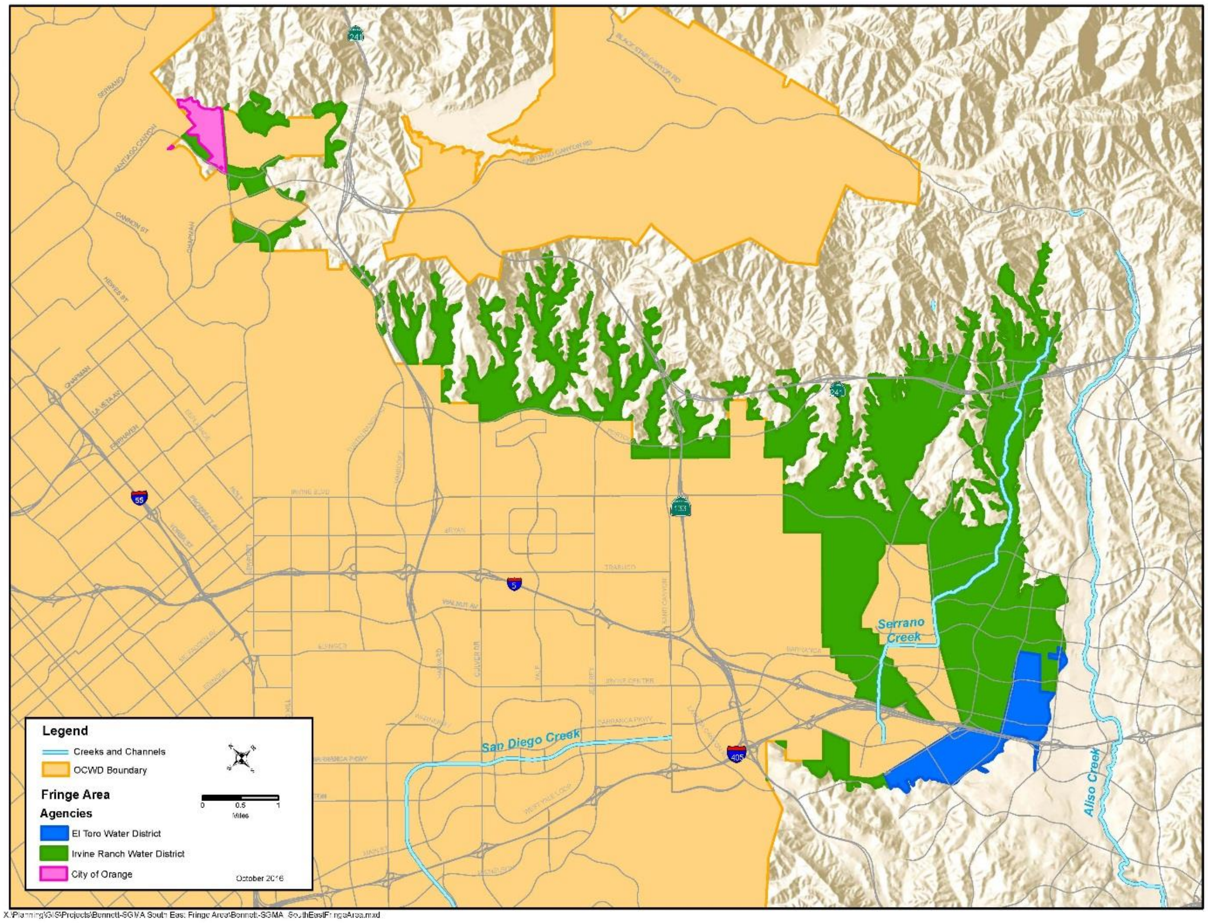

Figure 1-1: Agencies in the South East Management Area

Table 1-1 shows the area (in acres) associated with each agency within the South East Management Area. The South East Management Area covers approximately 4.4 percent of Basin 8-1, which has a total area of 223,600 acres.

Table 1-1: Agencies in South East Management Area and Area Covered

Agency	Area (acres)
Irvine Ranch Water District	8,870
El Toro Water District	762
City of Orange	134
Total Area	9,766

Update to 2017 Alternative

This document provides any updates to the 2017 Alternative for the South East Management Area plan, submitted by OCWD on December 2, 2016. The 2017 Alternative, including the South East Management Area was reviewed by the State of California Department of Water Resources (DWR) in July 2019. Based on DWR's assessment, the 2017 Alternative was found to meet the requirements under SGMA and was approved.

Approved alternatives are required to submit annual reports to DWR on April 1 of each year. Annual reports for Basin 8-1 were submitted to DWR as follows:

- Water Year 2016-17, Submitted on March 29, 2018
- Water Year 2017-18, Submitted on March 29, 2019
- Water Year 2018-19, Submitted on March 30, 2020
- Water Year 2019-20, Submitted on March 30, 2021

According to Water Code §10733.8, "At least every five years after initial submission of a plan pursuant to Section 10733.4, the department shall review any available groundwater sustainability plan or alternative submitted in accordance with Section 10733.6, and the implementation of the corresponding groundwater sustainability program for consistency with this part, including achieving the sustainability goal. The department shall issue an assessment for each basin for which a plan or alternative has been submitted in accordance with this chapter, with an emphasis on assessing progress in achieving the sustainability goal within the basin. The assessment may include recommended corrective actions to address any deficiencies identified by the department."

This document represents the first five-year update, which is due January 1, 2022.

Important Note:

For purposes of this report, the Basin 8-1 Alternative submitted on December 22, 2016, will be referred to as the 2017 Alternative. The first five-year update will be referred to as the 2022 Update for ease of reference. The 2017 Alternative was a comprehensive document showing that Basin 8-1 had been managed sustainably for more than 10 years. For the 2022 Update, the focus is on documenting that the basin has been continued to be sustainably managed during the five years since the 2017 Alternative was submitted and to present any new information from the last five years. As such, the 2017 Alternative is considered a key reference document with background information that is not duplicated in the 2022 Update.

The water resources in the South East Management Area include surface water from Serrano Creek and numerous smaller tributaries, groundwater and imported water. Serrano Creek provides surface waters that flow into and/or out of the IRWD's Lake Forest portion of the South East Management Area (Boyle, 2002). Historically, groundwater production has been a minor source of water supply for the South East Management Area and there has been no groundwater production since February 2018. Imported water received through the Metropolitan Water District of Southern California is the primary water supply source to meet the water demands within the South East Management Area.

Historically, IRWD has produced groundwater from six wells located in the city of Lake Forest. Groundwater production within the South East Management Area has historically represented less than 2 percent of the potable water supply for IRWD's Lake Forest area and less than 0.2 percent of IRWD's overall potable water supply. Due to the relatively low yield of the Aquifer in the South East Management Area, groundwater production is expected to remain a relatively insignificant water supply source for the area.

None of IRWD's six wells have been active since February 2018. At the time of the preparation of the Basin-8 Alternative, IRWD was pumping groundwater from only one active well (Well LF-2) in the South East Management Area. In early 2018, due to poor water quality of the well water, IRWD ceased well pumping and the well has been inactive since. IRWD has plans to rehabilitate Well LF-2 and resume groundwater production in the future. In addition, in February 2020, well LF-5 was destroyed due to low water production and high salinity and to also make way for a new pump station on the site where the well was located. While no plans are currently in place, placement for a potential new well was included with the pump station siting.

The five remaining wells within IRWD's Lake Forest portion of the Management Area are currently monitored for groundwater levels on a monthly basis. There are no other programs in the South East Management Area responsible for managing or monitoring groundwater resources at this time. As of the beginning of 2018, the monthly water quality monitoring of the operational well was halted temporarily due to lack of production. Sampling and water quality monitoring will resume at this well when the planned well rehabilitation project is completed. In addition, two wells are to be designated as groundwater level monitoring wells (LF-1 and LF-4) and added to the Basin 8-1 SGMA monitoring program. The groundwater levels at these wells will be monitored on a monthly basis with the results transmitted to DWR as part of the Basin 8-1 monitoring program.

The approach to sustainably managing the South East Management Area is to continue to monitor groundwater levels and production to ensure that groundwater pumping does not lead to significant and unreasonable conditions such as (1) chronic lowering of groundwater levels, (2) chronic reduction in storage, (3) groundwater quality degradation, (4) inelastic land subsidence or (5) unreasonable adverse effect on surface water resources. Descriptions of these undesirable results can be found in Sections 8 through 14.

SECTION 2. AGENCY INFORMATION

2.1 HISTORY OF AGENCIES IN SOUTH EAST BASIN MANAGEMENT AREA

No update since the 2017 Alternative – See 2017 Alternative.

2.2 GOVERNANCE AND MANAGEMENT STRUCTURE

No update since the 2017 Alternative – See 2017 Alternative.

2.3 LEGAL AUTHORITY

No update since the 2017 Alternative – See 2017 Alternative.

2.4 BUDGET

The budget required to monitor and report groundwater information for the South East Management Area has not been defined. As part of its standard operations, IRWD regularly collects and maintains information on its groundwater production, groundwater levels and water quality testing. Funding for well monitoring, operation, and rehabilitation where applicable is defined in the IRWD’s operating or capital budgets. Since the preparation of the 2017 Alternative, there continues to be no groundwater production within ETWD or City of Orange areas of the South East Management Area, therefore these agencies are not be responsible for monitoring and reporting groundwater information.

For this 2022 update, it should be noted that two monitoring wells (LF-1 and LF-4) will be designated to report on monthly water levels which will be transmitted to DWR as part of the Basin 8-1 SGMA monitoring program.

SECTION 3. MANAGEMENT AREA DESCRIPTION

3.1 SOUTH EAST SERVICE AREA

No update since the 2017 Alternative – See 2017 Alternative.

3.1.1 Jurisdictional Boundaries

No update since the 2017 Alternative – See 2017 Alternative.

3.1.2 Land Use Designations

No update since the 2017 Alternative – See 2017 Alternative.

3.2 GROUNDWATER CONDITIONS

Groundwater level trends in the South East Management Area are relatively stable, or rising, consistent with the limited recent groundwater production in the area. Of the six groundwater production wells IRWD has in the area, only one is active and that well is currently not pumping due to groundwater quality issues and required maintenance (see Figure 3-1). As there is no current groundwater pumping and only limited planned future groundwater development, the stable or rising groundwater level trends are expected to continue.

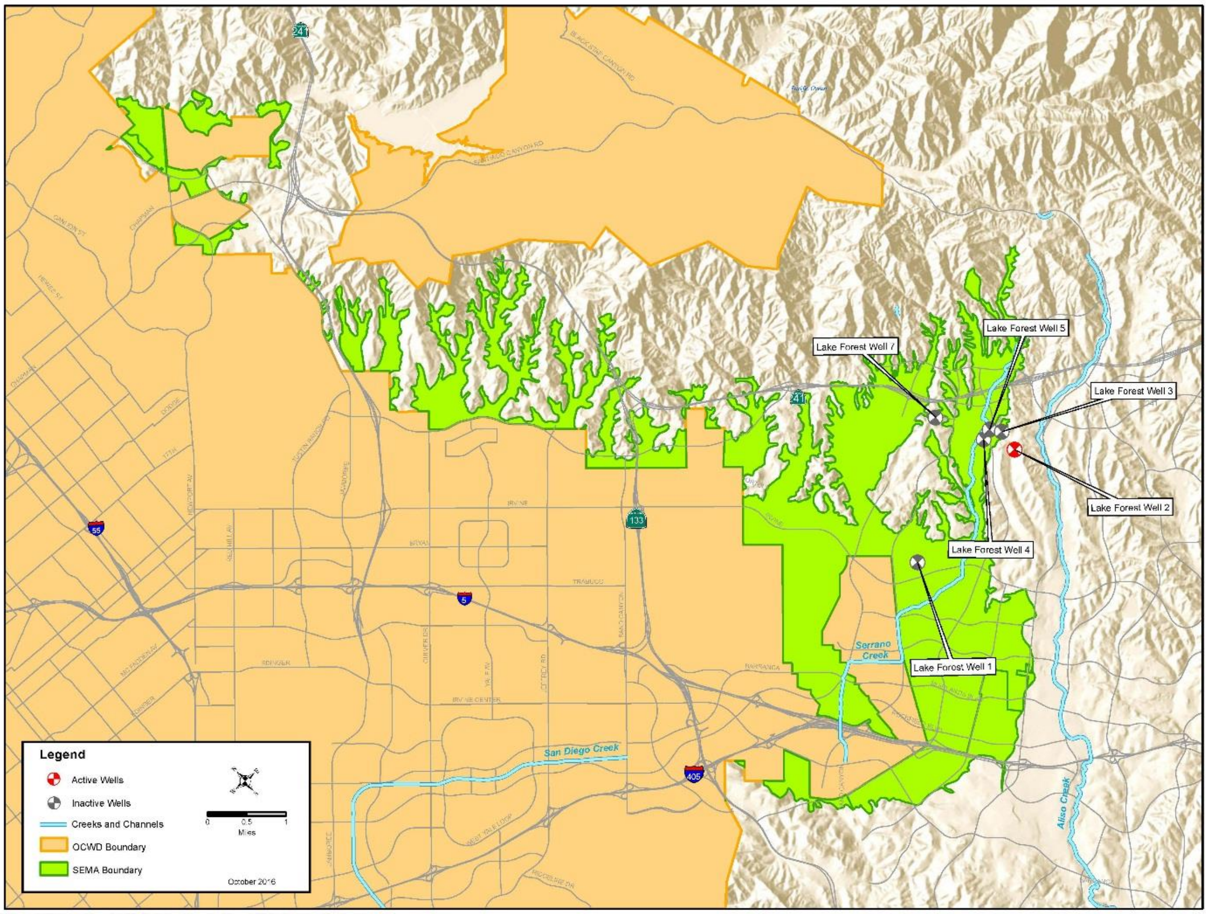

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Figure 3-1: Groundwater Production Wells (Active and Inactive)

A study completed in 2002 assessed the potential of the development of future wells in the IRWD Lake Forest area, which is located in the eastern portion of the South East Management Area. It was noted that based on available well driller's logs there was considerable clay in the alluvium and that the specific capacity of these wells is very low. Based on the very low specific capacity results, it appears that the alluvium is characterized by low permeability. This seems to be reflected in the low production capacity of the wells (Boyle 2002).

Since the preparation of the 2017 Alternative, only well LF-2 was operational up through January 2018. Due to water quality issues related to iron and manganese, well LF-2 was taken offline in early 2018 and IRWD plans to rehabilitate the well and construct treatment for the removal of iron and manganese. The rehabilitation project is planned to be performed in late 2022 and depending on the performance and water quality testing results from the well, IRWD may construct a treatment facility to remove iron and manganese. While well LF-2 has not been active in the last few years, it is shown as "active" on Figure 3-1 because IRWD plans to put well LF-2 back into production once it is rehabilitated and treatment facilities are constructed.

In 2020, well LF-5 was destroyed to make way for a new planned pump station on the site. Well LF-5 was previously used to supplement water in IRWD's recycled water system. However, due to continual poor water production and high salinity, IRWD ceased the operation of well LF-5, and in February 2020, IRWD destroyed the well. At the site, IRWD plans to construct a new recycled water pump station. Although construction and operation of a new well is not a currently planned project, space is being allocated on the existing site adjacent to the pump station to accommodate a potential new well in the future.

3.2.1 Groundwater Levels

The range of observed groundwater levels in the South East Management Area from 2016 to 2021 are summarized in Figure 3-2. It is noted that no groundwater level data exists in the ETWD and City of Orange portions of the South East Management Area. Historic and estimated groundwater levels from 1991 to 2021 for IRWD's Lake Forest wells are shown in Figure 3-2. Historic groundwater level data is available from 1991 through 2001, after which there is no data available until 2015. More recent groundwater level data is available from 2015 to present. Monthly groundwater levels from IRWD's Lake Forest wells for 2020 to 2021 are shown in Figure 3-3.

In all IRWD wells, groundwater levels are the same or higher in 2021 than they were in 2017. With the exception of LF-1, groundwater levels show a rising trend, indicating that recharge to the area exceeds the discharge. Well LF-1 shows a stable groundwater level trend.

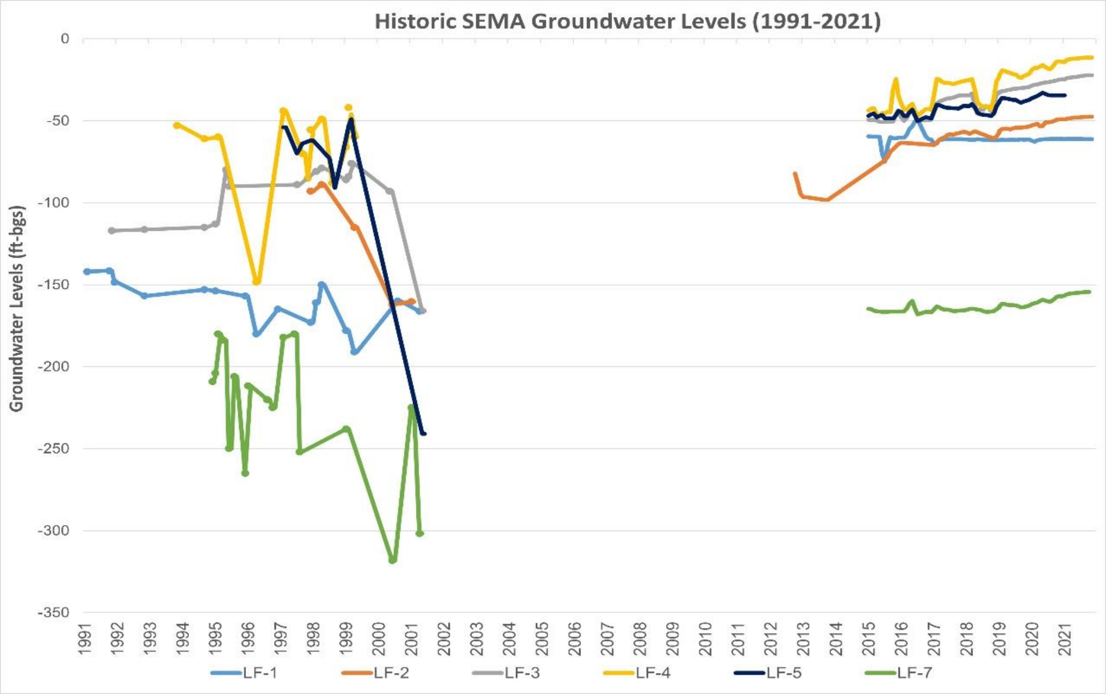

Figure 3-2:Historic Groundwater Levels in South East Management Area, 1991-2021

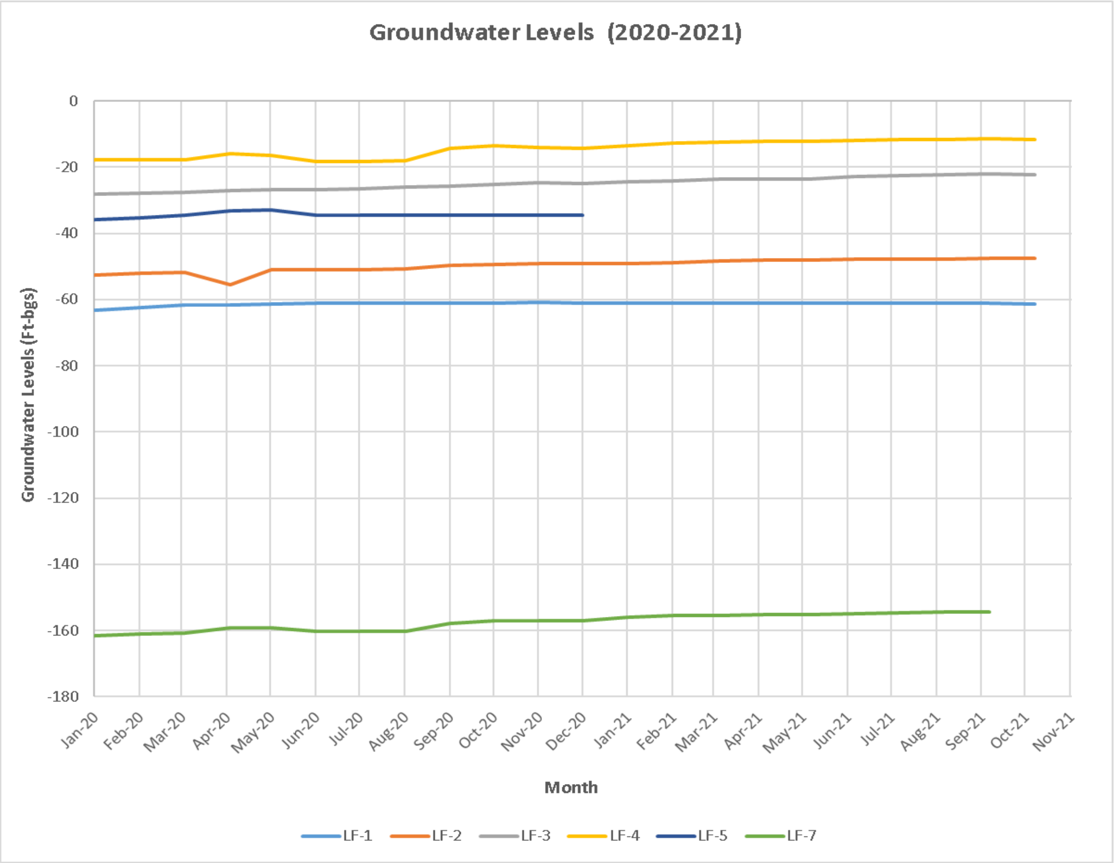

Figure 3-3: Current Groundwater Levels in South East Management Area, 2020-21

3.2.2 Regional Pumping Patterns

Table 3-1 summarizes information on all of the wells that are known to exist within the South East Management Area by agency. As presented, well design flows range from 125 to 350 gallons per minute (gpm) and well depths range from 675 to 1,000 feet below ground surface (ft-bgs).

Table 3-1: Wells and Flow Data

Agency	Well	State Well No.	System	Status	Design Flow (gpm)	Drilled	Depth (ft-bgs)	Perforated Intervals (ft)
IRWD	LF-1	06S/08W-15A00	Nonpotable	Inactive	300	1989	800	200-790
IRWD	LF-2	06S/08W-12Q02	Potable	Inactive	300	1957, redrilled 2010	675	200-675
IRWD	LF-3	06S/08W-12J01	Potable	Inactive	350	1950	800	270-395; 400-785
IRWD	LF-4	06S/08W-12L02	Nonpotable	Inactive	200	1993	810	350-470 510-790
IRWD	LF-5	06S/08W-12A01	Nonpotable	N/A	140	1997	800	350-780
IRWD	LF-7	06S/08W-12E00	Potable	Inactive	125	1994	1000	430-980
ETWD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
City of Orange	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

For the 2022 Update, Table 3-2 summarizes average annual pumping from 2016-2021 within the South East Management Area by agency. As shown, ETWD and City of Orange did not pump any groundwater from the South East Management Area during this time period. In IRWD's portion of the South East Management Area none of the existing wells are currently active. Over the last 5 years, well LF-2 annual pumping ranged from 0 acre-feet to 389 acre-feet and averaged approximately 90 acre-feet.

Table 3-2: Annual Pumping Average 2016-2021

Agency	Average Annual Production (acre-feet/yr.)
IRWD	90
ETWD	0
City of Orange	0
Total	90

In the last five years, pumping from LF-2 occurred in 2016 and 2018, after which LF-2 was taken offline. Figure 3-4 shows monthly pumping patterns for LF-2 from 2016 to 2021. Figure 3-5 shows annual pumping by water year (October-September) for 2017 through 2021.

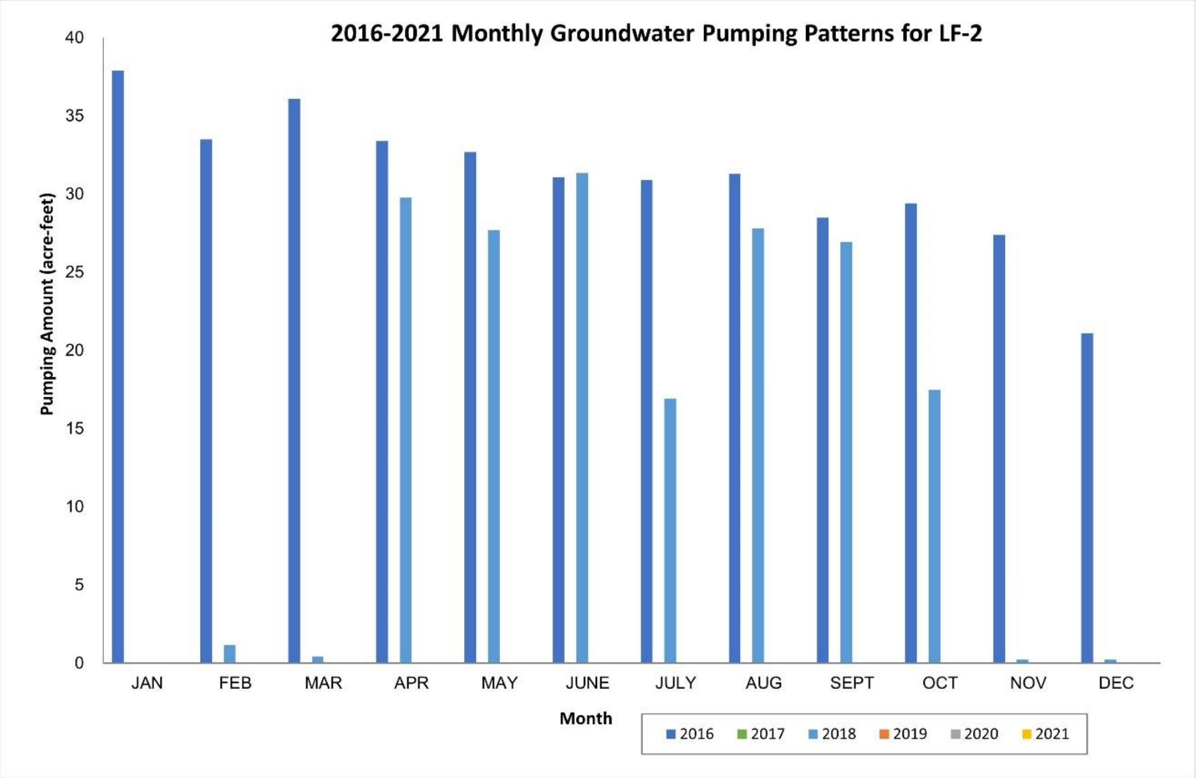

Figure 3-4: Monthly Groundwater Pumping Pattern in Well LF-2, 2016-2021

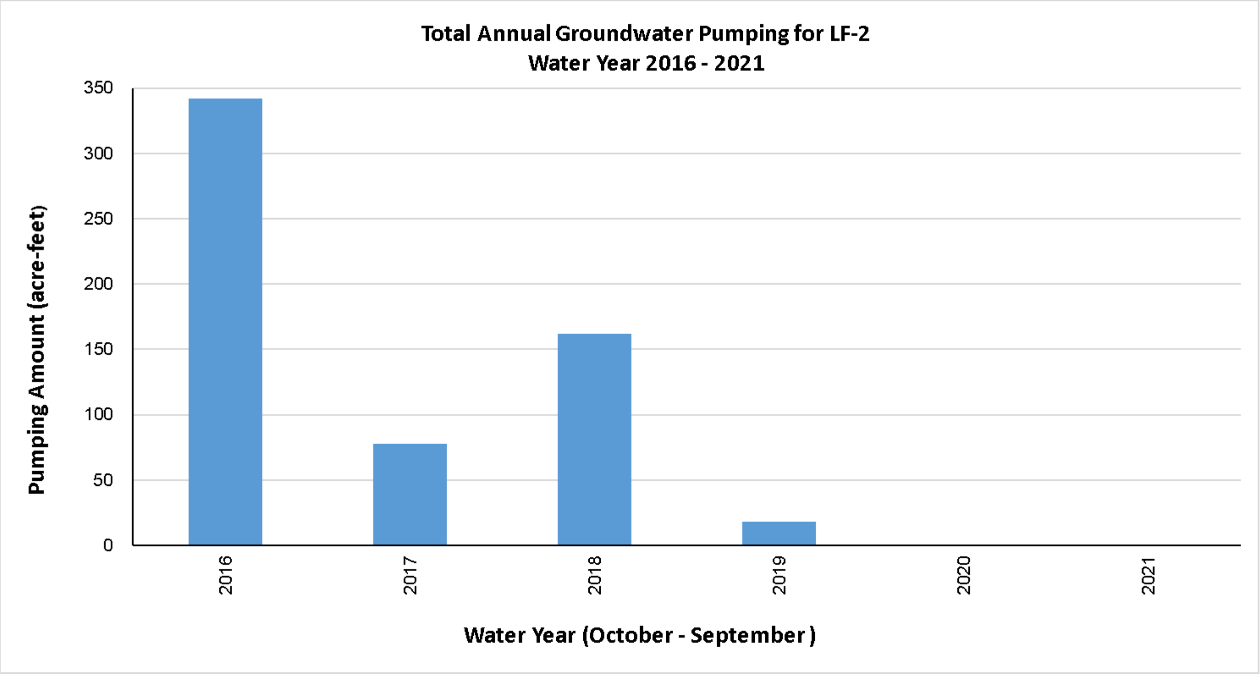

Figure 3-5: Total Annual Pumping for Well LF-2, (Water Year 2016-2021)[1]

1 All data shown for 2017 on this chart occurs between October and December 2016 of the water year.

3.2.3 Groundwater Storage Data

No update since the 2017 Alternative – See 2017 Alternative.

3.2.4 Groundwater Quality Conditions

Historically, only three of the six IRWD Lake Forest wells were permitted for potable use as the other three Lake Forest wells have had elevated levels of iron(Pb), manganese (Mn), electrical conductivity (EC) and total dissolved solids (TDS). Recent groundwater quality data for the South East Management Area which includes arsenic (As) is presented in Table 3-3. As presented, no other water quality data exists for the ETWD and City of Orange areas within the South East Management Area.

Table 3-3: Ground Water Quality in Selected Wells

Agency	Well Name	Well Use	Date Range	Avg TDS (#)[1] (mg/L)	Avg As (ug/L)	Avg Pb (ug/L)	Avg Mn (mg/L)
IRWD	LF-2	Production	2016-2018*	602	0.42	0.51	22.3
IRWD	LF-1	Production	1961-2000	>500 (21)			
IRWD	LF-4	Production	1993-2000	>500 (12)			
IRWD	LF-5	Production	1997-2001	>500 (5)			
IRWD	LF-3	Production	1991-1998	>500 (12)			
IRWD	LF-7	Production	1994-2001	<500 (12)			
City of Orange	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ETWD	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1 # = Number of Samples
* LF-2 Turned Offline in February 2018

3.2.5 Land Subsidence

Non-recoverable land subsidence has not been observed since 2015 in the South East Management Area (see Figure 3-6). The area is not susceptible to land subsidence given the following:

1. Minimal groundwater development exists in the South East Management Area.
2. Groundwater levels are stable or rising and have been for at least the last 10 years.
3. Low risk of future groundwater level declines due to limited planned groundwater production.

As shown in Figure 3-6, the South East Management Area experienced between -0.05 and 0.05 feet of vertical displacement across years 2015 to 2020 with an accuracy of approximately 0.05 feet in data readings.

Recently, as part of DWR's SGMA technical assistance to provide important SGMA-relevant data to Groundwater Sustainability Agency's (GSAs) for Groundwater Sustainability Plan (GSP) development and implementation, DWR contracted with TRE ALTAMIRA, Inc. to provide vertical displacement estimates are derived from InSAR data that are collected by the European Space Agency (ESA) Sentinel-1A satellite.

This dataset represents measurements of vertical ground surface displacement in more than 200 of the high-use and populated groundwater basins across the State of California between January of 2015 and October of 2020. InSAR data coverage began in late 2014 for parts of California, and coverage for the entire study area began in June 13, 2015. Included in this dataset are point data that represent average vertical displacement values for 100 meter by 100 meter areas, as well as GIS rasters that were interpolated from the point data; rasters for total vertical displacement relative to June 13, 2015, and rasters for annual vertical displacement rates with earlier coverage for some areas, both in monthly time steps. The level of accuracy is approximately 0.05 feet.

To show subsidence in Basin 8-1, the layer showing total land subsidence since the start of the InSAR data on 6/13/2015 and ending on 7/1/2020, which corresponds to the end of the water year was used. (GIS layer used: https://gis.water.ca.gov/arcgisimg/rest/services/SAR/Vertical_Displacement_TRE_ALTAMIRA_v2020_Total_Since_20150613_20200701/ImageServer.)

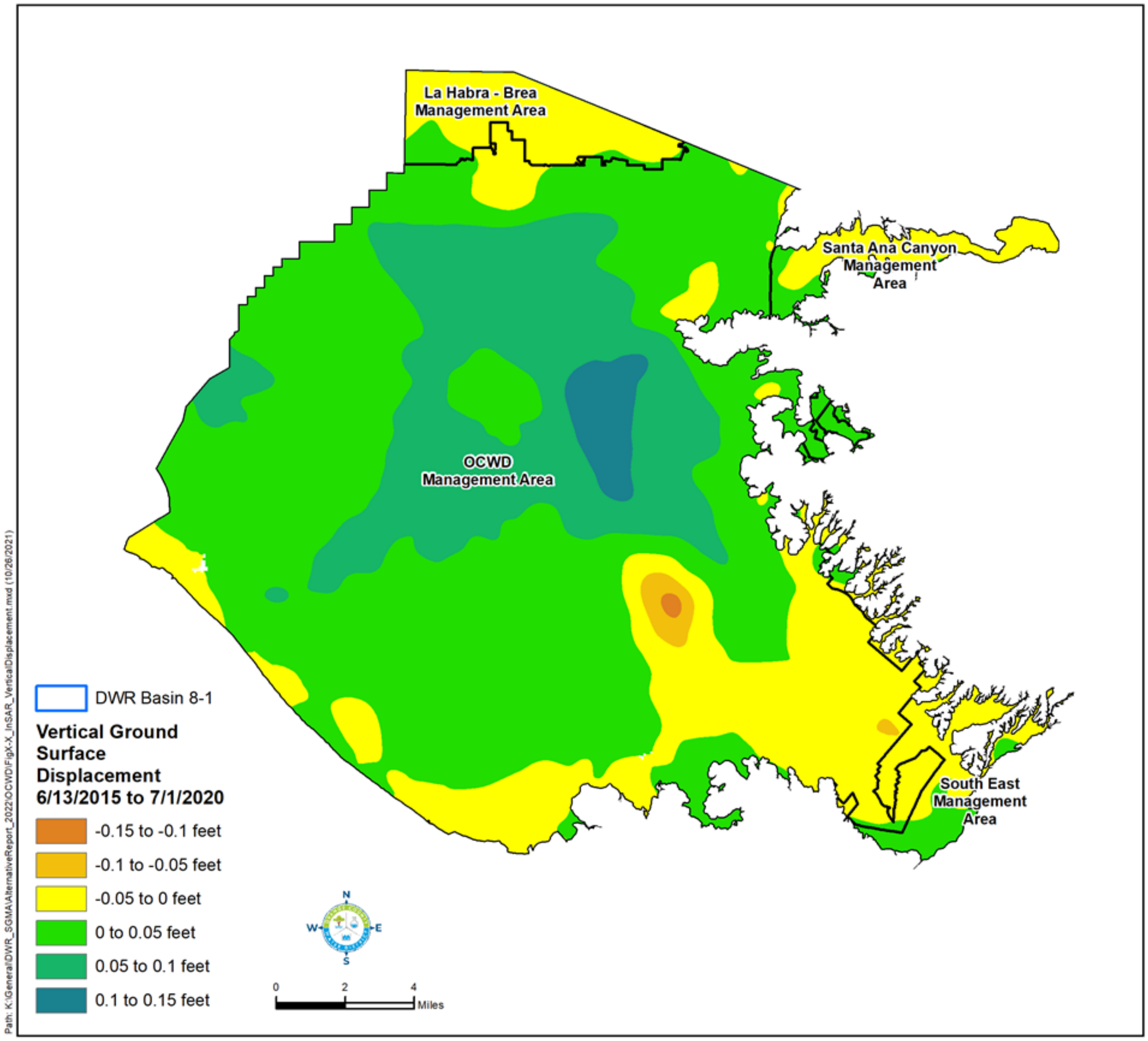

Figure 3-6: Total Vertial Ground Surface Displacement from June 2015 to July 2020

3.2.6 Groundwater and Surface Water Interactions and Groundwater Dependent Ecosystems

The primary surface water drainage in the South East Management Area is Serrano Creek. Serrano Creek is an intermittent stream that only flows during the rainy season following storm events. The predominant interaction between the surface flow in the creek and groundwater is percolation from the creek and recharge of the groundwater (see Boyle 2002 Groundwater Supply Evaluation study). Groundwater does not typically discharge at the land surface near the creek. Data from the California Department of

Water Resources (CDWR) NC dataset viewer indicates that there are some areas along Serrano Creek that are designated as groundwater dependent ecosystems (https://gis.water.ca.gov/app/NCDatasetViewer/).

Planned future groundwater pumping in IRWD's Lake Forest portion of the South East Management Area from Well LF-2 will not occur in areas of groundwater dependent ecosystems (GDEs). Some of IRWD's inactive wells are located near the Serrano Creek drainage, but outside the GDE areas. With the exception of Well LF-5, there are no plans to pump groundwater from any of these wells in the future. Well LF-2, which may be pumped in the future, is located outside the Serrano Creek drainage and is not expected to have an impact on GDEs within the Serrano Creek drainage. In the event that a replacement well is constructed near the existing Well LF-5, groundwater monitoring will be implemented to ensure the production from that well does not have an undesirable result on the GDE along Serrano Creek.

SECTION 4. WATER BUDGET

An average annual groundwater budget for the South East Management Area for the last 5 years is presented in Table 4-1. The simple water budget for the IRWD portion of the South East Management Area is based on measured groundwater production and the subsurface flow calculated by the numerical model for the OCWD Management Area (Basin 8-1 Alternative 2017). The development of individual components in the average annual groundwater budget are described in the following subsections.

4.1 BUDGET COMPONENTS

For IRWD's Lake Forest portion of the South East Management Area, the components of the groundwater budget are presented in Table 4-1 and described below. Groundwater Production includes an average from 2016-2021. As of 2018, the groundwater production is zero until the LF-2 well can be rehabilitated and placed back in service.

Table 4-1: Average Annual Groundwater Budget

South East Management Area Groundwater Budget 2016-2021 (acre-feet)	
Item	**Total (acre-feet)**
Recharge	2,900
Total Inflow	2,900
Groundwater Production	90
Subsurface Outflow	2,810
Total Outflow	2,900
Change in Storage	0

4.1.1 Recharge

Recharge includes infiltration from ephemeral creeks, precipitation and return flow recharge from irrigation. It was estimated to equal the total outflow as summarized in Table 4-1.

4.1.2 Groundwater Production

Groundwater production was taken from measured records by IRWD as summarized in Table 4-1. In the base period 2016 to 2021, groundwater production was only conducted by IRWD's Well LF-2. Groundwater production in this well ranged from 0 to 389 acre-ft/yr. from 2016 to 2021 with an average of approximately 90 acre-ft/yr.

4.1.3 Subsurface Outflow

Subsurface outflow from the South East Management Area into the OCWD Management Area was estimated using the OCWD groundwater flow model (Basin 8-1 Alternative 2017).

4.2 CHANGES IN GROUNDWATER STORAGE

Changes in groundwater storage within the South East Management Area since 2015 have been positive reflecting the rising groundwater levels measured in the wells. As indicated in Section 3.2.1, groundwater levels are the same or higher in 2021 than they were in 2017. With the exception of LF-1, groundwater levels show a rising trend, indicating that recharge to the area exceeds the discharge. Well LF-1 shows a stable groundwater level trend. These trends have persisted despite multiple years of below normal precipitation. As presented in Section 4.1, groundwater pumping in the South East Management Area is relatively minor and averages only 125 acre-feet per year over the previous 10 years (2006-2015), and 90 acre-feet in the last six years (2016-2021). The groundwater level and pumping data indicate groundwater production is below the sustainable yield of the basin.

4.3 WATER YEAR TYPE

No update since the 2017 Alternative – See 2017 Alternative.

4.4 ESTIMATE OF SUSTAINABLE YIELD

The sustainable yield of the South East Management Area is approximated by the volume of average annual recharge that is estimated to enter the basin (approximately 2,900 acre-ft), as shown in Table 4-1. Average annual groundwater production over the last 5 years, ranging from 0 acre-feet to 389 acre-feet and averaging approximately 90 acre-feet, is significantly below the sustainable yield, which is supported by rising groundwater levels in the area over the same time period. Due to production rate limitations and groundwater quality issues, it is unlikely groundwater production in the South East Management Area will ever increase to the sustainable yield.

4.5 CURRENT, HISTORICAL, AND PROJECTED GROUNDWATER BUDGET

IRWD does not plan any significant changes to groundwater use in the South East Management Area that would change the water budget. The historical water budget is discussed in Section 4.1 and summarized in Table 4-1. Currently, there is no groundwater production in the South East Management Area. Future groundwater production could include bringing Well LF-2 online, replacing Well LF-5, and developing two new wells (see Section 16). No projected groundwater production is currently anticipated within the ETWD and city of Orange portions of the South East Management Area. Any future groundwater production will be managed within the sustainable yield of the aquifer system.

SECTION 5. WATER RESOURCE MONITORING PROGRAMS

5.1 OVERVIEW

This section describes surface and groundwater monitoring programs in the South East Management Area

5.2 GROUNDWATER MONITORING PROGRAMS

No groundwater development exists in the ETWD and City of Orange portions of the South East Management Area. In IRWD's Lake Forest portion of the South East Management Area the existing five wells (whether active or inactive) have been, and will continue to be, used to monitor the groundwater levels on a monthly basis. Section 3.2.1 provides information on the South East Management Area groundwater levels, and Figure 3-1 shows the locations of the Lake Forest wells within the South East Management Area.

5.3 OTHER MONITORING PROGRAMS

IRWD monitors groundwater quality in LF-2, when operating, as required by the California Code of Regulation (Title 22) and California Division of Drinking Water, Santa Ana District. In addition, as of 2021 two monitoring wells will be designated (LF-1 and LF-4) for the monitoring and reporting groundwater elevations in the South East Management Area which will be transmitted to the DWR under the SGMA monitoring program for Basin 8-1. DWR currently requires bi-annual reporting for well monitoring data.

SECTION 6. WATER RESOURCE MANAGEMENT PROGRAMS

IRWD works with ETWD and City of Orange on plans for groundwater development within the South East Management Area and updates demand projections and the water budget accordingly.

IRWD: The compilation of land use data is the basis for IRWD's water resource planning including its portion of the South East Management Area. Per IRWD's 2020 Urban Water Management Plan (UWMP), the land use data obtained from multiple jurisdictions in IRWD's service area is used in conjunction with IRWD's applied water use factors in order to estimate water requirements.

ETWD: ETWD's water resource planning is based on the 2020 UWMP demand projections. Regional demands are forecasted by the Municipal Water District of Orange County and are then tailored to ETWD's service area using available data for land use, population, and economic growth, intermixed with a trajectory of conservation, which includes both additional future passive measures and active measures.

City of Orange: The City of Orange's current UWMP (2020) provides the basis for water resource planning in Orange's water service area. The UWMP, in conjunction with applicable water use factors, form the basis for any potential water use estimates required for potential planning use in the service area.

SECTION 7. NOTICE AND COMMUNICATION

There are three agencies within the South East Management Area, as follows:

- IRWD
- ETWD
- City of Orange

On September 30, 2021, OCWD sent a letter via email to all of the Basin 8-1 agencies, including each of the agencies listed above to let them know that the 2017 Alternative was being updated and would be available for review and comment. No comments were received by any of the agencies contacted. The three South East Management Area agencies coordinated with OCWD and the other management areas to prepare the 2022 Update, in accordance with SGMA requirements.

A draft 2022 Update was presented to OCWD staff and posted on the OCWD website on November 17, 2021 to allow for public review and comment. The final 2022 Update was received and filed by the OCWD board in December 2021.

SECTION 8. SUSTAINABLE MANAGEMENT APPROACH

The Sustainable Management Approach for the South East Management Area is to continue monitoring sustainable conditions and monitor to ensure that conditions do not lead to significant and unreasonable (1) lowering of groundwater levels, (2) reduction in storage, (3) water quality degradation, or (4) inelastic land subsidence or (5) unreasonable adverse effect on surface water resources.

SECTION 9. SUSTAINABLE MANAGEMENT RELATED TO GROUNDWATER LEVELS

9.1 HISTORY

As shown on Figure 3-2 historical groundwater levels in the IRWD's Lake Forest portion of the South East Management Area have shown stable or rising trends and are, in all cases, at the same level or higher than they were in 2017. Because future groundwater pumping in the South East Management Area is expected to be limited, groundwater levels are expected to remain relatively steady in the future.

9.2 MONITORING OF GROUNDWATER LEVELS

Groundwater levels are currently monitored in the five wells located in IRWD's Lake Forest portion of the South East Management Area on a monthly basis. This monitoring will continue into the future.

9.3 DEFINITION OF SIGNIFICANT AND UNREASONABLE LOWERING OF GROUNDWATER LEVELS

Significant and unreasonable lowering of groundwater levels is defined as a long-term chronic lowering of groundwater levels, despite changes in precipitation patterns. No long-term reduction in groundwater levels in the South East Management Area is expected to occur.

9.4 DETERMINATION OF MINIMUM THRESHOLDS

It is not possible to determine a minimum threshold at this time since no undesirable effects due to groundwater levels have occurred in the past and are not foreseen in the future.   Nevertheless, the South East Management Area well monitoring program is expected to continue to monitor water levels and groundwater quality in the future. If water levels start to show a consistent, long-term decline and undesirable results are observed, action would be taken and minimum thresholds would be evaluated and established as appropriate.

SECTION 10. SUSTAINABLE MANAGEMENT RELATED TO BASIN STORAGE

No groundwater development exists in the ETWD and City of Orange portions of the South East Management Area. The total volume of groundwater storage in IRWD's portion of the South East Management Area has been estimated to be approximately 360,000 acre-feet (see Section 3.2.3).

10.1 DEFINITION OF SIGNIFICANT AND UNREASONABLE REDUCTION IN STORAGE

No significant long-term reduction in groundwater storage is expected to occur in the South East Management Area because of the limited groundwater use. However, a decline in groundwater storage may be determined unreasonable if one more of the following occurred:

1. Significant loss of well production capacity.
2. Degradation of water quality that significantly impacts the use of groundwater.

10.2 DETERMINATION OF MINIMUM THRESHOLDS

A minimum threshold for the reduction of groundwater storage in the South East Management Area is not anticipated since no undesirable effects have occurred in the past and are not foreseen in the future. Nevertheless, IRWD's Lake Forest monitoring program continuously tracks water levels and groundwater quality. If water levels show a consistent decline, IRWD's Lake Forest monitoring program would be expanded to examine any potential impacts and action would be taken to identify minimum thresholds as appropriate.

SECTION 11. SUSTAINABLE MANAGEMENT RELATED TO WATER QUALITY

No groundwater development exists in the ETWD and City of Orange portions of the South East Management Area. Groundwater quality in IRWD's portion of the South East Management Area is affected by the quality of recharge from Serrano Creek and precipitation and incidental recharge from irrigation. Groundwater from subsurface inflow could contain naturally elevated concentrations of TDS and manganese. IRWD has the ability to utilize water produced from non-potable wells to supplement its extensive recycled water system which serves irrigation demands.

11.1 DEFINITION OF SIGNIFICANT AND UNREASONABLE DEGREDATION OF WATER QUALITY

There are three elements that must be considered when evaluating the impact of groundwater quality degradation.

The first element is considering the causal nexus between groundwater management activities and groundwater quality. For example, groundwater contamination due to improper handling of toxic materials impacts groundwater quality; however, this water quality degradation is not caused by groundwater management activities.

The second element is the beneficial uses of the groundwater and water quality regulations, such as Maximum Contaminant Levels (MCLs) and other potable water quality requirements.

The third element that must be considered is the volume of groundwater impacted by groundwater quality degradation. If small volumes are negatively affected that don't materially affect the use of the aquifer or basin for its existing beneficial uses, then this would not represent a significant and unreasonable degradation of water quality. However, if the impacted volume grows, then it could reach a level that it becomes significant and unreasonable.

When considering all three elements, the definition of significant and unreasonable degradation of water quality is defined as degradation of groundwater quality in the South East Management Area to the extent that a significant volume of groundwater becomes unusable for its designated beneficial uses.

11.2 DETERMINATION OF MINIMUM THRESHOLDS

The minimum thresholds for groundwater quality are exceedances of Maximum Contaminant Levels (MCLs) or other applicable regulatory limits that are directly attributable to groundwater management actions in the South East Management Area that prevents the use of groundwater for its designated beneficial uses

SECTION 12. SUSTAINABLE MANAGEMENT RELATED TO SEAWATER INTRUSION

The South East Management Area is located far from the ocean and thus there is no reason to consider the potential impact of seawater intrusion in this management area.

SECTION 13. SUSTAINABLE MANAGEMENT RELATED TO LAND SUBSIDENCE

Subsidence is not an issue for the South East Management Area given the following:

- Minimal groundwater development exists in the South East Management Area.
- Groundwater levels are stable or rising and have been for at least 10 years.
- Low risk of future groundwater level declines due to limited planned groundwater production.

As discussed previously in Section 3, the Basin 8-1 area will continue to be monitored for changes in InSAR data (via OCWD and consultants) to evaluate ground surface fluctuations within the service area. If irreversible subsidence was found to occur in a localized area in relation to groundwater pumping patterns or groundwater storage conditions, the South East Management Area managers would coordinate with local officials to investigate and develop an approach to address the subsidence.

SECTION 14. MANAGING GROUNDWATER DEPLETIONS IMPACTING SURFACE WATER

Although IRWD does not have immediate plans for groundwater pumping in areas of GDEs, in the event that replacement or new wells are constructed near sensitive areas, groundwater monitoring will be implemented to ensure the groundwater production does not have an undesirable result on the GDE along Serrano Creek.

SECTION 15. PROTOCOLS FOR MODIFYING MONITORING PROGRAMS

Protocols for modifying monitoring programs are based on changes from historical conditions or changes in water quality that begin to approach or exceed regulatory limits.

15.1 ESTABLISHMENT OF PROTOCOLS FOR WATER QUALITY

Protocols for modifying monitoring programs are described in the 2017 Alternative.

SECTION 16. PROCESS TO EVALUATE NEW PROJECTS

When new projects are proposed within the South East Management Area, the agency proposing the project will be responsible for preparing a CEQA document to ensure alternatives have been evaluated and any significant and unreasonable results are mitigated. Plans to rehabilitate the well are currently going out for construction bid with potential construction expected to start in fall of 2022. The project may include facilities to remove high levels of iron and manganese as needed to meet potable water quality requirements.

There are a number of potential well projects currently in development in the South East Management Area. These include:

- LF-1 and LF-4 designated monitoring well operations.
- LF-2 rehabilitation and water quality treatment planned construction in 2022.
- LF-5 (replacement) future projects may include the possible development of a new production well on or near the existing decommissioned site.
- General well rehabilitation and monitoring projects across the South East Management Area, with approved funding allocated in the capital budgets approved for 2021-2023.

In IRWD’s Lake Forest portion of the South East Management Area, a 2002 study by Boyle Engineering Corporation and 2015 study by Dudek were performed in order to assess the potential for development of two future wells, LF-6 and LF-8, as well as the re-drilling of existing inactive wells. Although IRWD has no near-term plans to drill wells LF-6 and LF-8, it has included a capital project for the design, construction and equipping of LF-1.

A capital project for the design, construction and equipping of LF-1 has been included in IRWD’s most recent capital budget, however, there are no plans to begin this specific project. IRWD also has no near-term plans to drill wells LF-6 and LF-8. In 2000, its last active year, LF-1 pumped approximately 230 acre-feet. Over the last 5 years well LF-2 annual pumping has ranged from 0 acre-feet to 389 acre-feet and averaged approximately 90 acre-feet including years of non-operation. It is expected that when LF-1 is redrilled, groundwater production from IRWD’s southern portion of the South East Management Area could increase.

Water produced from LF-1 could be used to provide supply to the nearby lake which currently is supplied by untreated imported water. Water produced could also potentially be pumped and conveyed to the Baker Water Treatment Plant for treatment if needed (Dudek, 2015). Due to the consistently lower yields from the aquifer in this area, it is expected that additional production from LF-1 will continue to be considered supplemental, and therefore insignificant in terms of IRWD’s overall water supply for its Lake Forest area. As of 2021, LF-1 is still currently off line although there are future plans to potentially re-drill and rehabilitate the well in the future.

SECTION 17. REFERENCES

Following are references and technical studies for the South East Management Area.

- Basin 8-1 Alternative, 2017
- Communication with OCWD. Email dated November 28, 2016.
- Communication with OCWD. Email dated October 21, 2021.
- Communication with OCWD. Email dated November 17, 2021.
- Geohydrology and Acritical-Recharge Potential of the Irvine Area Orange County, California. J. A. Singer, January 8,1973.
- Groundwater Supply Evaluation for the Los Alisos System Phase 1. Boyle Engineering Corporation, July 2002.
- Ground Water Management, Irvine Area, Orange County, California. Harvey O. Banks, Consulting Engineer, Inc.
- Lake Forest Groundwater Conveyance Analysis Results. Dudek, November 5, 2015.
- 2015 Urban Water Management Plan, Irvine Ranch Water District, 2016
- 2020 Urban Water Management Plan, Irvine Ranch Water District, 2021

Basin 8-1 Alternative

Santa Ana Canyon Management Area

2022 Update

Prepared by: Orange County Water District

January 1, 2021

Basin 8-1 Alternative

2022 Update

Santa Ana Canyon Management Area

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Prepared for the Department of Water Resources, pursuant to Water Code §10733.6(b)(3),(c) and §10733.8

January 1, 2022

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SECTION 1. EXECUTIVE SUMMARY

The Santa Ana Canyon Management Area covers the easternmost extent of the Department of Water Resources (DWR) Basin 8-1, Coastal Plain of Orange County Groundwater Basin (Basin). This Management Area was created for this Alternative (under 23 CCR 354.20) because of the unique characteristics of the Santa Ana Canyon and the appropriateness of developing different management objectives and strategies for this portion of the Basin. These different objectives and management approaches, as described in this Section, account for the significant differences in groundwater use, geology, aquifer characteristics, and other factors which distinguish Santa Ana Canyon from other portions of the Basin. Figure 1-1 shows the extent of the Santa Ana Canyon Management Area and the agencies with jurisdiction in the Santa Ana Canyon Management Area. Table 1-1 lists the agencies shown on Figure 1-1.

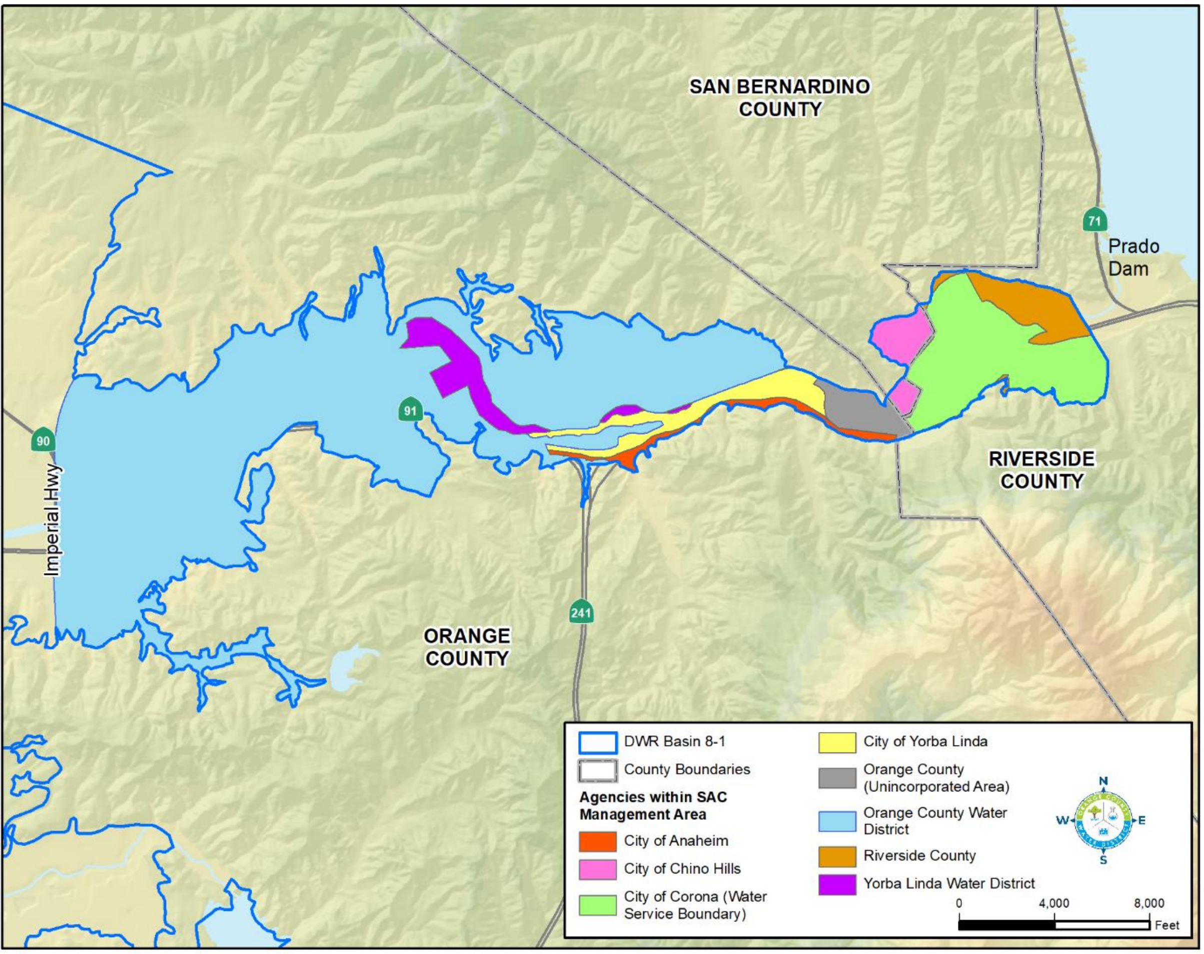


Figure 1-1: Agencies in the Santa Ana Canyon Management Area

The agencies within Basin 8-1 collaborated to prepare and submit an Alternative to a Groundwater Sustainability Plan (GSP). In accordance with Water Code §10733.6(b)(3), the Alternative presented an analysis of basin conditions that demonstrated that the Basin had operated within its sustainable yield over a period of at least 10 years. The Alternative was submitted to DWR on December 22, 2016. On July 17, 2019, DWR determined that the Alternative satisfied SGMA objectives and was therefore approved.

Agencies with approved alternatives are required to submit annual reports to DWR by April 1 of each year. Annual reports for Basin 8-1 were submitted to DWR as follows:

- Water Year 2016-17, submitted on March 29, 2018
- Water Year 2017-18, submitted on March 29, 2019
- Water Year 2018-19, submitted on March 30, 2020
- Water Year 2019-20, submitted on March 30, 2021

According to Water Code §10733.8, “At least every five years after initial submission of a plan pursuant to Section 10733.4, the department shall review any available groundwater sustainability plan or alternative submitted in accordance with Section 10733.6, and the implementation of the corresponding groundwater sustainability program for consistency with this part, including achieving the sustainability goal. The department shall issue an assessment for each basin for which a plan or alternative has been submitted in accordance with this chapter, with an emphasis on assessing progress in achieving the sustainability goal within the basin. The assessment may include recommended corrective actions to address any deficiencies identified by the department.”

This document, called the 2022 Update, represents the first five-year update, which is due January 1, 2022.

For purposes of this report, the Basin 8-1 Alternative submitted on December 22, 2016, will be referred to as the 2017 Alternative. The first five-year update will be referred to as the 2022 Update for ease of reference. The 2017 Alternative was a comprehensive document showing that Basin 8-1 had been managed sustainably for more than 10 years. For the 2022 Update, the focus is on documenting that the basin has been sustainably managed during the five years since the 2017 Alternative was submitted and to present relevant new information from the last five years. As such, the 2017 Alternative is considered a key reference document with background information that is not duplicated in the 2022 Update.

The water resources in the Santa Ana Canyon Management Area include the Santa Ana River and limited groundwater. Groundwater is primarily located in a thin alluvial aquifer that is 90 to 100 feet thick and is a combination of infiltrated Santa Ana River water and subsurface inflow from the adjacent foothills. Groundwater produced from the alluvial aquifer is primarily used for irrigation, but some is also used for potable purposes. The volume of produced groundwater represents less than one percent of the total available water supply to the Santa Ana Canyon Management Area due to the significantly larger flow of the Santa Ana River as shown on Table 1-2. Even under projected dry conditions, groundwater production is expected to be less than four percent of the total available water supply (see 2017 Alternative, Santa Ana Canyon Management Area).

Table 1-1: Agencies in Santa Ana Canyon Management Area

Agency
City of Anaheim
City of Chino Hills
City of Yorba Linda
City of Corona
Orange County Water District
County of Orange
Riverside County
Yorba Linda Water District

Table 1-2: Water Budget, 5-Year Average (2016-21)

Flow Component	5-Yr Avg: 2016-21 (afy)
INFLOW	
Santa Ana River Base Flow	76,860
Santa Ana River Storm Flow	78,750
Subsurface Inflow	6,000
TOTAL INFLOW	**161,610**
OUTFLOW	
Santa Ana River Base Flow	76,120
Santa Ana River Storm Flow	78,750
Evapotranspiration	740
Groundwater Production	1,000
Subsurface Outflow	5,000
TOTAL OUTFLOW	**161,610**

Per the monitoring discussed in Section 5, groundwater levels in the Santa Ana Canyon Management Area are relatively stable, having been consistently 20 to 30 feet below ground surface since 1991, indicating that the supply of subsurface inflow and surface water from the Santa Ana River is more than sufficient to sustain local groundwater production. Groundwater quality is suitable for irrigation and potable uses. Native groundwater from the surrounding foothills tends to have naturally elevated total dissolved solids (TDS) and manganese concentrations. Most wells in the canyon appear to produce a blend of infiltrated Santa Ana River water and native groundwater, with some wells producing more infiltrated Santa Ana River water than others.

The Orange County Water District (OCWD) monitors Santa Ana River flow and quality as well as groundwater levels, quality, and production in the Santa Ana Canyon Management Area (see Section 5). Moreover, OCWD has a wide variety of water resource management programs that cover the OCWD Management Area as well as programs in the upper Santa Ana River watershed to address Santa Ana River flow and quality (see Section 6). These programs are important in protecting the quality of the Santa Ana River, which has a significant influence on the groundwater quality in the Santa Ana Canyon Management Area.

The approach to managing the Santa Ana Canyon Management Area is for OCWD, in cooperation with the County of Orange, to continue monitoring groundwater levels and quality to ensure that no significant and unreasonable undesirable results occur in the future, both in the Santa Ana Canyon portion of the Basin and in the other hydrologically connected portions of the Basin.

Due to the conditions documented within the Santa Ana Canyon Management Area, it will not be difficult to prevent conditions that could lead to significant and unreasonable undesirable results due to the low risk of increased groundwater production, little available developable land, and continued high flows of the Santa Ana River relative to the amount of groundwater production. A summary of the applicable undesirable results that must be prevented under SGMA is presented below. A more detailed description of these can be found in Sections 8 to 13.

1. **Water Levels:** Long-term reduction in groundwater levels in the Santa Ana Canyon Management Area are not expected given the high volume of Santa Ana River flow relative to the amount of groundwater production and the ability of the shallow alluvial aquifer to be recharged as a result of continuous and abundant surface flow in the Santa Ana Canyon; however, if an unforeseen long-term reduction in groundwater levels were to occur, water levels could reach a significant and unreasonable level if one or more of the following occurred as a result of reduced groundwater levels:
    a. Significant loss of riparian habitat along the Santa Ana River.
    b. Significant loss of well production capacity (in the Santa Ana Canyon Management Area).
    c. Degradation of water quality that significantly impacts the beneficial uses of groundwater.
2. **Storage:** As with groundwater levels, long-term reduction in groundwater storage in the Santa Ana Canyon Management Area is not projected to occur; however, an unforeseen decline in groundwater storage could reach a significant and unreasonable level if such a decline caused one or more of the following:
    a. Loss of significant riparian habitat along the Santa Ana River.
    b. Significant loss of well production capacity.
    c. Degradation of water quality that significantly impacts the beneficial uses of groundwater.
3. **Water Quality:** The significant and unreasonable degradation of water quality is defined as the degradation of groundwater quality in the Santa Ana Canyon Management Area that is attributable to groundwater production or recharge practices within the Santa Ana

Canyon Management Area that cause a significant volume of groundwater to become unusable for its designated beneficial uses.

4. **Seawater Intrusion:** This does not apply to the Santa Ana Canyon Management Area because this area if far removed from the coastline.
5. **Subsidence:** No vertical changes have been noted using DWR-supplied InSAR data. It is unlikely that this will occur in the Santa Ana Canyon Management Area due to:
    a. The presence of shale and sandstone bedrock underlying the alluvial aquifer.
    b. The alluvial aquifer is thin, generally less than 100 feet, and comprised mainly of sand and gravel with little clay.
    c. Groundwater levels and groundwater storage are stable.
    d. Very low risk of substantial groundwater level declines due to a de minimis amount of groundwater production relative to the overall inflow of water to the Santa Ana Canyon Management Area.
6. **Groundwater Depletions Impacting Surface Water:** Due to hydrogeologic conditions and land use limitations, groundwater production in the Santa Ana Canyon Management area has had and is projected to have a de minimis effect on groundwater conditions and flows of surface water through the canyon. Therefore, this factor does not apply to the Santa Ana Canyon Management Area.

SECTION 2. AGENCY INFORMATION

2.1 HISTORY OF AGENCIES IN SANTA ANA CANYON MANAGEMENT AREA

As shown on Figure 1-1, eight agencies have jurisdiction within the Santa Ana Canyon Management Area. The footprint of the various agencies within the Santa Ana Canyon Management Area has not changed since the 2017 Alternative. Table 1-1 lists the agencies and the approximate area covered by each.

The Santa Ana Canyon Management Area covers 2.6 percent of Basin 8-1, which has a total area of 223,600 acres or 350 mi^2.

2.2 GOVERNANCE AND MANAGEMENT STRUCTURE

There are currently no groundwater withdrawals or plans for withdrawals within the portions of the Santa Ana Canyon Management Area that are within the City of Anaheim, City of Chino Hills, City of Yorba Linda, Riverside County, and the Yorba Linda Water District. Key reasons for the lack of significant groundwater production are the lack of demands in these areas, the relatively high mineral content of groundwater in the Santa Ana Canyon Management Area, and lack of developable land due to land use limitations. In addition, there are no groundwater withdrawals or plans for withdrawals by the City of Corona. Although there are existing groundwater withdrawals within the Corona service area, the wells are owned and operated by the County of Orange for golf course irrigation. As mentioned above, Corona delivers water from sources outside of the Santa Ana Canyon Management Area.

Accordingly, no additional groundwater governance and management structure is needed for the areas in the Santa Ana Canyon Management Area beyond the existing monitoring program that OCWD already carries out in accordance with its authorities under the OCWD Act, in cooperation with the other jurisdictional agencies. The governance and management structure of OCWD is described in the OCWD Management Area part of this report. As will be shown later in this section, groundwater withdrawals by the County of Orange and private well owner within the Santa Ana Canyon Management Area are de minimis compared to the overall flow of water through the Santa Ana Canyon Management Area, and they are expected to remain at current sustainable levels. As a result, there is no need for other agencies to establish groundwater governance or management in the Santa Ana Canyon Management Area beyond the existing groundwater production, level and quality data collection and reporting to DWR by OCWD per SGMA requirements.

2.3 LEGAL AUTHORITY

The legal authority of OCWD is described in the OCWD Management Area part of this report. As described in the OCWD Management Area part of the report, OCWD has obtained water rights from the State Water Resources Control Board (SWRCB) to all of the flows in the Santa Ana River arriving at Prado Dam. As a result, any future groundwater production within the

Santa Ana Canyon Management Area would be reviewed by OCWD and the SWRCB to ensure it does not interfere with OCWD's existing water rights. Moreover, though outside of OCWD's boundaries, OCWD currently monitors portions of Santa Ana Canyon pursuant to its authority under Section 2, subparagraphs 5, 6, 7 and 14, of the OCWD Act.

The Orange County Well Ordinance (County Ordinance No. 2607) requires that a permit be obtained from Orange County prior to the construction or destruction of any well. In unincorporated areas and in 29 of 34 Orange County cities, the Orange County Health Officer is responsible for enforcement of the well ordinance. In the remaining five cities (Anaheim, Buena Park, Fountain Valley, Orange and San Clemente), well ordinances are enforced by city personnel. Any plans for wells in areas covered by Riverside and San Bernardino Counties would be reviewed by OCWD to ensure they did not interfere with OCWD's rights to Santa Ana River flows.

2.4 BUDGET

OCWD's costs for data collection within the Santa Ana Canyon Management Area are contained within OCWD's budget for data collection in the OCWD Management Area, which is presented in the OCWD Management Area portion of this report. The County of Orange is responsible for costs associated with collecting production data from wells used to irrigate the County-owned Green River Golf Course. The other agencies within the Santa Ana Canyon Management Area do not incur any additional data collection costs since no further monitoring other that already undertaken by OCWD, and Orange County is believed needed in order to prevent undesirable results from occurring. As a result, an estimated budget for other agencies has not been prepared for the Santa Ana Canyon Management Area due to the minimal nature of the effort to collect and report groundwater production, level and water quality data.

SECTION 3. MANAGEMENT AREA DESCRIPTION

3.1 SANTA ANA CANYON MANAGEMENT AREA

The Santa Ana Canyon is a narrow east-west trending canyon between the Santa Ana Mountains to the south and the Chino Hills to the north near the intersection of Orange, San Bernardino and Riverside Counties. As shown on Figure 3-1, a key feature is the Santa Ana River. Just upstream of the Santa Ana Canyon is Prado Dam, which was constructed by the US Army Corps of Engineers in 1941 to reduce flood risks to Orange County.

Detailed geologic information, including cross sections, is presented in the 2017 Alternative.

The Santa Ana Canyon Management Area covers the area of alluvial deposits in the Santa Ana Canyon east of Imperial Highway (Hwy 90), as shown on Figure 3-1. Imperial Highway was selected as the western boundary of the Santa Ana Canyon Management Area because this is where the groundwater basin transitions from a relatively thin alluvial aquifer to a deep multi-layered alluvial basin. Moreover, Imperial Highway is the approximate boundary of OCWD’s groundwater flow model, allowing subsurface outflows from the entire Santa Ana Canyon Management Area to be readily quantified for purposes of the water budget and monitoring groundwater in storage.

Previously published reports indicated that the alluvial deposits in Santa Ana Canyon ranged from 90 to 100 feet thick (USGS, 1964). Cross-sections presented in the 2017 Alternative using more recent data showed that the thickness of the alluvial deposits in the Santa Ana Canyon are consistent with those reported by the USGS (1964).

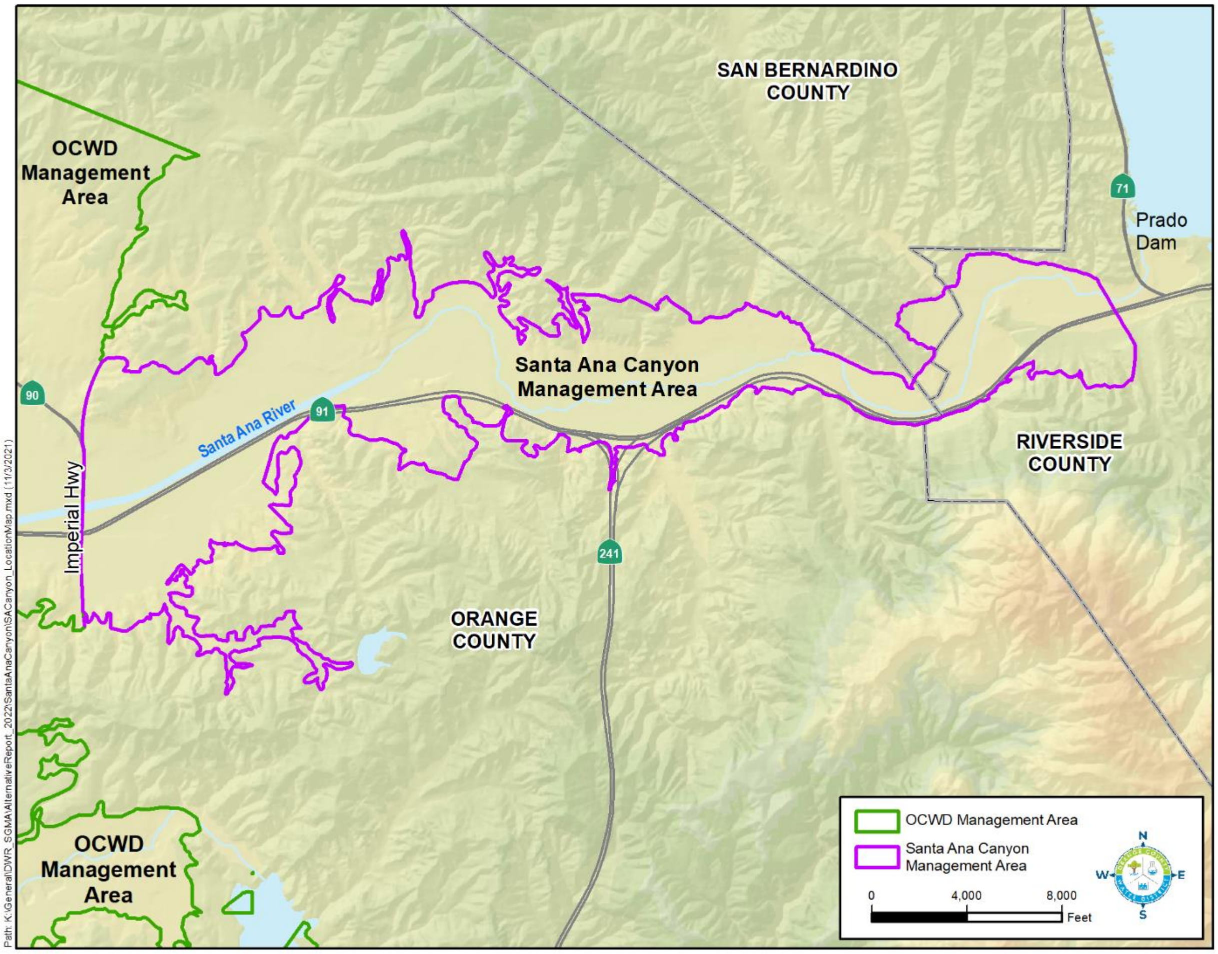


Figure 3-1: Boundary of Santa Ana Canyon Management Area

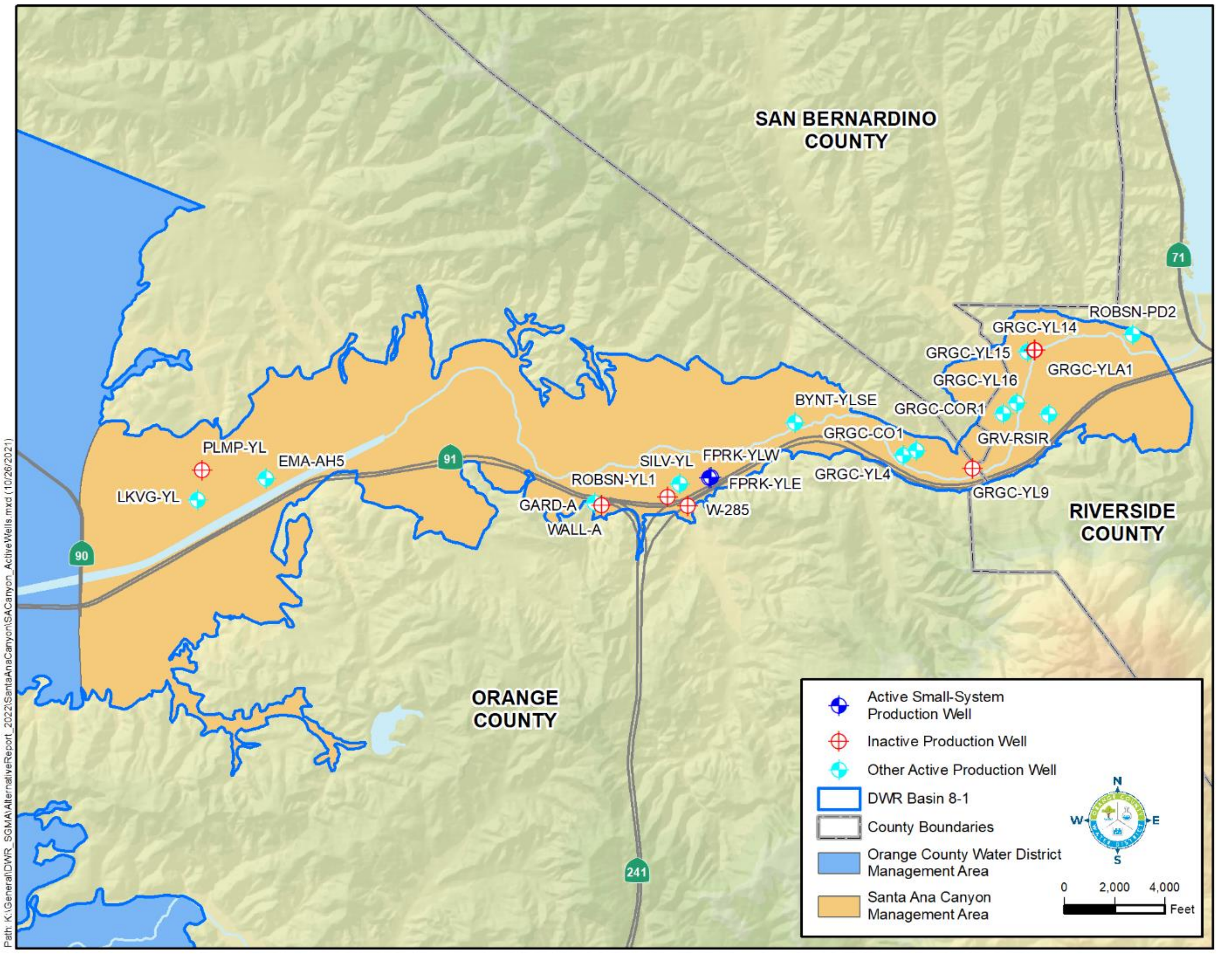


Figure 3-2: Groundwater Production Wells (Active and Inactive)

3.1.1 Jurisdictional Boundaries

As described in Section 2, there are eight agencies with jurisdiction in the Santa Ana Canyon Management Area as shown on Figure 2-1. The western boundary of the Santa Ana Canyon Management Area coincides with Imperial Highway and is within OCWD's jurisdiction.

3.1.2 Existing Land Use Designations

As described in the OCWD Management Area part of this report, much of the land use in Orange County is urban. The Santa Ana Canyon Management Area has some dedicated open-space due to the presence of the Santa Ana River and adjacent floodplain and the Chino Hills State Park, located in the far northeastern portion of the Santa Ana Canyon Management Area. The Green River Golf Club owned by the County of Orange covers approximately 220 acres along the river near the intersections of Orange, Riverside, and San Bernardino counties. Land use has remained essentially unchanged in the last five years.

3.2 GROUNDWATER CONDITIONS

Groundwater within the Santa Ana Canyon Management Area occurs in a narrow canyon within a relatively thin alluvial aquifer that is less than 100 feet thick in most places.

3.2.1 Groundwater Elevation

Groundwater elevations in the Santa Ana Canyon Management Area tend to be stable. Hydrographs from four wells show that water levels vary over a narrow range as shown on Figure 3-3. Well locations are shown on Figure 3-2 and cover the eastern (GRV-RSIR), south-central (FPRK-YLE/SILV-YL), and western (SCE-YLCS, EMA-AH5) areas of the Santa Ana Canyon Management Area.

Maximum water level elevations in many wells were recorded in 2004, which was a record-breaking wet year with very high sustained flows in the Santa Ana River. Low water levels appear to be primarily related to short-term local pumping. In the vicinity of all the wells, groundwater is approximately 20 to 30 feet below ground surface. Since the Santa Ana River channel is incised in some areas by 10 to 15 feet below the surrounding area, the depth to groundwater is even shallower directly beneath the river channel where it is not covered by the river itself.

The consistent, stable nature of groundwater elevations in the Santa Ana Canyon Management Area shows that the aquifer is generally full and at equilibrium, which is consistent with the finding that here are no measurable losses of flows between Prado Dam upstream and OCWD’s diversion to its recharge system just below Imperial Highway.

Within the last five years, OCWD, in cooperation with the County of Orange, began collecting groundwater elevation data at selected wells at the Green River Golf Course to complement existing groundwater elevation monitoring data. Note that wells SILV-YL and SCE-YLCS were formerly monitored for the CASGEM program. Well SCE-YLCS was destroyed and replaced by well EMA-AH5. As a result, water level data from SILV-YL and EMA-AH5 will be included in annual reports required to comply with SGMA.

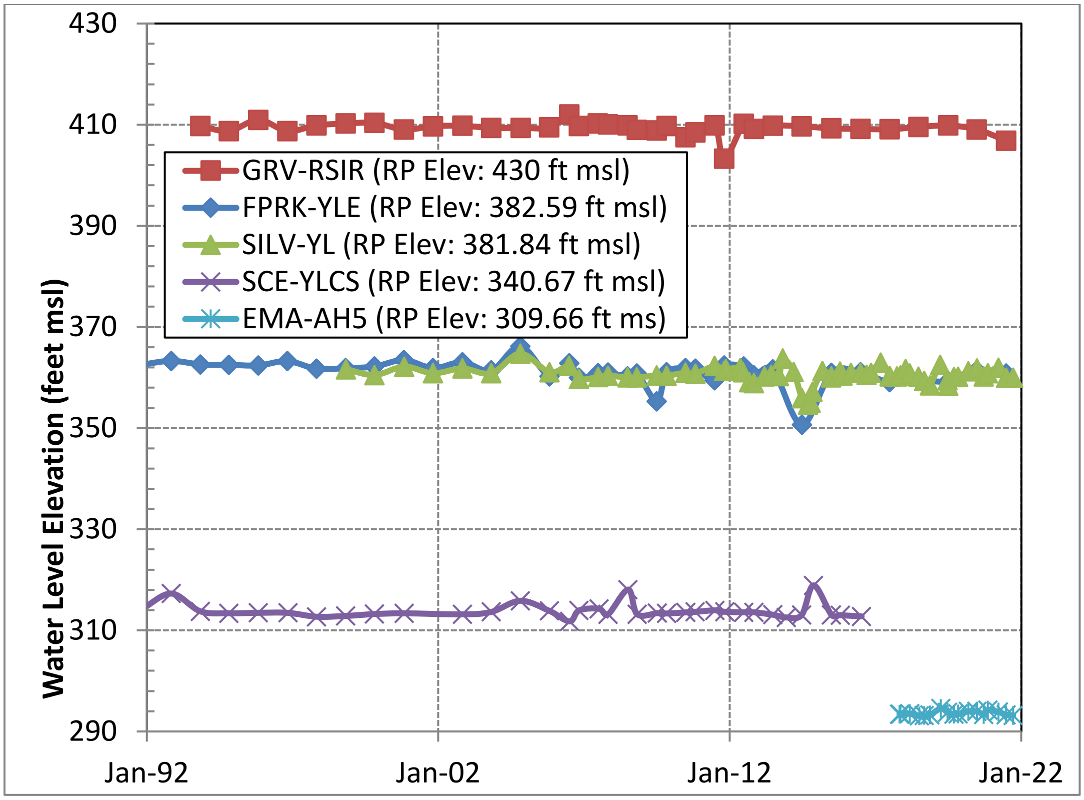


Figure 3-3: Water Level Hydrographs of Selected Wells

3.2.2 Groundwater Beneficial Uses and Regional Pumping Patterns

The Santa Ana Canyon Management Area is within the Santa Ana Region of the California Water Boards and is subject to the Santa Ana Region Basin Plan (January 24, 2014; updated July 2014). The Basin Plan designates zones related to groundwater management. The Santa Ana Canyon Management Area is included in the Orange County Management Zone. Within this Zone, groundwater has been designated for municipal, agricultural, and industrial (service supply and process) beneficial uses. Currently, local groundwater provides primarily irrigation supply with some residential drinking water (RV Park) and domestic uses.

There are 18 wells that can withdraw groundwater within the Santa Ana Canyon Management Area as shown on Figure 3-2; however, some of the wells shown are not currently being used (e.g., inactive). At the time the 2017 Alternative was prepared, some wells, namely those owned by the County of Orange to supply irrigation water to the Green River Golf Course, were not metered. OCWD worked with the County of Orange to have all their wells metered and production reported to OCWD. Prior estimates of pumping before meters were installed was on the order of 1,000 acre-feet per year (Personal Communication, Merrie Weinstock, County of Orange). Data collected in recent years shows that total production is less, averaging just over 600 acre-feet per year.

As shown on Table 3-1, total groundwater production within the Santa Ana Canyon Management Area over the last 5 years has averaged just over 1,000 acre-feet per year. Table

3-1 lists the production wells, meter status, and 5-year average production for wells located within the Santa Ana Canyon Management Area.

Table 3-1: Production Wells, Flow-Meter Status, and 5-Year Average Production

Well Name	Well Use	Owner	Metered	Production 5-Yr Avg 2016-21 (afy)*	Notes
BYNT-YLSE	IR	Neff Ranch, Ltd	Yes	69.8	
EMA-AH5	IR	County Of Orange	Yes	118.2	SGMA monitoring well.
FPRK-YLE	DW/IR	Canyon RV Park	Yes	79.5	
FPRK-YLW	DW/IR	Canyon RV Park	Yes	36.9	
GARD-A	IR	Kindred Outreach Ministries	Yes	1	
GRGC-CO1	IR	OCFCD	Yes	82.2	Monthly metering started Jan. 2019. Avg based on Jan. 2019-June 2021.
GRGC-COR1	IR	OCFCD	Yes	295.0	Monthly metering started Jan. 2019. Avg based on Jan. 2019-June 2021
GRGC-YL14	IR	OCFCD	Yes		Inactive
GRGC-YL15	IR	OCFCD	No		Inactive, only used for emergencies.
GRGC-YL16	IR	OCFCD	Yes	161.0	Monthly metering started Jan. 2019. Avg based on Jan. 2019-June 2021
GRGC-YL4	IR	OCFCD	Yes	75.5	Monthly metering started Jan. 2019. Avg based on Jan. 2019-June 2021
GRGC-YL9	IR	OCFCD	Yes		Inactive
GRGC-YLA1	IR	OCFCD	Yes		Inactive
GRV-RSIR	IR	Green River Village	Yes	6.2	
LKVG-YL	IR	Eastlake Village HOA	Yes	70.8	
ROBSN-PD2	IR	Robertson Ready Mix	Yes	5.4	Monthly metering started Jan. 2018. Avg based on Jan. 2018-June 2021
ROBSN-YL1	IR	Robertson Ready Mix	Yes		Inactive
WALL-A	DOM	Kindred Outreach Ministries	No		Inactive
			Total	**1,007**	

*Five-year average except where noted.
IR= Irrigation; DW=Drinking Water; DOM=Domestic
OCFCD = Orange County Flood Control District

3.2.3 Groundwater Storage Data

Groundwater storage in Basin 8-1 is estimated at 66 million acre-feet (OCWD, 2007), which does not include the Santa Ana Canyon Management Area. To estimate the amount of storage in the alluvial aquifer within Santa Ana Canyon Management Area, all well data were used and depths to bedrock estimated. The thickness of the alluvial deposits is assumed to be zero at the basin margin. Using a Topo to Raster Interpolation function in ArcGIS, the total volume of alluvial deposits was estimated at 174,000 acre-feet. Assuming a porosity of 25 percent gives a total potential groundwater storage volume of 43,500 acre-feet. The actual volume of groundwater in storage is smaller given that this estimate does not take into account that the depth to groundwater is typically 20 to 30 feet below ground surface.

3.2.4 Groundwater Quality Conditions

Groundwater quality in the Santa Ana Canyon Management Area is generally good and suitable to meet beneficial uses. Groundwater in the Santa Ana Canyon Management Area is a mixture of infiltrated Santa Ana River water and subsurface inflow. Detailed water quality information is presented in the 2017 Alternative. No substantive changes in groundwater quality have occurred within the last five years.

3.2.5 Land Subsidence

Land subsidence measurements derived from InSAR data provided by DWR show that land displacement in the Santa Ana Canyon Management Area from June 2015 to July 2020 is within the accuracy of the method (0 to 0.05 ft). This is not surprising given the following:

1. The presence of shale and sandstone bedrock underlying the alluvial aquifer is not thought to be sufficiently compressible to cause inelastic subsidence.
2. The alluvial aquifer is thin, generally less than 100 feet, and composed mainly of sand and gravel with only minor amounts of clay.
3. Groundwater levels and storage volumes have not changed significantly over the last five years.

3.2.6 Groundwater and Surface Water Interactions and Groundwater Dependent Ecosystems

Groundwater within the Santa Ana Canyon alluvial aquifer is consistently 20 to 30 feet below ground surface and even shallower in the incised portions of the Santa Ana River channel. As described in Section 4, Water Budget, the flow of surface water through the canyon dwarfs the documented groundwater production. As a result, groundwater production has a de minimis impact on groundwater conditions and flows of surface water through the canyon. This in turn demonstrates that groundwater production in the Santa Ana Canyon has little to no impact on local groundwater dependent ecosystems in the Santa Ana Canyon Management Area.

SECTION 4. WATER BUDGET

The water budget of the Santa Ana Canyon Management Area is dominated by surface flows of the Santa Ana River with a minor contribution of subsurface inflow, return flows from irrigation, and a small amount of groundwater production. Table 1-2 presents the water budget for the Santa Ana Canyon Management Area for the last five years. Additional water budget information was presented in the 2017 Alternative. The water budget contains both surface water and groundwater components and is not used to analyze change in groundwater storage. The purpose of presenting this water budget is to show the relative contributions of different sources in the Santa Ana Canyon Management Area.

Groundwater level data suggest that groundwater conditions in the Santa Ana Canyon Management Area are essentially at steady state conditions with inflow equaling outflow and no change in groundwater storage. Inflow to the shallow alluvial aquifer includes subsurface inflow and infiltrated Santa Ana River water. Outflow includes evapotranspiration, groundwater production and subsurface outflow. Table 4-1 presents the groundwater budget for the Santa Ana Canyon Management Area.

Table 4-1: Groundwater Budget, 5-Year Average (2016-21)

Flow Component	5-Yr Avg: 2016-21 (afy)
INFLOW	
Subsurface Inflow (1)	6,000
Infiltrated Santa Ana River Flow (2)	740
TOTAL INFLOW	**6,740**
OUTFLOW	
Evapotranspiration (3)	740
Groundwater Production	1,000
Subsurface Outflow to OCWD Management Area (4)	5,000
TOTAL OUTFLOW	**6,740**
NET CHANGE	0

(1) Subsurface inflow is estimated and includes irrigation return flow and areal recharge from precipitation.
(2) Estimated infiltration of Santa Ana River flow to balance outflow.
(3) Evapotranspiration is based on 370 acres of riparian habitat and a usage rate of 2 afy/acre of habitat per Santa Ana River Watermaster Reports.
(4) Subsurface outflow is based on OCWD's calibrated groundwater flow model.

4.1 BUDGET COMPONENTS

The components of the groundwater budget are described below.

4.1.1 Subsurface Inflow/Outflow

In the 2017 Alternative, the estimated subsurface outflow was 4,000 acre-feet per year based on the steady state groundwater flow model. More recent transient groundwater flow modeling using the period 1999 to 2017, showed that average outflow from the Santa Ana Canyon to the main basin to be approximately 5,000 acre-feet per year. As a result, the water budget tables have been updated accordingly.

Subsurface inflow is a combination of subsurface mountain front recharge, areal recharge from precipitation, and irrigation return flow. It is estimated to be approximately 6,000 acre-feet per year.

4.1.2 Infiltrated Santa Ana River Flow

Water quality data suggests that some of the groundwater produced from wells in the Santa Ana Canyon Management Area is a blend of subsurface inflow and infiltrated Santa Ana River water; however, there is not enough data to determine the relative contribution of each source. For purposes of the groundwater budget, the amount of infiltrated Santa Ana River flow is the amount necessary to balance the water budget assuming subsurface inflow is 6,000 acre-feet per year. If the assumed amount of subsurface inflow were to change, the amount of infiltrated Santa Ana River water needed to balance the water budget would change accordingly.

Evapotranspiration

Evapotranspiration is assumed to be due to riparian vegetation adjacent to the Santa Ana River. The County of Orange, as part of developing a Habitat Management Plan (HMP), established a baseline of 370 acres of riparian vegetation within the Santa Ana Canyon Management Area (County of Orange, 2016).

The Santa Ana River Watermaster reports that riparian vegetation consumes approximately 2 acre-feet per year per acre of vegetated area. Using this approach, the estimated evapotranspiration within the Santa Ana Canyon Management area is estimated to be 740 acre-feet per year.

4.1.3 Groundwater Production

As described in Section 3.2.2, there are 18 wells that can withdraw groundwater within the Santa Ana Canyon Management Area (Figure 3-2); however, some of the wells shown are not currently being used (e.g., inactive). Groundwater production from these wells is summarized in Table 3-1.

4.2 CHANGES IN GROUNDWATER STORAGE

As shown in Figure 3-3, groundwater levels in the Santa Ana Canyon Management Area are stable, indicating that the thin, alluvial aquifer is generally always in a near-full equilibrium condition. Therefore, any changes in groundwater storage are small and insignificant.

4.3 WATER YEAR TYPE

The water year type has little impact on the water budget in the Santa Ana Canyon Management Area given the minimal changes in groundwater level observed through time due to the ever-present Santa Ana River flow and subsurface inflow. Water budgets for wet and dry year water types are presented in the 2017 Alternative.

4.4 ESTIMATE OF SUSTAINABLE YIELD

As described in Table 4-1, average groundwater production over the last five years is less than one percent of the total inflow to the Santa Ana Canyon Management Area. This condition is the same as what was presented in the 2017 Alternative. It is clear the sustainable yield of the Santa Ana Canyon Management Area is much greater than current production levels. Nevertheless, there are no plans for additional wells or groundwater production in the Santa Ana Canyon Management Area, and it is highly unlikely that groundwater demands would rise to the level of changing the water budget of this area significantly. In terms of sustainable yield, it is more appropriate to look at Basin 8-1 as a whole.

4.5 CURRENT, HISTORICAL, AND PROJECTED WATER BUDGET

Current water budgets are presented in presented in Tables 4-1 and 4-2. Historical and projected water budgets, including Dry and Wet Year Water Budgets, are presented in the 2017 Alternative.

SECTION 5. WATER RESOURCE MONITORING PROGRAMS

5.1 OVERVIEW

This section describes OCWD’s surface water and groundwater monitoring programs in the Santa Ana Canyon Management Area.

5.2 GROUNDWATER MONITORING PROGRAMS

OCWD monitors groundwater levels, quality and production in the Santa Ana Canyon Management Area. As shown on Figure 5-1, groundwater levels are monitored at six wells. Within the last five years, well SCE-YLCS was destroyed and replaced in the monitoring network by well EMA-AH5. Water level data from wells SILV-YL and EMA-AH5 will be reported annually to DWR in compliance with SGMA. In addition, OCWD worked with the County of Orange to install meters on wells used to supply Green River Golf Course and to begin collecting and reporting production data. Data provided in this report utilizes metered data for all wells that pump groundwater in the Santa Ana Canyon Management area.

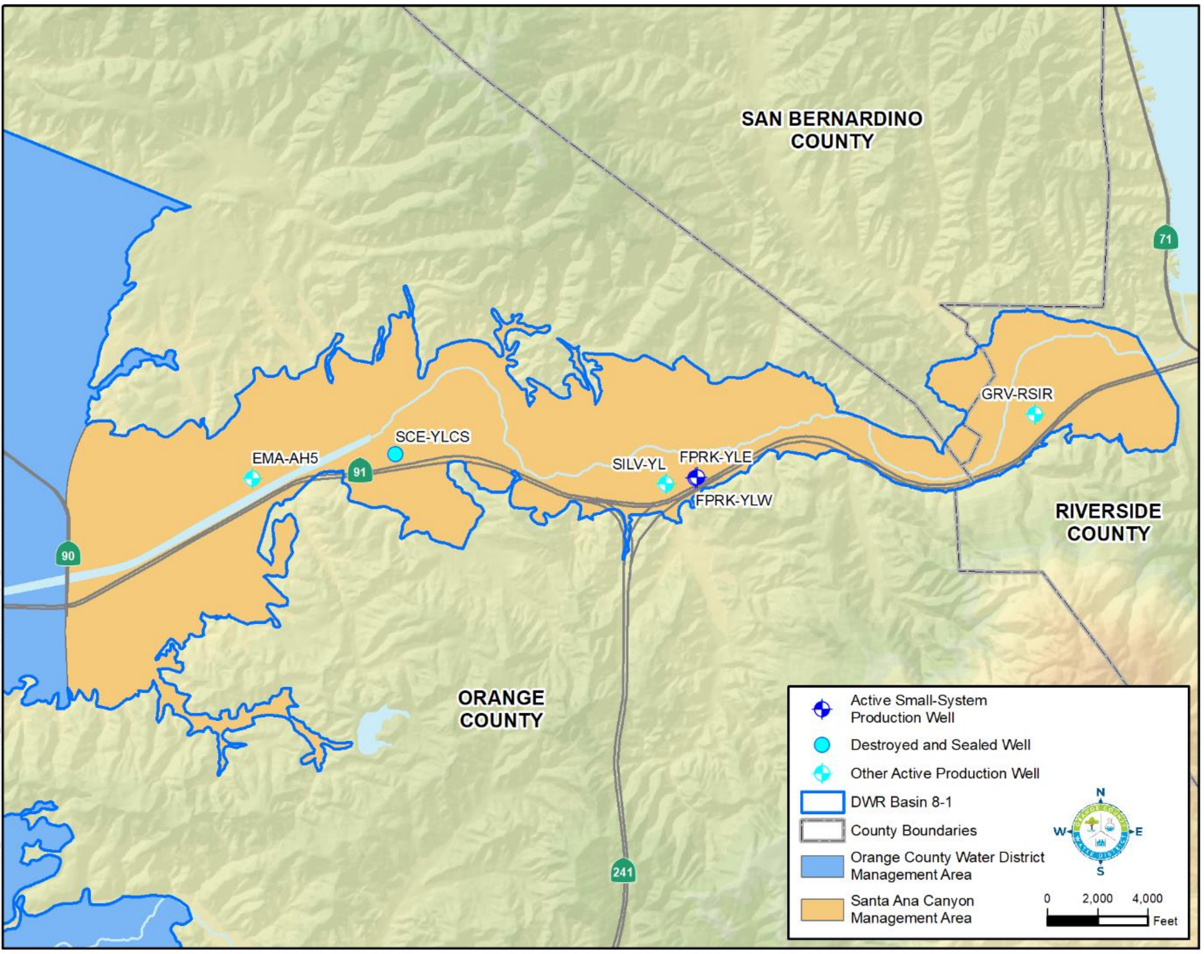


Figure 5-1: Wells Used to Monitor Groundwater Levels

For wells within OCWD’s boundaries, groundwater production must be reported at a minimum frequency of every 6 months. Groundwater production volumes from the County of Orange’s wells that supply the Green River Golf Course are now being collected monthly.

OCWD also monitors groundwater quality in selected wells in the Santa Ana Canyon Management Area. Table 5-1 lists the wells monitored and the groundwater quality monitoring program each well is part of, which is based on its use (e.g., irrigation, potable). Wells used for irrigation are sampled every year for volatile organic compounds (VOCs) and every three years for general minerals (major cations and anions), 1,4-dioxane, and perchlorate (ClO_4). The two wells in Featherly Park used for potable supplies are monitored in accordance with drinking water regulations.

Table 5-1: Wells Monitored for Water Quality

Well Name	Water Quality Monitoring Program
IRRIGATION WELLS BYNT-YLSE	Annual: Volatile Organic Compounds (VOCs) Every 3 yrs: General Minerals, 1,4-Dioxane, and ClO_4
EMA-AH5	
GARD-A	
GRGC-CO1	
GRGC-COR1	
GRGC-YL15	
GRGC-YL16	
GRGC-YL4	
GRV-RSIR	
LKVG-YL ROBSN-PD2	
POTABLE USE WELLS FPRK-YLE FPRK-YLW	Annual: NO_3, ClO_4, 1,4-Dioxane, Mn, TDS, EC Atrazine/Simazine: every 3 yrs Title 22 Inorganics: every 3 yrs CN: every 9 yrs CrIV: every 3 yrs Radioactivity: every 6 yrs (Gross Alpha, Uranium) Radioactivity: every 9 yrs (Radium 226 & Radium 228)

5.3 OTHER MONITORING PROGRAMS

OCWD monitors the quantity and quality of water in the Santa Ana River just below Prado Dam. The flow of the Santa Ana River below Prado Dam is measured by the United States Geological Survey (USGS) at station No. 11074000 (http://waterdata.usgs.gov/ca/nwis/dv/?site_no=11074000). In addition to flow, the USGS measures the electrical conductivity (EC) of the water as well as sampling the water two times per month for TDS. One use of these data is to calculate the flow-weighted average TDS of base and storm flow discharged from Prado Dam. The flow and quality data are collected for the Santa Ana River Watermaster, which was formed to implement the Stipulated Judgement in the case of Orange County Water District v. City of Chino, et al., Case No. 1172628-County of Orange, entered by the court on April 17, 1969. Copies of the watermaster reports can be found on OCWD's website at http://www.ocwd.com. In addition to OCWD, the Santa Ana River Watermaster is comprised of representatives from the Inland Empire Utilities Agency, San Bernardino Valley Municipal Water District, and Western Municipal Water District.

The significance of the 1969 Judgment is that it guarantees a minimum base flow at Prado Dam of 42,000 acre-feet per year; however, per the terms of the Judgment, the upstream agencies have received (and will continue to receive) credits when base flows exceed of 42,000 acre-feet at Prado. With these cumulative credits, the required minimum base flow is 34,000 acre-feet. As a point of reference, the base flow in Water Year 2020-21 was estimated to be 76,000 acre-feet (Note that this is an OCWD estimate to be finalized in a future SAR Watermaster Report).

OCWD also closely monitors the quality of water in the Santa Ana River before it is diverted into OCWD's recharge system below Imperial Highway. More information about this program can be found in Section 5 of the OCWD Management Area section of this report.

SECTION 6. WATER RESOURCE MANAGEMENT PROGRAMS

OCWD has a wide variety of water resource management programs that cover the main groundwater basin as well as the upper Santa Ana River watershed to address Santa Ana River flow and quality. These programs are important in protecting the quality of the Santa Ana River, which affects groundwater quality in the Santa Ana Canyon Management Area. These programs are described in detail in Section 6 of the OCWD Management Area part of the 2017 Alternative.

SECTION 7. NOTICE AND COMMUNICATION

There are eight stakeholder agencies within the Santa Ana Canyon Management Area, including the following:

- City of Anaheim
- City of Chino Hills
- City of Yorba Linda
- City of Corona
- Orange County Water District
- County of Orange
- Riverside County
- Yorba Linda Water District

On September 30, 2021, OCWD sent a letter via email to all of the Basin 8-1 agencies, including each of the agencies listed above to let them know that the 2017 Alternative was being updated and would be available for review and comment. No comments were received by any of the agencies contacted.

A draft of the 2022 Update was presented to the OCWD Board and posted on the OCWD website on November 18, 2021, to allow for public review and comment. The final 2022 Update was presented to the OCWD Board on December 15, 2021. At this board meeting, a resolution was adopted to support the submission of the 2022 Update to DWR.

SECTION 8. SUSTAINABLE MANAGEMENT APPROACH

The approach to sustainably managing the Santa Ana Canyon Management Area is to continue monitoring conditions to ensure that no significant and unreasonable results occur in the future.

SECTION 9. SUSTAINABLE MANAGEMENT RELATED TO GROUNDWATER LEVELS

9.1 HISTORY

As shown on Figure 3-3, groundwater levels in the Santa Ana Canyon Management Area have been steady over the last 20 years. Given the large amount of surface inflow to the Santa Ana Canyon Management Area relative to the amount of groundwater production, groundwater levels are expected to remain steady in the future.

9.2 MONITORING OF GROUNDWATER LEVELS

OCWD monitors groundwater levels at multiple wells in the Santa Ana Canyon Management Area and will continue to do so in the future.

Within the last five years, several wells at the Green River Golf Course were added to the OCWD monitoring network and destroyed well SCE-YLCS was replaced in the network by well EMA-AH5.

9.3 DEFINITION OF SIGNIFICANT AND UNREASONABLE LOWERING OF GROUNDWATER LEVELS

No long-term reduction in groundwater levels is foreseen in the Santa Ana Canyon Management Area; however, if that were to occur, a decline in groundwater levels could reach a significant and unreasonable level if one more of the following occurred as a result of reduced groundwater levels:

1. Significant and unreasonable loss of riparian habitat along the Santa Ana River.
2. Significant and unreasonable loss of well production capacity.
3. Degradation of water quality that significantly impacts the beneficial uses of groundwater.

9.4 DETERMINATION OF MINIMUM THRESHOLDS

It is not possible to determine a minimum threshold at this time since no undesirable effects due to water levels have occurred in the past and are not foreseen. Nevertheless, OCWD's monitoring program continuously tracks water levels and groundwater quality in the Management Area. If water levels started to show a consistent long-term decline, OCWD's monitoring program would be expanded to examine potential impacts to riparian habitat, well yields, and groundwater quality. If impacts were observed, action would be taken, and minimum thresholds would be evaluated and established as appropriate.

SECTION 10. SUSTAINABLE MANAGEMENT RELATED TO BASIN STORAGE

The total volume of groundwater storage in the OCWD Basin is estimated to be 66 million acre-feet (OCWD, 2007). The total potential storage volume in the Santa Ana Canyon Management Area is estimated to be 43,500 acre-feet, as described in Section 3.2.3.

10.1 DEFINITION OF SIGNIFICANT AND UNREASONABLE REDUCTION IN STORAGE

As with groundwater levels, no long-term reduction in groundwater storage is foreseen in the Santa Ana Canyon Management Area; however, if that were to occur, a decline in groundwater storage could reach a significant and unreasonable level if one more of the following occurred due to a reduction in storage:

1. Significant and unreasonable loss of riparian habitat along the Santa Ana River.
2. Significant and unreasonable loss of well production capacity.
3. Degradation of water quality that significantly impacts the beneficial uses of groundwater.

10.2 DETERMINATION OF MINIMUM THRESHOLDS

It is not possible to determine a minimum threshold at this time since no undesirable effects due to a change in groundwater storage levels have occurred in the past and are not foreseen in the future. Nevertheless, OCWD's monitoring program continuously tracks water levels, which is a proxy for groundwater storage, and groundwater quality in the Management Area. If water levels showed a consistent long-term decline, OCWD's monitoring program would be expanded to examine potential impacts to riparian habitat, well yields and groundwater quality. If impacts were observed, action would be taken, and minimum thresholds would be evaluated and established as appropriate.

SECTION 11. SUSTAINABLE MANAGEMENT RELATED TO BASIN WATER QUALITY

Groundwater quality in the Santa Ana Canyon Management Area is affected by the quality of Santa Ana River water and subsurface inflow from the surrounding foothills. As mentioned in Section 6, Water Resource Programs, OCWD is involved in multiple programs to protect and improve the quality of water in the Santa Ana River. Groundwater from subsurface inflow contains naturally elevated concentrations of TDS and manganese.

OCWD has an extensive groundwater monitoring program in the Santa Ana Canyon Management Area as described in Section 5, Water Resource Monitoring Programs.

11.1 DEFINITION OF SIGNIFICANT AND UNREASONABLE DEGRADATION OF WATER QUALITY

There are three elements that must be considered when evaluating the impact of groundwater quality degradation.

The first element is considering the causal nexus between local groundwater management activities and groundwater quality. For example, if subsurface inflow from the surrounding foothills increases during a wet period, TDS and manganese levels could increase; however, this increase is not caused by groundwater management activities, but by natural events. A similar situation applies to the quality of Santa Ana River water. Although OCWD is involved in many programs to protect and improve the quality of Santa Ana River water, there could be changes in water quality that are outside of the control of Santa Ana Canyon Management Area stakeholders.

The second element to consider is if the beneficial uses of the groundwater have been negatively affected and/or if water quality regulations, such as Maximum Contaminant Levels (MCLs) and other potable water quality requirements have been exceeded.

The third element that must be considered is the volume of groundwater impacted by groundwater quality degradation. If small volumes are negatively affected yet do not materially affect the use of the aquifer for its existing beneficial uses, then this would not represent a significant and unreasonable degradation of water quality. However, if the impacted volume grows, then it could reach a level that it becomes significant and unreasonable.

When considering all three elements, “significant and unreasonable degradation of water quality” is defined as degradation of groundwater quality in the Santa Ana Canyon Management Area that is attributable to groundwater production or recharge practices within the Santa Ana Canyon Management Area and to the extent that a significant volume of groundwater becomes unusable for its designated beneficial uses.

11.2 DETERMINATION OF MINIMUM THRESHOLDS

The minimum thresholds for groundwater quality are exceedances of Maximum Contaminant Levels (MCLs) or other applicable regulatory limits that are directly attributable to groundwater production and recharge practices in the Santa Ana Canyon Management Area that prevents the use of groundwater for its designated beneficial uses.

SECTION 12. SUSTAINABLE MANAGEMENT RELATED TO SEAWATER INTRUSION

The Santa Ana Canyon Management Area is located far from the ocean and thus there is no reason to consider the potential impact of seawater intrusion in this management area.

SECTION 13. SUSTAINABLE MANAGEMENT RELATED TO LAND SUBSIDENCE

Recently, as part of DWR's SGMA technical assistance to provide important SGMA-relevant data to Groundwater Sustainability Agency's (GSAs) for Groundwater Sustainability Plan (GSP) development and implementation, DWR contracted with TRE ALTAMIRA, Inc. to provide vertical displacement estimates are derived from InSAR data that are collected by the European Space Agency (ESA) Sentinel-1A satellite.

This dataset represents measurements of vertical ground surface displacement in more than 200 of the high-use and populated groundwater basins across the State of California between January of 2015 and October of 2020. InSAR data coverage began in late 2014 for parts of California, and coverage for the entire study area began on June 13, 2015. Included in this dataset are point data that represent average vertical displacement values for 100 square meter areas, as well as GIS rasters that were interpolated from the point data; rasters for total vertical displacement relative to June 13, 2015, and rasters for annual vertical displacement rates with earlier coverage for some areas, both in monthly time steps. The level of accuracy is approximately 0.05 feet.

To show subsidence in Basin 8-1, OCWD used the used a layer showing the total land subsidence since the start of the InSAR data on 6/13/2015 and ending on 7/1/2020, which corresponds to the end of the OCWD water year. The GIS layer used was: https://gis.water.ca.gov/arcgisimg/rest/services/SAR/Vertical_Displacement_TRE_ALTAMIRA_v2020_Total_Since_20150613_20200701/ImageServer

Figure 13-1 shows the total land displacement in Basin 8-1 from June 2015 to July 2020. In the Santa Ana Canyon Management Area, vertical displacement is essentially unchanged and within the accuracy of the method (0 to 0.05 ft). This is not surprising given the following:

- The presence of shale and sandstone bedrock underlying the alluvial aquifer is not thought to be sufficiently compressible to cause inelastic subsidence.
- The alluvial aquifer is thin, generally less than 100 feet, and composed mainly of sand and gravel with only minor amounts of clay.
- Groundwater levels and storage volumes are stable.
- Substantial groundwater level declines are highly unlikely due to the de minimis amount of groundwater production relative to the overall inflow of water to the Santa Ana Canyon Management Area.

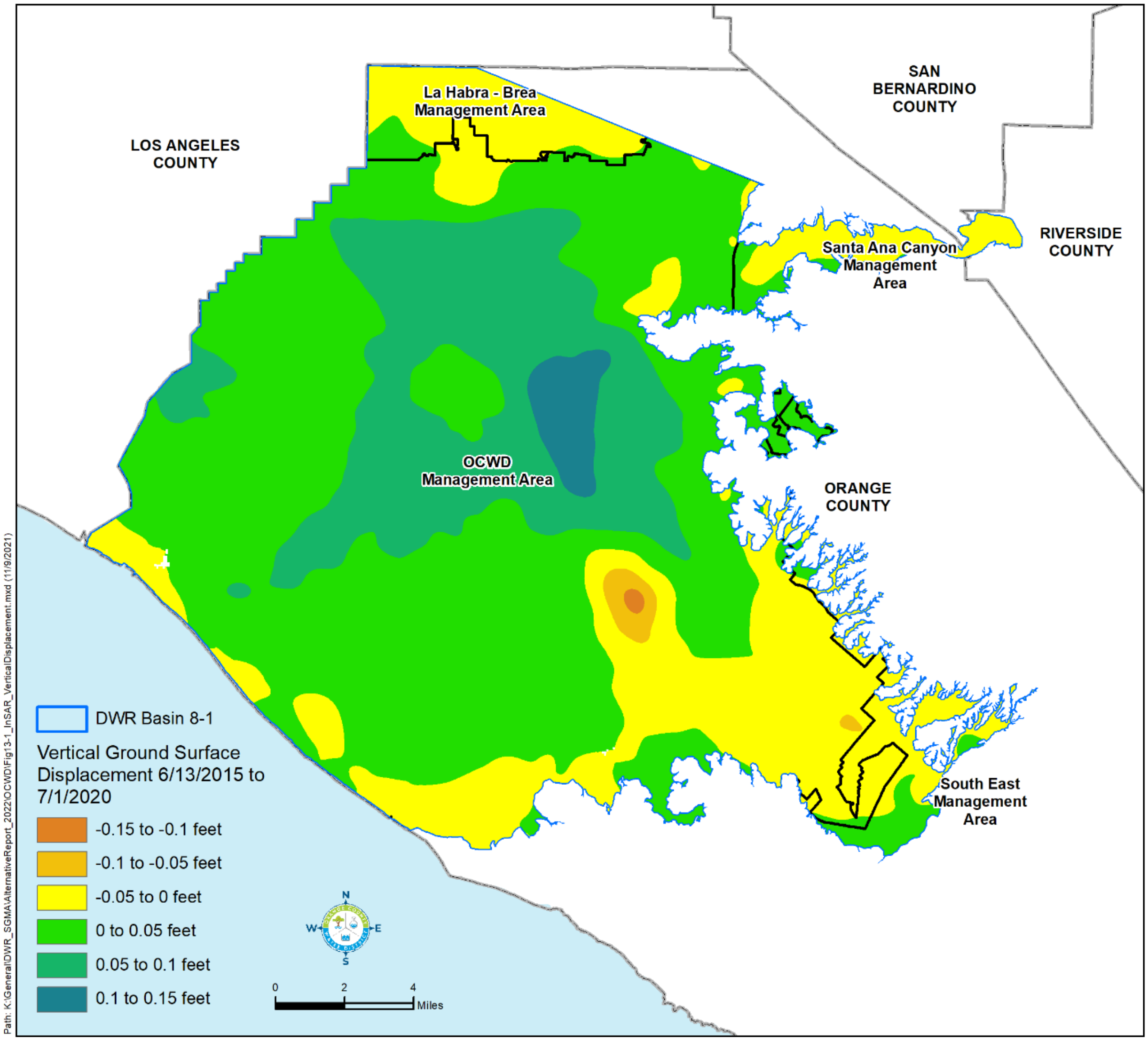


Figure 13-1: Total Vertical Ground Surface Displacement from June 2015 to July 2020

SECTION 14. MANAGING GROUNDWATER DEPLETIONS IMPACTING SURFACE WATER

The primary surface water feature in the Santa Ana Canyon Management Area is the Santa Ana River. In the Santa Ana Canyon Management Area, the Santa Ana River is a soft-bottomed channel that supports riparian habitat. Riparian habitat is dependent on river water released through Prado Dam, which is predominantly treated wastewater discharged in the upper watershed when storm flow is not present.

Groundwater within the Santa Ana Canyon alluvial aquifer is consistently 20 to 30 feet below ground surface and even shallower in the incised portions of the Santa Ana River channel. As described in Section 4, Water Budget, the flow of surface water through the canyon is two orders of magnitude larger than groundwater production. As a result, groundwater production has a de minimis impact on groundwater conditions and the flows of surface water through the canyon. This, in turn, means that groundwater production in the Santa Ana Canyon has a de minimis impact on the groundwater dependent ecosystems in the Santa Ana Canyon Management Area. Therefore, the undesirable result of “depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water due to groundwater conditions occurring throughout the basin” does not apply.

SECTION 15. PROTOCOLS FOR MODIFYING MONITORING PROGRAMS

Protocols for modifying monitoring programs are described in the 2017 Alternative.

SECTION 16. PROCESS TO EVALUATE NEW PROJECTS

For projects within OCWD, the process described in the OCWD Management Area part of this report applies. If new projects are proposed by others outside of OCWD’s boundaries, OCWD would collaborate with the agency proposing the project to ensure that any proposed project would not cause significant and unreasonable results. Moreover, OCWD would review proposed projects through the CEQA process (i.e., reviewing and commenting on draft CEQA documents).

SECTION 17. REFERENCES

County of Orange, 2016. County of Orange, Santa Ana River Canyon and Brush Canyon Habitat Management Areas, 2016 Annual Monitoring Report, June 2016.

OCWD, 2007. Report on Evaluation of Orange County Groundwater Basin Storage and Operational Strategy, February 2007.

USGS, 1964. Geology and Oil Resources of the Eastern Puente Hills Area, Southern California. By D.L. Durham and R.F. Yerkes. USGS Professional Paper 420-B.

Attachment 1

Department of Water Resources (DWR) Comments on 2017 Alternative and Responses

Responses to DWR Comments on Alternative Plan

This section provides comments to DWR's Alternative Assessment Staff report, dated July 17, 2019. In addition, responses are provided for the four suggested recommended actions listed in the staff report (Section IV, B).

OCWD Comments on DWR Alternative Assessment Staff Report, July 17, 2019.

Page 7, Part IV, D, Basin coverage. DWR is correct in that the three agencies that collaborated in preparing the Alternative do not cover the entire basin; however, all other agencies with jurisdiction, such as the County of Orange, City of Corona, City of Yorba Linda, City of Anaheim and others were notified and offered the opportunity to be involved. No comments were received from any of the contacted agencies. It is our opinion, that through this process, OCWD, La Habra and IRWD did achieve complete coverage of Basin 8-1.

Page 14, Part V, B.2, Groundwater Conditions DWR staff mentioned that monitoring data showing that there are no depletions of interconnected surface water that will cause significant and unreasonable impacts on beneficial users of surface water is not provided, per Page 9 of the Alternative. Page 9 of the Alternative is part of the Overview of the entire report and does not contain detailed information Detailed monitoring information, including 10 years of water level data (Page 364), water budget information, etc. is presented in the Santa Ana Canyon Management Area section of the Alternative. The information presented in the Santa Ana Canyon Management Area section of the report supports the conclusion that there are no depletions of interconnected surface water that will cause significant and unreasonable impacts on beneficial users of surface water. Additional information has been provided below in response to Recommendation No. 1.

Page 16,. Part V, B.4, Management Areas. At the time the 2017 Alternative was submitted, the City of La Habra Groundwater Sustainability Agency (GSA) was contemplating preparing a GSP to be submitted in 2020. However, the City of La Habra GSA has elected to continue contributing to the Basin 8-1 Alternative.

Response to DWR's Recommended Actions.

Pages 32-33, Part IV, B, Recommended Actions.

> **DWR Recommended Action 1**. Staff recommend the Agencies clarify the basis for the determination that depletions of interconnected surface water in the Santa Ana Canyon Management Area are de minimis, while considering the volume of pumping, the extent of the interconnection between groundwater and surface water, and the beneficial users of the surface water.
>
> Staff recommend clarifying whether surface water bodies in the La Habra-Brea Management Area are interconnected with groundwater and whether groundwater-dependent ecosystems exist within the Santa Ana Canyon and La Habra Management Areas.

OCWD Response:

OCWD provided several lines of evidence for the determination that depletions of interconnected surface water in the Santa Ana Canyon area are insignificant (i.e., de minimis).

1. The large disparity in the supply of surface water to the Santa Ana Canyon area compared to the amount of pumping. The annual flow in the Santa Ana River is much greater than the amount of annual groundwater production. When the 2017 Alternative was prepared, some production wells in the Santa Ana Canyon were estimated, namely production wells supplying irrigation water to the Green River Golf Course. OCWD and Orange County Department of Public Works have worked together to install meters on wells supplying the Green River Golf Course. Now all production wells in the Santa Ana Canyon are metered. This effort resulted in a reduction in pumping as prior estimates were too high. For the 2022 Update, the 5-year water budget is presented in Table 1-2 in the Santa Ana Canyon section (reproduced below). This water budget is a combined surface and groundwater water budget for the Santa Ana Canyon Management Area. As shown on this table, groundwater production over this five-year period is approximately 0.6 percent of the total inflow to the canyon area.

Table1-2: Water Budget, 5-Year Average (2016-21)

Flow Component	5-Yr Avg: 2016-21 (afy)
INFLOW	
Santa Ana River Base Flow	76,860
Santa Ana River Storm Flow	78,750
Subsurface Inflow	6,000
TOTAL INFLOW	**161,610**
OUTFLOW	
Santa Ana River Base Flow	76,120
Santa Ana River Storm Flow	78,750
Evapotranspiration	740
Groundwater Production	1,000
Subsurface Outflow	5,000
TOTAL OUTFLOW	**161,610**

2. The second line of evidence is the stability of groundwater levels as shown in Figure 3-3 in the Santa Ana Canyon section of the report. This figure is reproduced below. The consistent, stable nature of groundwater elevations in the Santa Ana Canyon Management Area shows that the aquifer is generally full and at equilibrium, which is consistent with the finding that here are no measurable losses of flows between Prado Dam upstream and OCWD's diversion to its recharge system just below Imperial Highway.
3. The third line of evidence, mentioned above, is the finding that there are no measurable losses of flows between Prado Dam and OCWD's diversion at the Imperial Rubber Dam. The location of these two measuring locations is shown in the figure below. The measuring location below Prado Dam is operated by the United States Geological Survey (USGS) and is identified as US11074000, Santa Ana R BL Prado Dam, CA. The USGS carefully reviews data from this location and publishes it annually as it is of interest to multiple stakeholders, including OCWD, the US Army Corps of Engineers, and a number of agencies upstream of Prado Dam.

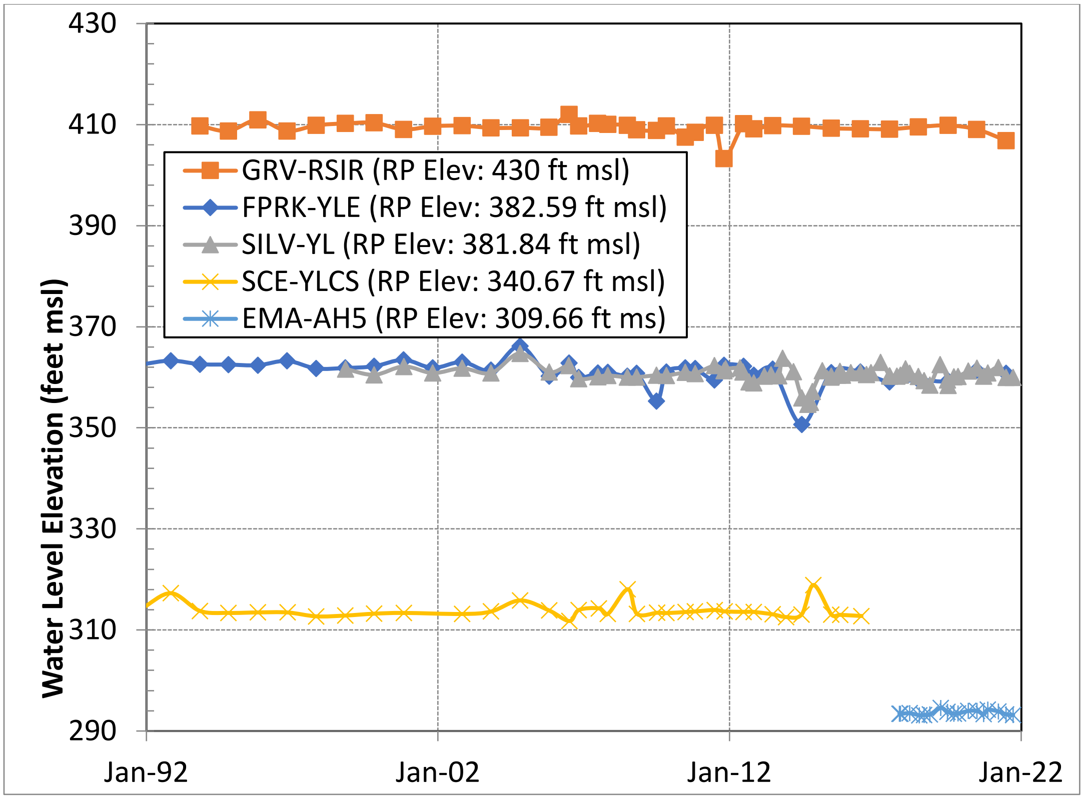
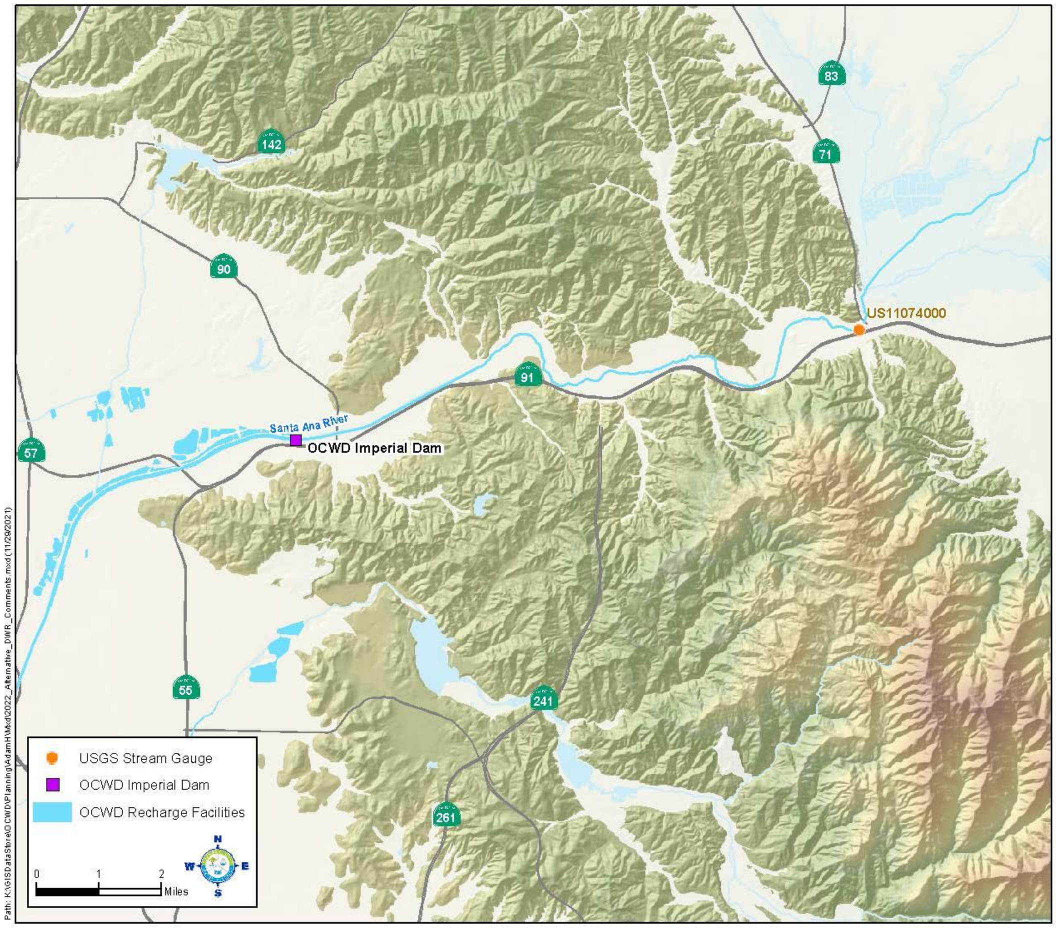


Figure 3-3: Water Level Hydrographs of Selected Wells

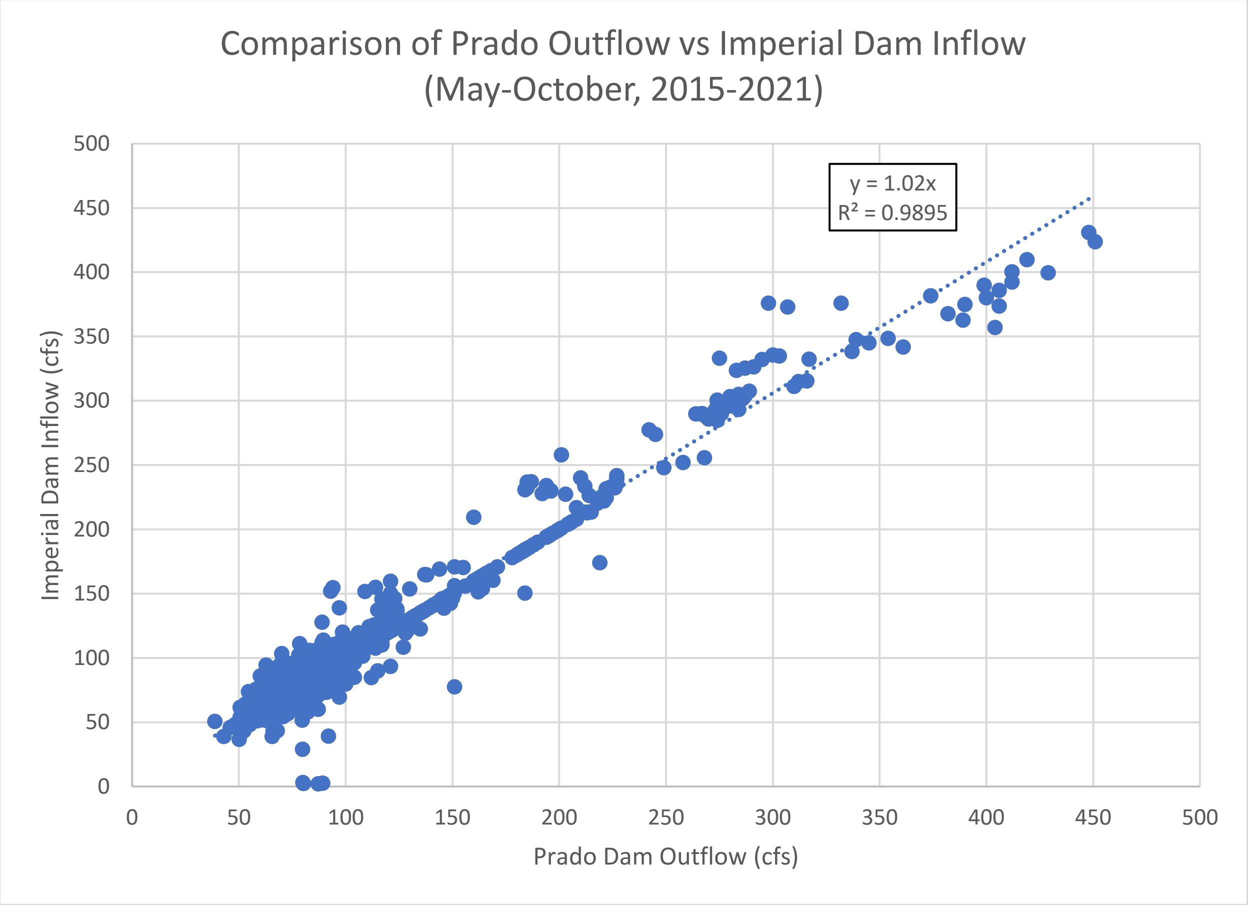


Location of USGS gauging station below Prado Dam and OCWD Imperial Rubber Dam

Inflow from the Santa Ana River to OCWD's recharge system is measured at the Imperial Rubber Dam (see figure). When flows are less than 1,000 cubic feet per second (cfs), the rubber dam remains fully inflated and all surface flows are either diverted from the river to downstream recharge basins or it is bypassed around the dam and placed back into the river channel. Flows that are diverted from the river pass through a Parshall flume, which measures the flow rate. Flows that are bypassed around the dam are measured using sonic flowmeters installed in the bypass pipelines. This arrangement ensures that all flows received by OCWD under 1,000 cfs are measured accurately. OCWD staff routinely check the accuracy of these two measuring stations. OCWD data from the Imperial Rubber Dam location provide data on total flow of the Santa Ana River on a daily basis.

OCWD compiled daily flow measurements for the USGS gauge below Prado Dam (11074000) and at OCWD's Imperial Rubber Dam for the period July 2015 to October 2021. During the winter months, there can be rainfall that occurs between Prado Dam and the Imperial Rubber Dam, resulting in ungauged inflow in this reach. To screen out these periods, the flow data for May through October is used and shown in the graph below. This graph shows there is very good agreement between the outflow at Prado Dam and what is received at the Imperial

Rubber Dam (r^2 =0.99). This demonstrates that there are no net losses in flow between these two locations, at least within the margin of error in the measurement accuracy. The conclusion is that the flow measurements at the two gauges are consistent with the water level data that show that the Santa Ana Canyon Management Area is in hydrologic equilibrium, and also that the volume of groundwater pumping is relatively small so as to not measurably reduce surface water volumes through the canyon.



DWR has made a dataset, called "Natural Communities Commonly Associated with Groundwater (NCCAG) Dataset" available at NC Dataset Viewer (ca.gov). This dataset shows that there is riparian vegetation located in the Santa Ana Management Area along the SAR channel. The evapotranspiration associated with the riparian vegetation was estimated to be 740 afy as shown in Table 1-2.

La Habra GSA Response:

Requested information on whether surface water bodies in the La Habra-Brea Management Area are interconnected with groundwater and whether groundwater-dependent ecosystems exist within the La Habra Management Area is included in the 2022 Update.

> **DWR Recommended Action 2**. Staff recommend a basin-wide water budget utilizing inflow and outflow information from each management area or a water budget for each management area be provided in accordance with the GSP regulations (CCR 23 Section 354.18).

OWWD Response:

Over the years, OCWD has developed a comprehensive data collection system to characterize basin inflows and outflows. In an average year, approximately 80 percent of the inflow to the basin is measured and all of the groundwater production is measured and accounted for. In addition, every year, the change in groundwater storage is estimated based on water level changes in the three basin aquifers. This process defines the current storage condition in the basin and refines the net incidental (unmeasured) recharge portion of the water budget. Section 4 of the OCWD Management Area section of the Alternative describes the various elements of the water budget. The five-year water budget presented in the OCWD Management Area of the report is reproduced below.

Table 4-1: Water Budget, WY2016-17 to 2020-21 (OCWD Management Area)

FLOW COMPONENT	2016-17	2017-18	2018-19	2019-20	2020-21
INFLOW					
Santa Ana River baseflow	70,000	65,400	98,000	74,500	76,400
Santa Ana River stormflow	65,400	24,100	63,700	79,500	36,600
Recycled Water (GWRS/Alamitos Barrier)	98,000	106,400	97,200	99,700	101,700
Imported Water	50,400	66,100	40,300	18,100	0
Net Estimated Unmeasured or Incidental Recharge*	67,900	26,200	45,600	41,400	19,100
TOTAL INFLOW:	351,700	288,200	344,800	313,200	233,800
OUTFLOW					
Groundwater Production	300,700	237,200	303,800	277,200	281,800
TOTAL OUTFLOW:	300,700	237,200	303,800	277,200	281,800
CHANGE IN STORAGE:	51,000	51,000	41,000	36,000	(48,000)

The water budget presented in Table 4-1 is essentially the water budget for Basin 8-1, except for the La Habra Management Area. The water budget for the Santa Ana Canyon Management Area shows that this area provides a net source of water to the OCWD Management area that is captured in the surface water recharge component and net estimated unmeasured recharge (via subsurface inflow). The water budget for the South East Management area is captured in the net unmeasured recharge (via subsurface inflow) minus any groundwater production in this area. Groundwater production in the South East Management area is so small, it is inconsequential in terms of the overall water budget.

Starting in April 2022, OCWD and other agencies within Basin 8-1 will be presenting the various water budget components as defined in CCR 23 Section 354.18 as part of the annual reporting process.

La Habra GSA Response:

Additional information regarding the water budget in the La Habra-Brea Management Area is included in the 2022 Update.

> **DWR Recommended Action 3**. Staff recommend that the Agencies provide the agreements among the different jurisdictions which commit the Agencies to conduct monitoring and implement the Alternative within their management areas. If no GSP is developed for the La Habra-Brea Management Area, the next Alternative update should provide additional explanation and quantification of the management approaches, sustainable management criteria, and evidence for the presence or absence of undesirable results for the La Habra-Brea Management Area.

Response:

The response to this recommended action comes in two parts. The first addresses the commitment of the Agencies to conduct monitoring and implement the Alternative within their management areas. The second addresses additional information requested for the La Habra-Brea Management Area.

Part 1: Commitment to Conduct Monitoring and Implement Alternative:

As part of the process of developing the Basin 8-1 Alternative, OCWD collaborated with the City of La Habra Groundwater Sustainability Agency and the Irvine Ranch Water District (IRWD). Both of these agencies committed resources to prepare their respective sections of the Alternative and submitted letters of support for the Alternative. The letters of support and OCWD's resolution of support were submitted to DWR along with the Alternative in December 2016. These same agencies have committed resources to updating the Alternative and OCWD has again adopted a resolution of support to submit the updated Alternative to DWR. This process demonstrates the continued commitment of the agencies to comply with SGMA and take necessary actions to continue sustainably managing Basin 8-1.

In terms of groundwater monitoring, OCWD has an extensive monitoring well network. A subset of these wells was part of the CASGEM program. As described in the 2022 Update, this well network was updated and is now part of the Monitoring Well Network (MWN), which has replaced CASGEM. Included in the MWN are two wells owned by IRWD that are located in the South East Management Area. As a result, water level data submitted twice a year by OCWD covers all of Basin 8-1 except for the La Habra-Brea Management Area. The City of La Habra GSA will be submitting water level data for their area separately.

In addition to groundwater level monitoring, the agencies are committed to continuing to conduct monitoring of water quality, groundwater production, subsidence, and any other monitoring that may be required to satisfy sustainable management criteria.

Part 2: Additional Information for La Habra-Brea Management Area

The City of La Habra GSA incorporated additional information into the La Habra-Brea Management Area section, including additional explanation and quantification of the management approaches, sustainable management criteria, and clarifying the evidence for the absence of undesirable results for the La Habra-Brea Management Area. Additionally, data gaps within the monitoring network are discussed in the 2022 Update, including steps currently being taken to address and fill the gaps.

> **DWR Recommended Action 4**. Staff recommend the Agencies explain the timeframe that the Basin can safely operate, without experiencing undesirable results, after exceeding 500,000 AF below full conditions (23 CCR Section 354.26(b)(2)) and clarify the wells used to calculate the change in groundwater in storage and the overall groundwater in storage.

Response:

It is important to reiterate that exceeding 500,000 acre-feet from full is a hypothetical situation and is not an intended action under normal basin management circumstances. Such a hypothetical situation is considered an extraordinary circumstance; for example, an extended drought that is exacerbated by a lengthy shutdown of imported water into southern California due to a catastrophic event such as a major earthquake. This hypothetical situation would not be expected to last more than one year; however, other worse hypothetical cases can be conceived. Because the cause(s) and magnitude of a hypothetical temporary storage exceedance beyond 500,000 acre-feet below full are unknown, it is difficult to quantify a precise timeframe that the Basin can operate without experiencing undesirable results. That said, a *cumulative* exceedance of no more than 200,000 acre-feet beyond 500,000 acre-feet below full conditions over five consecutive years is suggested as a general guideline. This means that the average exceedance would be no more than 40,000 acre-feet during a maximum five-year period. If the period of exceedance was two years, then the average exceedance would be 100,000 acre-feet. As a general guideline, limiting the magnitude and duration of the exceedance will lessen the potential for undesirable results, as described below:

1. The rate of inland movement of seawater intrusion with the basin at 500,000 acre-feet below full conditions and with the seawater barriers is expected to be on the order of 1-2 feet per day. Over a 5-year period, this could represent a brackish water encroachment of roughly ½ mile into some of the coastal gaps. While this encroachment could cause localized water quality degradation, it is unlikely to reach production wells which are farther inland. Once the storage exceedance ends, and the basin storage is within the established operating range, the seawater barriers' performance would be expected to recover to their design conditions and subsequently halt and reverse the brackish groundwater inland encroachment.

2. Reduction of pore pressures in and drainage of water from thick, compressible confining layers is a slow process due to the low permeability of the confining layers. Therefore, a maximum five-year period of basin storage exceeding 500,000 acre-feet from full would not be expected to cause significant inelastic land subsidence.

3. Lowering of groundwater levels could temporarily reduce or halt the production potential of an unknown number of water supply wells; however, assuming the distribution of lower groundwater levels is distributed across the Basin, the magnitude of reduced groundwater levels would be lessened, and the number of temporarily-impacted wells would likely be manageable.

Note that this discussion applies to the OCWD portion of the groundwater basin. Storage conditions in the La Habra-Brea Management Area are separate.

OCWD uses a large network of wells to obtain water levels in June every year, including:

1. OCWD owned wells (including multi-port monitoring wells)
2. Groundwater producer wells (must be turned off for 24 hours in advance)
3. Selected wells in Geotracker

The wells/monitoring points used for the June 2021 contour maps of the Shallow, Principal and Deep Aquifers are attached. For 2021, 350 wells/monitoring points were used for the Shallow Aquifer, 421 wells/monitoring points for the Principal Aquifer, and 61 wells/monitoring points for the Deep Aquifer. There may be small changes in this well/monitoring point list on an annual basis.

List of Wells/Monitoring Points Used for June 2021 Water Level Contour Map of Orange County Groundwater Basin (OCWD Management Area)

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Shallow Aquifer Wells (Model Layer 1)

STAID1	WELLNM	STAID	STANAME	OWNERNM	NAD83_X	NAD83_Y	GIS_SYMNM	PERF_ZONE	SHORTDATE	WLELEV_2021
19013	CSF-1	19127	CSF-1/1/WB1/MP1	CA. STATE UNIV., FULLERTON	6064343.084	2270822.497	Multiport Monitoring Well	MP1 (132)	<Null>	<Null>
1092	FPRK-YLE	1093	FPRK-YLE/1	CANYON RV PARK	6119133.638	2263083.811	Active Small-System Production Well	60-84	6/29/2021	360.79
1090	FPRK-YLW	1091	FPRK-YLW/1	CANYON RV PARK	6119044.248	2263049.927	Active Small-System Production Well	48-80	6/29/2021	359.55
1136	SULY-OA4	1137	SULY-OA4/1	CHANDLER'S SAND & GRAVEL	6094796.046	2243793.122	Inactive Production Well	-	<Null>	<Null>
23723	CHEV-MW15B	23724	CHEV-MW15B/1	CHEVRON MANAGEMENT COMPANY	6072572.119	2277343.802	Monitoring Well	90-130	<Null>	<Null>
15561	CNXT-NBES2	15562	CNXT-NBES2/1	CONEXANT SYSTEMS, INC.	6071916.005	2188840.827	Monitoring Well	21-41	5/27/2021	21.63
15734	CNXT-NBES3A	15735	CNXT-NBES3A/1	CONEXANT SYSTEMS, INC.	6071601.336	2188635.986	Monitoring Well	23.9-44.3	5/27/2021	21.43
15571	CNXT-NBES4B	15572	CNXT-NBES4B/1	CONEXANT SYSTEMS, INC.	6071542.899	2188493.017	Monitoring Well	23-43	<Null>	<Null>
15569	CNXT-NBES6	15570	CNXT-NBES6/1	CONEXANT SYSTEMS, INC.	6071620.501	2188443.488	Monitoring Well	25-40	<Null>	<Null>
8610	CNXT-NBMW29	8611	CNXT-NBMW29/1	CONEXANT SYSTEMS, INC.	6071755.155	2189235.843	Monitoring Well	21-40	<Null>	<Null>
8608	CNXT-NBMW30	8609	CNXT-NBMW30/1	CONEXANT SYSTEMS, INC.	6071902.892	2189098.302	Monitoring Well	21-42	<Null>	<Null>
14611	SILV-YL	14612	SILV-YL/1	COUNTY OF ORANGE	6117870.025	2262814.346	Other Active Production Well	40-66	6/30/2021	359.99
15932	DAVI-O	15933	DAVI-O/1	DAVIDSON, TOM & CINDY	6090897.443	2241414.862	Other Active Production Well	-	<Null>	<Null>
23713	DLA-GTMW04	23714	DLA-GTMW04/1	DEFENSE LOGISTICS AGENCY	6087208.914	2219923.944	Monitoring Well	90-110	7/7/2021	48.06
4156	OCWD-BS103	5213	OCWD-BS103/1	DEPARTMENT OF WATER RESOURCES	6027754.184	2208435.987	Monitoring Well	43-78	6/29/2021	-4.68
5218	OCWD-BS105	5219	OCWD-BS105/1	DEPARTMENT OF WATER RESOURCES	6022947.616	2207365.785	Monitoring Well	69-85	7/7/2021	-8.97
3071	OCWD-BS106	5222	OCWD-BS106/1	DEPARTMENT OF WATER RESOURCES	6024891.085	2211245.522	Monitoring Well	50-92	6/30/2021	-6.17
5133	OCWD-SA10	5134	OCWD-SA10/1	DEPARTMENT OF WATER RESOURCES	6039247.362	2190515.118	Monitoring Well	90-120	6/28/2021	3.249
5139	OCWD-SA12	5140	OCWD-SA12/1	DEPARTMENT OF WATER RESOURCES	6040581.662	2205805.671	Monitoring Well	86-126	6/30/2021	8.88
5115	OCWD-SA3	5116	OCWD-SA3/1	DEPARTMENT OF WATER RESOURCES	6034107.028	2196075.864	Monitoring Well	100-160	6/28/2021	2.631
1620	CMIL-A	3108	CMIL-A/1	FIRST INTERSTATE BANK	6101671.628	2260355.691	Destroyed and Sealed Well	21-101	<Null>	<Null>
39	GG-28	2687	GG-28/1	GARDEN GROVE	6049374.528	2232905.514	Inactive Production Well	130-240	6/30/2021	59
1407	WWGC-SAK3	1408	WWGC-SAK3/1	GARDEN GROVE	6056974.671	2220835.054	Other Active Production Well	149-170	6/28/2021	50.85
9522	SCWC-YLCO2	9523	SCWC-YLCO2/1	GOLDEN STATE WATER COMPANY	6091725.912	2261952.552	Inactive Production Well	100-480	5/25/2021	254
506	ETCH-AL2	507	ETCH-AL2/1	GOODWIN MUTUAL WATER COMPANY	6086723.02	2261993.771	Inactive Production Well	85-185	6/29/2021	236.58
23034	HEUL-A	23035	HEUL-A/1	HEULER, BARTON	6060159.382	2256110.939	Other Active Production Well	125-145	<Null>	<Null>
2830	OCWD-HH2	2832	OCWD-HH2/2	HUNTINGTON HARBOUR CORPORATION	6012383.001	2212193.192	Monitoring Well	85-95	6/29/2021	-8.893
2845	OCWD-HH3	2847	OCWD-HH3/2	HUNTINGTON HARBOUR CORPORATION	6012242.137	2210674.48	Monitoring Well	75-85	6/29/2021	-7.988
4242	OCWD-HH5	4245	OCWD-HH5/3	HUNTINGTON HARBOUR CORPORATION	6013929.084	2207761.949	Monitoring Well	63-73	6/29/2021	-5.877
20312	OCWD-HH6B	20313	OCWD-HH6B/1	HUNTINGTON HARBOUR CORPORATION	6011785.354	2213862.346	Monitoring Well	90-100	7/1/2021	-10.411
1200	HYNS-S2	1201	HYNS-S2/1	HYNES ESTATES, INC.	6032783.88	2236398.43	Destroyed and Sealed Well	162-182	<Null>	<Null>
23616	IRWD-MICH11	23617	IRWD-MICH11/1	IRVINE RANCH WATER DISTRICT	6078141.044	2188888.245	Other Active Production Well	21-69	<Null>	<Null>
23618	IRWD-MICH12	23622	IRWD-MICH12/1	IRVINE RANCH WATER DISTRICT	6078209.142	2188963.633	Other Active Production Well	19-63	<Null>	<Null>
23623	IRWD-MICH13	23624	IRWD-MICH13/1	IRVINE RANCH WATER DISTRICT	6078263.018	2188904.583	Other Active Production Well	21-67	<Null>	<Null>
23625	IRWD-MICH14	23626	IRWD-MICH14/1	IRVINE RANCH WATER DISTRICT	6078303.831	2188587.342	Other Active Production Well	-	<Null>	<Null>
23627	IRWD-MICH15	23628	IRWD-MICH15/1	IRVINE RANCH WATER DISTRICT	6078219.918	2188672.325	Other Active Production Well	-	<Null>	<Null>
23495	CREA-YL	23496	CREA-YL/1	JOHN CREANGA	6078734.136	2277902.352	Other Active Production Well	135-175	6/30/2021	302.223
1211	ITO-LA	1212	ITO-LA/1	JOINT FORCES TRAINING BASE LOS ALAMITOS	6014444.094	2233893.201	Other Active Production Well	70-710	6/29/2021	14.26
432	W-432	433	W-432/1	KATHY BONANNO	6080325.38	2272580.463	Inactive Production Well	117-137	6/30/2021	286.993
1759	MKAW-FV	3235	MKAW-FV/1	KAWAGUCHI ENTERPRISES, LP	6051164.175	2210349.133	Other Active Production Well	185-225	<Null>	<Null>
11544	LAC-33Y10	11545	LAC-33Y10/1	LOS ANGELES COUNTY	6000026.997	2231221.991	Monitoring Well	75-115	<Null>	<Null>
1160	GHAV-GG	1161	GHAV-GG/1	MAGILL, STANLEY R.	6059608.702	2232220.109	Other Active Production Well	168-188	6/28/2021	61.3
22691	HMW-01	22692	HMW-01/1	MANHEIM CALIFORNIA (COX ENTERPRISES)	6078590.494	2262972.301	Monitoring Well	55-75	<Null>	<Null>
19926	USMC-16MW11	19927	USMC-16MW11/1	MARINE CORPS AIR STATION	6110625.131	2193056.413	Monitoring Well	160-180	<Null>	<Null>
18840	USMC-16MW2	18841	USMC-16MW2/1	MARINE CORPS AIR STATION	6110221.201	2193322.5	Monitoring Well	153-178	<Null>	<Null>
19957	USMC-24EX11	19958	USMC-24EX11/1	MARINE CORPS AIR STATION	6104523.31	2191224.413	Monitoring Well	135-180	<Null>	<Null>
19959	USMC-24EX12A	19960	USMC-24EX12A/1	MARINE CORPS AIR STATION	6105720.54	2190982.863	Monitoring Well	115-160	<Null>	<Null>
19965	USMC-24EX13A	19966	USMC-24EX13A/1	MARINE CORPS AIR STATION	6107553.141	2190629.843	Monitoring Well	110-160	<Null>	<Null>
19971	USMC-24EX14	19972	USMC-24EX14/1	MARINE CORPS AIR STATION	6104912.99	2191678.953	Monitoring Well	115-185	<Null>	<Null>
19953	USMC-24EX9	19954	USMC-24EX9/1	MARINE CORPS AIR STATION	6108691.53	2189395.353	Monitoring Well	120-200	<Null>	<Null>
20253	USMC-24MW10AB	20255	USMC-24MW10AB/2	MARINE CORPS AIR STATION	6107253.063	2191367.404	Monitoring Well	130-140	<Null>	<Null>
20269	USMC-24MW9AB	20271	USMC-24MW9AB/2	MARINE CORPS AIR STATION	6106891.198	2190845.415	Monitoring Well	140-150	<Null>	<Null>
18621	USMC-24NEW7	18622	USMC-24NEW7/1	MARINE CORPS AIR STATION	6108983.5	2190576.7	Monitoring Well	118-158	<Null>	<Null>
18619	USMC-24NEW8	18620	USMC-24NEW8/1	MARINE CORPS AIR STATION	6109711.5	2190269.7	Monitoring Well	122-162	<Null>	<Null>
13875	USMC-MW03E	13876	USMC-MW03E/1	MARINE CORPS AIR STATION	6109510.523	2188847.525	Monitoring Well	124-164	<Null>	<Null>
13833	USMC-MW19E	13834	USMC-MW19E/1	MARINE CORPS AIR STATION	6104580.874	2194499.736	Monitoring Well	98-138	<Null>	<Null>
14336	USMC-MW23	14337	USMC-MW23/1	MARINE CORPS AIR STATION	6105584.809	2185916.035	Monitoring Well	64-104	<Null>	<Null>
18586	USMC-MW29A	18587	USMC-MW29A/1	MARINE CORPS AIR STATION	6110133.9	2187312.33	Monitoring Well	75-100	<Null>	<Null>
22910	USMC-MW2D2	22911	USMC-MW2D2/1	MARINE CORPS AIR STATION	6081840.685	2206480.568	Monitoring Well	76-86	<Null>	<Null>
13861	USMC-MW31	13862	USMC-MW31/1	MARINE CORPS AIR STATION	6107617.015	2189648.229	Monitoring Well	105-145	<Null>	<Null>
13859	USMC-MW37	13860	USMC-MW37/1	MARINE CORPS AIR STATION	6108153.508	2188707.479	Monitoring Well	89-130	<Null>	<Null>
22617	USMC-MW43B	22618	USMC-MW43B/1	MARINE CORPS AIR STATION	6110701.167	2188814.201	Monitoring Well	100.41-140.91	<Null>	<Null>
13817	USMC-MW51	13818	USMC-MW51/1	MARINE CORPS AIR STATION	6107153.052	2192582.528	Monitoring Well	125-165	<Null>	<Null>
13877	USMC-MW70	13878	USMC-MW70/1	MARINE CORPS AIR STATION	6110644.542	2189446.258	Monitoring Well	125-165	<Null>	<Null>
13903	USMC-MW73	13904	USMC-MW73/1	MARINE CORPS AIR STATION	6109324.506	2187794.721	Monitoring Well	90-130	<Null>	<Null>
13889	USMC-MW91	13890	USMC-MW91/1	MARINE CORPS AIR STATION	6108291.003	2188258.73	Monitoring Well	110-150	<Null>	<Null>
7256	USMC-PS1	7257	USMC-PS1/1	MARINE CORPS AIR STATION	6106591.503	2189442.242	Monitoring Well	102-122	<Null>	<Null>
7258	USMC-PS2	7259	USMC-PS2/1	MARINE CORPS AIR STATION	6105657.052	2193519.226	Monitoring Well	103-133	<Null>	<Null>
18564	USMC-PS3A	18565	USMC-PS3A/1	MARINE CORPS AIR STATION	6109290.87	2187093.49	Monitoring Well	70-105	<Null>	<Null>
13849	USMC-MP06	14437	USMC-MP06/1/WB1/MP1	MARINE CORPS AIR STATION	6100689.85	2194415.05	Multiport Monitoring Well	MP1 (110)	<Null>	<Null>
13851	USMC-MP08	14457	USMC-MP08/1/WB1/MP1	MARINE CORPS AIR STATION	6105310.575	2187889.19	Multiport Monitoring Well	MP1 (70)	<Null>	<Null>
13853	USMC-MP10	14501	USMC-MP10/1/WB1/MP1	MARINE CORPS AIR STATION	6089272.939	2200492.977	Multiport Monitoring Well	MP1 (222)	<Null>	<Null>
20296	USMC-24EX20B	20297	USMC-24EX20B/1	MARINE CORPS AIR STATION	6106098.39	2192979.513	Other Active Production Well	106.8-204.8	<Null>	<Null>
20015	USMC-SGU1	20016	USMC-SGU1/1	MARINE CORPS AIR STATION	6109366.294	2188607.434	Other Active Production Well	96-206	3/9/2021	153.37
20090	USMC-SGU16	20091	USMC-SGU16/1	MARINE CORPS AIR STATION	6108500.694	2189851.338	Other Active Production Well	105-185	3/9/2021	128.4
21967	USMC-SGU39	21968	USMC-SGU39/1	MARINE CORPS AIR STATION	6105829.364	2192700.994	Other Active Production Well	90-190	3/8/2021	108.56
15117	MCGN-BP1	15118	MCGN-BP1/1	MC GINNESS, BILL	6030378.839	2253137.368	Other Active Production Well	50-255	6/30/2021	39.29
14284	MSG-BP10L	14285	MSG-BP10L/1	MCCOLL SITE GROUP	6037931.453	2272258.752	Monitoring Well	247-257	6/30/2021	103.92
1134	SULY-OA1	1135	SULY-OA1/1	MILAN REI, LLC	6095028.945	2243462.53	Other Active Production Well	-	6/29/2021	<Null>
428	W-428	429	W-428/1	MONBRI, LLC	6074730.957	2271716.012	Inactive Production Well	-	<Null>	<Null>
3976	OCWD-P10	3977	OCWD-P10/1	ORANGE COUNTY WATER DISTRICT	6044117.886	2186405.599	Destroyed and Sealed Well	90-130	<Null>	<Null>
19007	OCWD-BIO1	19008	OCWD-BIO1/1	ORANGE COUNTY WATER DISTRICT	6082730.975	2257183.878	Inactive Production Well	25-115	7/7/2021	229.84
20858	OCWD-EW2	20859	OCWD-EW2/1	ORANGE COUNTY WATER DISTRICT	6053332.928	2263207.928	Inactive Production Well	130-196	<Null>	<Null>
20851	OCWD-EW2A	20852	OCWD-EW2A/1	ORANGE COUNTY WATER DISTRICT	6049376.318	2263317.874	Inactive Production Well	122-188	<Null>	<Null>
22619	OCWD-EW3A	22620	OCWD-EW3A/1	ORANGE COUNTY WATER DISTRICT	6050896.1	2260365.9	Inactive Production Well	235-290	<Null>	<Null>
21041	OCWD-EW4	21042	OCWD-EW4/1	ORANGE COUNTY WATER DISTRICT	6053819.546	2259558.892	Inactive Production Well	130-255	<Null>	<Null>
18056	OCWD-I26A	18057	OCWD-I26A/1	ORANGE COUNTY WATER DISTRICT	6048813.793	2200416.667	Injection Well	60-195	7/6/2021	5.49
19465	OCWD-I27A	19466	OCWD-I27A/1	ORANGE COUNTY WATER DISTRICT	6036244.383	2199722.281	Injection Well	78-148	<Null>	<Null>
19469	OCWD-I28A	19470	OCWD-I28A/1	ORANGE COUNTY WATER DISTRICT	6036238.41	2199048.656	Injection Well	80-140	7/6/2021	3
19697	OCWD-I29A	19698	OCWD-I29A/1	ORANGE COUNTY WATER DISTRICT	6034766.9	2200360.103	Injection Well	90-120	<Null>	<Null>
19701	OCWD-I30A	19702	OCWD-I30A/1	ORANGE COUNTY WATER DISTRICT	6034047.2	2200278.003	Injection Well	95-160	6/28/2021	2.53
19711	OCWD-I31A	19712	OCWD-I31A/1	ORANGE COUNTY WATER DISTRICT	6033586.7	2201013.903	Injection Well	90-165	7/6/2021	1.67
19707	OCWD-I32A	19708	OCWD-I32A/1	ORANGE COUNTY WATER DISTRICT	6033114.8	2200599.403	Injection Well	90-155	<Null>	<Null>
19654	OCWD-I33A	19655	OCWD-I33A/1	ORANGE COUNTY WATER DISTRICT	6045921.5	2194432.303	Injection Well	61-156	6/30/2021	5.16
19656	OCWD-I34A	19657	OCWD-I34A/1	ORANGE COUNTY WATER DISTRICT	6045756.9	2193917.303	Injection Well	60-135	<Null>	<Null>
19658	OCWD-I35A	19659	OCWD-I35A/1	ORANGE COUNTY WATER DISTRICT	6045558.2	2193150.603	Injection Well	60-115	6/30/2021	7.89
19678	OCWD-I36A	19679	OCWD-I36A/1	ORANGE COUNTY WATER DISTRICT	6045421.1	2192575.403	Injection Well	60-110	<Null>	<Null>
1018	AM-1	1019	AM-1/1	ORANGE COUNTY WATER DISTRICT	6090472.39	2264185.952	Monitoring Well	97-115	6/30/2021	245.03

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Shallow Aquifer Wells (Model Layer 1)

STAID1	WELLNM	STAID	STANAME	OWNERNM	NAD83_X	NAD83_Y	GIS_SYMNM	PERF_ZONE	SHORTDATE	WLELEV_2021
545	AM-10	546	AM-10/1	ORANGE COUNTY WATER DISTRICT	6071304.771	2257813.261	Monitoring Well	217-235	7/7/2021	121.51
557	AM-11	558	AM-11/1	ORANGE COUNTY WATER DISTRICT	6072499.755	2255656.617	Monitoring Well	218-240	6/30/2021	121.98
555	AM-12	556	AM-12/1	ORANGE COUNTY WATER DISTRICT	6070962.221	2255565.488	Monitoring Well	210-225	7/7/2021	113.56
553	AM-13	554	AM-13/1	ORANGE COUNTY WATER DISTRICT	6072701.528	2256964.39	Monitoring Well	252-270	6/30/2021	128.38
2744	AM-15A	2745	AM-15A/1	ORANGE COUNTY WATER DISTRICT	6062585.788	2256914.422	Monitoring Well	214-220	6/25/2021	89.81
2895	AM-19A	2896	AM-19A/1	ORANGE COUNTY WATER DISTRICT	6065134.464	2236977.559	Monitoring Well	115-123	6/25/2021	77.56
1022	AM-2	1023	AM-2/1	ORANGE COUNTY WATER DISTRICT	6091404.587	2263383.522	Monitoring Well	87-100	6/30/2021	246.46
6515	AM-21A	6516	AM-21A/1	ORANGE COUNTY WATER DISTRICT	6067232.542	2241283.088	Monitoring Well	157-165	6/25/2021	90.52
7011	AM-25A	7012	AM-25A/1	ORANGE COUNTY WATER DISTRICT	6060775.248	2252483.682	Monitoring Well	188-195	6/25/2021	84.41
1020	AM-3	1021	AM-3/1	ORANGE COUNTY WATER DISTRICT	6090425.411	2261850.384	Monitoring Well	91-107	6/30/2021	245.62
7543	AM-30A	7544	AM-30A/1	ORANGE COUNTY WATER DISTRICT	6046015.103	2255909.924	Monitoring Well	152-159	6/25/2021	55.16
22901	AM-31AR	22902	AM-31AR/1	ORANGE COUNTY WATER DISTRICT	6052258.095	2257683	Monitoring Well	150-170	7/8/2021	69.05
8904	AM-39A	8905	AM-39A/1	ORANGE COUNTY WATER DISTRICT	6057788.178	2260561.644	Monitoring Well	115-135	6/29/2021	82.15
549	AM-4	550	AM-4/1	ORANGE COUNTY WATER DISTRICT	6078257.417	2258629.141	Monitoring Well	187-205	7/7/2021	166.388
8908	AM-40A	8909	AM-40A/1	ORANGE COUNTY WATER DISTRICT	6057765.028	2259083.041	Monitoring Well	145-165	6/25/2021	83.08
10147	AM-41A	10148	AM-41A/1	ORANGE COUNTY WATER DISTRICT	6055818.758	2261031.665	Monitoring Well	156-166	6/30/2021	77.7
8232	AM-42A	8233	AM-42A/1	ORANGE COUNTY WATER DISTRICT	6057305.512	2258837.864	Monitoring Well	115-130	<Null>	<Null>
14615	AM-44	14616	AM-44/1	ORANGE COUNTY WATER DISTRICT	6075009.801	2261947.637	Monitoring Well	140-160	6/30/2021	168.75
15331	AM-45	15332	AM-45/1	ORANGE COUNTY WATER DISTRICT	6071037.809	2252432.19	Monitoring Well	102-132	7/7/2021	104.04
15329	AM-46	15330	AM-46/1	ORANGE COUNTY WATER DISTRICT	6073338.847	2254329.24	Monitoring Well	94-124	7/7/2021	124.15
20711	AM-47A	20712	AM-47A/1	ORANGE COUNTY WATER DISTRICT	6054345.1	2258323.2	Monitoring Well	160-170	6/25/2021	73.68
20703	AM-48A	20704	AM-48A/1	ORANGE COUNTY WATER DISTRICT	6069389.1	2259146.8	Monitoring Well	116-146	7/8/2021	114.1
20760	AM-49	20761	AM-49/1	ORANGE COUNTY WATER DISTRICT	6068833	2259389.2	Monitoring Well	120-150	6/30/2021	112.28
22372	AM-50	22373	AM-50/1	ORANGE COUNTY WATER DISTRICT	6075090.3	2260329.2	Monitoring Well	140-150	7/1/2021	158.68
22714	AM-51	22715	AM-51/1	ORANGE COUNTY WATER DISTRICT	6078407.7	2256724.2	Monitoring Well	105-125	7/1/2021	176.413
23001	AM-52	23002	AM-52/1	ORANGE COUNTY WATER DISTRICT	6074643.8	2257784.5	Monitoring Well	140-150	7/1/2021	145.33
22939	AM-53	22940	AM-53/1	ORANGE COUNTY WATER DISTRICT	6076000.9	2255632.4	Monitoring Well	35-50	6/30/2021	199.08
23209	AM-54A	23210	AM-54A/1	ORANGE COUNTY WATER DISTRICT	6055949.4	2259518.7	Monitoring Well	102-117	6/25/2021	77.92
2732	AM-5A	2733	AM-5A/1	ORANGE COUNTY WATER DISTRICT	6078678.675	2259935.902	Monitoring Well	168-175	7/7/2021	166.45
551	AM-6	552	AM-6/1	ORANGE COUNTY WATER DISTRICT	6075037.515	2257301.421	Monitoring Well	232-250	7/7/2021	143.29
2734	AM-7	2735	AM-7/1	ORANGE COUNTY WATER DISTRICT	6071731.515	2260900.336	Monitoring Well	210-225	7/7/2021	131.58
2736	AM-8	2737	AM-8/1	ORANGE COUNTY WATER DISTRICT	6069027.597	2259867.528	Monitoring Well	268-285	7/7/2021	112.8
2738	AM-9	2739	AM-9/1	ORANGE COUNTY WATER DISTRICT	6068551.962	2256957.039	Monitoring Well	285-303	6/30/2021	106.16
14585	AMD-9	14586	AMD-9/1	ORANGE COUNTY WATER DISTRICT	6075825.081	2261784.701	Monitoring Well	200-220	7/1/2021	158.94
18333	FM-10A	18334	FM-10A/1	ORANGE COUNTY WATER DISTRICT	6057594.391	2262015.979	Monitoring Well	151-171	6/29/2021	80.97
18337	FM-11A	18338	FM-11A/1	ORANGE COUNTY WATER DISTRICT	6054079.666	2261018.177	Monitoring Well	134-154	6/30/2021	73.93
18341	FM-12A	18342	FM-12A/1	ORANGE COUNTY WATER DISTRICT	6058082.287	2263020.488	Monitoring Well	135-155	6/29/2021	82.13
18345	FM-13A	18346	FM-13A/1	ORANGE COUNTY WATER DISTRICT	6064721.254	2262602.268	Monitoring Well	140-160	7/1/2021	93.9
18349	FM-14A	18350	FM-14A/1	ORANGE COUNTY WATER DISTRICT	6064616.249	2263074.072	Monitoring Well	147-167	7/2/2021	93.36
18353	FM-15A	18354	FM-15A/1	ORANGE COUNTY WATER DISTRICT	6054101.553	2262617.193	Monitoring Well	120-140	6/29/2021	71.92
18414	FM-16A	18415	FM-16A/1	ORANGE COUNTY WATER DISTRICT	6063638.746	2262326.768	Monitoring Well	125-145	7/3/2021	91.85
19614	FM-18A	19615	FM-18A/1	ORANGE COUNTY WATER DISTRICT	6049386.482	2263643.669	Monitoring Well	120.5-150.5	6/29/2021	63.93
19618	FM-19A	19619	FM-19A/1	ORANGE COUNTY WATER DISTRICT	6051553.311	2262443.484	Monitoring Well	115-135	6/29/2021	68.63
7019	FM-1A	7020	FM-1A/1	ORANGE COUNTY WATER DISTRICT	6053145.617	2258731.83	Monitoring Well	164-172	6/25/2021	71.88
20764	FM-20A	20765	FM-20A/1	ORANGE COUNTY WATER DISTRICT	6053785.7	2263876.3	Monitoring Well	130-150	6/29/2021	72.54
20768	FM-21A	20769	FM-21A/1	ORANGE COUNTY WATER DISTRICT	6047768.5	2262675.5	Monitoring Well	140-160	6/29/2021	60.141
20753	FM-22A	20754	FM-22A/1	ORANGE COUNTY WATER DISTRICT	6051124.3	2260372.1	Monitoring Well	150-170	6/25/2021	67.28
20884	FM-23A	20885	FM-23A/1	ORANGE COUNTY WATER DISTRICT	6054153.6	2260625.1	Monitoring Well	128-143	6/29/2021	74.3
20701	FM-24A	20702	FM-24A/1	ORANGE COUNTY WATER DISTRICT	6051431.3	2258787.9	Monitoring Well	154-174	6/25/2021	67.61
20316	FM-25	20317	FM-25/1	ORANGE COUNTY WATER DISTRICT	6068593.3	2262774.2	Monitoring Well	132-152	6/30/2021	110.53
20878	FM-26	20879	FM-26/1	ORANGE COUNTY WATER DISTRICT	6053369.5	2263220	Monitoring Well	145-155	<Null>	<Null>
20894	FM-27	20895	FM-27/1	ORANGE COUNTY WATER DISTRICT	6054575.1	2263550.9	Monitoring Well	105-125	6/29/2021	74.86
23221	FM-29A	23222	FM-29A/1	ORANGE COUNTY WATER DISTRICT	6048986.6	2262406	Monitoring Well	150-170	6/29/2021	62.36
23571	FM-30A	23572	FM-30A/1	ORANGE COUNTY WATER DISTRICT	6061066.47	2263552.561	Monitoring Well	106-126	6/29/2021	86.65
23227	FM-31A	23228	FM-31A/1	ORANGE COUNTY WATER DISTRICT	6054066.6	2261852.6	Monitoring Well	122-137	6/29/2021	73.97
23231	FM-32A	23232	FM-32A/1	ORANGE COUNTY WATER DISTRICT	6045296.9	2263968.8	Monitoring Well	135-155	6/29/2021	56.56
23483	FM-33A	23484	FM-33A/1	ORANGE COUNTY WATER DISTRICT	6052364.7	2264780	Monitoring Well	135-155	6/29/2021	69.67
23575	FM-34A	23576	FM-34A/1	ORANGE COUNTY WATER DISTRICT	6057208.2	2265369.9	Monitoring Well	114-124	7/8/2021	81.62
23894	FM-35A	23895	FM-35A/1	ORANGE COUNTY WATER DISTRICT	6062993.381	2262539.528	Monitoring Well	180.1-195.1	7/6/2021	89.8
7521	FM-4A	7522	FM-4A/1	ORANGE COUNTY WATER DISTRICT	6048400.799	2258801.821	Monitoring Well	142-160	6/25/2021	60.89
7932	FM-5	7933	FM-5/1	ORANGE COUNTY WATER DISTRICT	6059389.1	2261084.6	Monitoring Well	121-141	6/29/2021	85
9947	FM-6	9948	FM-6/1	ORANGE COUNTY WATER DISTRICT	6053264.065	2274113.568	Monitoring Well	150-310	6/30/2021	175.28
10145	FM-7A	10146	FM-7A/1	ORANGE COUNTY WATER DISTRICT	6054314.136	2259267.565	Monitoring Well	160-170	6/25/2021	74.11
18325	FM-8	18326	FM-8/1	ORANGE COUNTY WATER DISTRICT	6059585.097	2263564.489	Monitoring Well	114-134	6/29/2021	84.74
18329	FM-9A	18330	FM-9A/1	ORANGE COUNTY WATER DISTRICT	6063388.839	2262959.974	Monitoring Well	166-186	6/30/2021	89
19009	IDM-3	19010	IDM-3/1	ORANGE COUNTY WATER DISTRICT	6099726.882	2201438.084	Monitoring Well	174-194	6/28/2021	94.682
19404	IDM-4	19405	IDM-4/1	ORANGE COUNTY WATER DISTRICT	6103585.541	2200230.218	Monitoring Well	136-156	6/28/2021	107.205
19478	IDP-2R	19479	IDP-2R/1	ORANGE COUNTY WATER DISTRICT	6106015.21	2193086.752	Monitoring Well	155-195	6/28/2021	115.845
721	KBS-1	998	KBS-1/1	ORANGE COUNTY WATER DISTRICT	6074374.124	2260345.831	Monitoring Well	209-219	7/1/2021	154.21
14600	KBS-4	14601	KBS-4/1	ORANGE COUNTY WATER DISTRICT	6073595.666	2262004.207	Monitoring Well	138-158	7/7/2021	154.88
1360	MCAS-4	1361	MCAS-4/1	ORANGE COUNTY WATER DISTRICT	6098189.884	2189446.916	Monitoring Well	181-238	6/28/2021	95.46
10217	MCAS-5A	10218	MCAS-5A/1	ORANGE COUNTY WATER DISTRICT	6101340.027	2187474.726	Monitoring Well	120-130	6/28/2021	118.26
21062	OCWD-34X40	21063	OCWD-34X40/1	ORANGE COUNTY WATER DISTRICT	6005285	2228276.5	Monitoring Well	88-113	<Null>	<Null>
23057	OCWD-34Y01	23058	OCWD-34Y01/1	ORANGE COUNTY WATER DISTRICT	6001790.9	2226024.1	Monitoring Well	60-80	7/6/2021	2.734
5410	OCWD-35H11	5413	OCWD-35H11/1	ORANGE COUNTY WATER DISTRICT	6002891.562	2224892.037	Monitoring Well	44-77	7/6/2021	-1.064
5414	OCWD-35N01	5416	OCWD-35N01/1	ORANGE COUNTY WATER DISTRICT	6001915.345	2223579.533	Monitoring Well	39-79	<Null>	<Null>
2859	OCWD-AIR1	2860	OCWD-AIR1/1	ORANGE COUNTY WATER DISTRICT	6037614.933	2265072.135	Monitoring Well	200-250	6/29/2021	39.807
3327	OCWD-AN2	3328	OCWD-AN2/1	ORANGE COUNTY WATER DISTRICT	6078166.807	2262263.165	Monitoring Well	35-115	6/28/2021	174.34
3317	OCWD-BP3	3318	OCWD-BP3/1	ORANGE COUNTY WATER DISTRICT	6069054.595	2245231.281	Monitoring Well	185-205	7/7/2021	97.415
3311	OCWD-BP4	3312	OCWD-BP4/1	ORANGE COUNTY WATER DISTRICT	6070719.841	2250468.164	Monitoring Well	140-180	7/7/2021	91.57
20224	OCWD-BP5	20226	OCWD-BP5/2	ORANGE COUNTY WATER DISTRICT	6069894.721	2249887.593	Monitoring Well	146.5-166.5	7/7/2021	125.41
20227	OCWD-BP6	20228	OCWD-BP6/1	ORANGE COUNTY WATER DISTRICT	6069328.8	2249065.103	Monitoring Well	148-168	7/7/2021	102.79
20229	OCWD-BP7	20231	OCWD-BP7/2	ORANGE COUNTY WATER DISTRICT	6069218.53	2247697.383	Monitoring Well	148-168	7/7/2021	101.76
22323	OCWD-BS10	22324	OCWD-BS10/1	ORANGE COUNTY WATER DISTRICT	6013179.752	2219396.307	Monitoring Well	100-110	7/1/2021	-13.06
22330	OCWD-BS11	22331	OCWD-BS11/1	ORANGE COUNTY WATER DISTRICT	6008506.1	2221300	Monitoring Well	95-115	7/1/2021	-9.453
22774	OCWD-BS12	22968	OCWD-BS12/1	ORANGE COUNTY WATER DISTRICT	6015660.3	2214181.8	Monitoring Well	115-125	7/1/2021	-12.659
23682	OCWD-BS13A	23683	OCWD-BS13A/1	ORANGE COUNTY WATER DISTRICT	6009763.8	2214240.5	Monitoring Well	127-132	7/1/2021	-10.876
22776	OCWD-BS14	22912	OCWD-BS14/1	ORANGE COUNTY WATER DISTRICT	6003965.9	2221842.9	Monitoring Well	75-85	7/1/2021	-4.65
19673	OCWD-BS16	19674	OCWD-BS16/1	ORANGE COUNTY WATER DISTRICT	6021997.663	2201854.703	Monitoring Well	60-80	7/1/2021	-9.627
19675	OCWD-BS18	19676	OCWD-BS18/1	ORANGE COUNTY WATER DISTRICT	6018119.189	2205526.66	Monitoring Well	72-82	7/1/2021	-11.001
22899	OCWD-BS18B	22900	OCWD-BS18B/1	ORANGE COUNTY WATER DISTRICT	6018114.308	2205521.438	Monitoring Well	52-62	7/1/2021	-11.192
19854	OCWD-BS19	19855	OCWD-BS19/1	ORANGE COUNTY WATER DISTRICT	6019002.9	2203605.503	Monitoring Well	62.5-82.5	7/1/2021	-9.346
20140	OCWD-BS20B	20141	OCWD-BS20B/1	ORANGE COUNTY WATER DISTRICT	6018514.448	2207922.493	Monitoring Well	70.8-80.8	6/24/2021	-9.28
22778	OCWD-BS21	22895	OCWD-BS21/1	ORANGE COUNTY WATER DISTRICT	6004262.7	2223732.4	Monitoring Well	65-85	6/29/2021	-2.96
23498	OCWD-BS24A	23500	OCWD-BS24A/1	ORANGE COUNTY WATER DISTRICT	6005236.2	2219558.6	Monitoring Well	87.5-92.5	7/1/2021	-8.055
2867	OCWD-CTG1	2868	OCWD-CTG1/1	ORANGE COUNTY WATER DISTRICT	6061970.346	2206073.478	Monitoring Well	160-260	6/30/2021	32.73
3309	OCWD-FC2	3310	OCWD-FC2/1	ORANGE COUNTY WATER DISTRICT	6072303.404	2252609.097	Monitoring Well	95-115	7/7/2021	105.49
3305	OCWD-FH1	3306	OCWD-FH1/1	ORANGE COUNTY WATER DISTRICT	6081695.772	2257027.264	Monitoring Well	120-140	7/7/2021	213.83

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Shallow Aquifer Wells (Model Layer 1)

STAID1	WELLNM	STAID	STANAME	OWNERNM	NAD83_X	NAD83_Y	GIS_SYMNM	PERF_ZONE	SHORTDATE	WLELEV_2021
7056	OCWD-GA2	7057	OCWD-GA2/1	ORANGE COUNTY WATER DISTRICT	6024924.606	2202223.668	Monitoring Well	30-40	6/24/2021	-4.615
23477	OCWD-HG2	23478	OCWD-HG2/1	ORANGE COUNTY WATER DISTRICT	6090811.6	2258833	Monitoring Well	43-48	7/7/2021	258.38
543	OCWD-KB1	544	OCWD-KB1/1	ORANGE COUNTY WATER DISTRICT	6073294.322	2259903.951	Monitoring Well	180-200	7/7/2021	141.77
20232	OCWD-LB1	20234	OCWD-LB1/2	ORANGE COUNTY WATER DISTRICT	6070964.86	2251336.473	Monitoring Well	148-168	7/7/2021	97.07
20237	OCWD-LB3	20239	OCWD-LB3/2	ORANGE COUNTY WATER DISTRICT	6071277.961	2250678.833	Monitoring Well	145-165	7/7/2021	93.26
21196	OCWD-LB4	21198	OCWD-LB4/2	ORANGE COUNTY WATER DISTRICT	6070798.52	2250812.078	Monitoring Well	78-88	7/7/2021	121.19
3303	OCWD-LV1	3304	OCWD-LV1/1	ORANGE COUNTY WATER DISTRICT	6085675.722	2259327.385	Monitoring Well	135-155	7/7/2021	237.5
3020	OCWD-M1	3021	OCWD-M1/1	ORANGE COUNTY WATER DISTRICT	6042016.978	2187264.062	Monitoring Well	75-110	6/30/2021	2.55
2906	OCWD-M10	2907	OCWD-M10/1	ORANGE COUNTY WATER DISTRICT	6038138.474	2201788.445	Monitoring Well	80-160	6/29/2021	2.175
2911	OCWD-M11	2912	OCWD-M11/1	ORANGE COUNTY WATER DISTRICT	6040661.307	2201457.181	Monitoring Well	70-105	6/30/2021	3.83
2924	OCWD-M12	2925	OCWD-M12/1	ORANGE COUNTY WATER DISTRICT	6043375.718	2201517.376	Monitoring Well	70-110	6/30/2021	5.775
2929	OCWD-M13	2930	OCWD-M13/1	ORANGE COUNTY WATER DISTRICT	6045991.781	2201410.369	Monitoring Well	65-95	6/30/2021	10.798
2947	OCWD-M14A	2948	OCWD-M14A/1	ORANGE COUNTY WATER DISTRICT	6046612.239	2200062.034	Monitoring Well	60-90	6/28/2021	7.94
2954	OCWD-M15A	2955	OCWD-M15A/1	ORANGE COUNTY WATER DISTRICT	6046620.011	2199773.098	Monitoring Well	60-85	6/28/2021	6.96
2961	OCWD-M16	2962	OCWD-M16/1	ORANGE COUNTY WATER DISTRICT	6046615.518	2199268.584	Monitoring Well	65-90	6/28/2021	4.264
2966	OCWD-M17A	2967	OCWD-M17A/1	ORANGE COUNTY WATER DISTRICT	6046331.102	2200365.515	Monitoring Well	60-95	6/28/2021	7.867
2934	OCWD-M19	2935	OCWD-M19/1	ORANGE COUNTY WATER DISTRICT	6046001.209	2200836.043	Monitoring Well	60-110	6/30/2021	8.575
3022	OCWD-M2	3023	OCWD-M2/1	ORANGE COUNTY WATER DISTRICT	6039248.099	2187144.76	Monitoring Well	85-150	6/28/2021	4.202
2938	OCWD-M20	2939	OCWD-M20/1	ORANGE COUNTY WATER DISTRICT	6045975.835	2200531.536	Monitoring Well	60-105	6/30/2021	8.088
4395	OCWD-M21	4398	OCWD-M21/1	ORANGE COUNTY WATER DISTRICT	6046004.999	2200239.171	Monitoring Well	65-100	6/30/2021	7.39
2976	OCWD-M22	2977	OCWD-M22/1	ORANGE COUNTY WATER DISTRICT	6046004.496	2199936.42	Monitoring Well	70-105	6/30/2021	7.525
2987	OCWD-M24	2988	OCWD-M24/1	ORANGE COUNTY WATER DISTRICT	6045442.857	2199803.456	Monitoring Well	70-95	6/24/2021	6.605
3026	OCWD-M25	3027	OCWD-M25/1	ORANGE COUNTY WATER DISTRICT	6033478.884	2192672.122	Monitoring Well	65-185	6/30/2021	4.323
3014	OCWD-M26	3015	OCWD-M26/1	ORANGE COUNTY WATER DISTRICT	6040602.649	2193477.553	Monitoring Well	70-135	7/1/2021	3.386
3016	OCWD-M27	3017	OCWD-M27/1	ORANGE COUNTY WATER DISTRICT	6043039.524	2189845.444	Monitoring Well	60-110	6/30/2021	3.357
3030	OCWD-M28	3031	OCWD-M28/1	ORANGE COUNTY WATER DISTRICT	6040384.981	2184652.638	Monitoring Well	80-145	6/30/2021	3.808
3018	OCWD-M30	3019	OCWD-M30/1	ORANGE COUNTY WATER DISTRICT	6043301.989	2183249.013	Monitoring Well	90-110	6/28/2021	3.325
3024	OCWD-M31	3025	OCWD-M31/1	ORANGE COUNTY WATER DISTRICT	6040492.197	2179496.985	Monitoring Well	82-162	6/28/2021	4.918
11859	OCWD-M36	11860	OCWD-M36/1	ORANGE COUNTY WATER DISTRICT	6035356.833	2200840.246	Monitoring Well	80-90	6/28/2021	2.46
14515	OCWD-M37	14516	OCWD-M37/1	ORANGE COUNTY WATER DISTRICT	6035034.164	2201302.677	Monitoring Well	120-130	6/28/2021	1.78
15127	OCWD-M38	15128	OCWD-M38/1	ORANGE COUNTY WATER DISTRICT	6030736.262	2198146.213	Monitoring Well	94-104	6/30/2021	0.234
2992	OCWD-M4	2993	OCWD-M4/1	ORANGE COUNTY WATER DISTRICT	6049340.682	2199524.535	Monitoring Well	80-120	6/28/2021	3.04
16654	OCWD-M40	16655	OCWD-M40/1	ORANGE COUNTY WATER DISTRICT	6051222.286	2195005.215	Monitoring Well	85-105	6/28/2021	0.72
18425	OCWD-M41	18427	OCWD-M41/2	ORANGE COUNTY WATER DISTRICT	6031312.152	2196141.497	Monitoring Well	95-105	6/30/2021	1.256
18418	OCWD-M42	18419	OCWD-M42/1	ORANGE COUNTY WATER DISTRICT	6030956.495	2201880.558	Monitoring Well	100-120	6/24/2021	-1.085
23769	OCWD-M43R	23770	OCWD-M43R/1	ORANGE COUNTY WATER DISTRICT	6056258.4	2193225.9	Monitoring Well	75-95	6/28/2021	-10.84
20371	OCWD-M44	20372	OCWD-M44/1	ORANGE COUNTY WATER DISTRICT	6048200.8	2193011.3	Monitoring Well	50-60	6/28/2021	5.089
19640	OCWD-M45	19641	OCWD-M45/1	ORANGE COUNTY WATER DISTRICT	6040339.8	2203350.603	Monitoring Well	195-205	6/30/2021	1.11
18766	OCWD-M48	18767	OCWD-M48/1	ORANGE COUNTY WATER DISTRICT	6059972.844	2188953.882	Monitoring Well	80-100	6/28/2021	-25.796
2942	OCWD-M5	2943	OCWD-M5/1	ORANGE COUNTY WATER DISTRICT	6046006.801	2199404.116	Monitoring Well	65-95	6/30/2021	6.035
22780	OCWD-M51A	22847	OCWD-M51A/1	ORANGE COUNTY WATER DISTRICT	6065086.6	2189052.9	Monitoring Well	28-38	6/24/2021	6.643
22782	OCWD-M52A	22845	OCWD-M52A/1	ORANGE COUNTY WATER DISTRICT	6067063.8	2192832.5	Monitoring Well	46-56	6/24/2021	14.66
22783	OCWD-M53A	22849	OCWD-M53A/1	ORANGE COUNTY WATER DISTRICT	6070492.9	2196785	Monitoring Well	21.5-31.5	7/27/2021	21.502
22785	OCWD-M54A	22852	OCWD-M54A/1	ORANGE COUNTY WATER DISTRICT	6074213.9	2188681.7	Monitoring Well	38-43	6/24/2021	-18.326
23136	OCWD-M55B	23137	OCWD-M55B/1	ORANGE COUNTY WATER DISTRICT	6073271.8	2195029.2	Monitoring Well	57-67	6/24/2021	24.195
23138	OCWD-M56	23139	OCWD-M56/1	ORANGE COUNTY WATER DISTRICT	6076007.2	2194374.4	Monitoring Well	106-116	6/24/2021	12.115
23819	OCWD-M57	23820	OCWD-M57/1	ORANGE COUNTY WATER DISTRICT	6043815.8	2186794.1	Monitoring Well	80-130	6/28/2021	3.257
23888	OCWD-M58A	23889	OCWD-M58A/1	ORANGE COUNTY WATER DISTRICT	6038939.075	2198039.987	Monitoring Well	80-90	6/28/2021	2.69
2997	OCWD-M6A	2998	OCWD-M6A/1	ORANGE COUNTY WATER DISTRICT	6043358.318	2199431.427	Monitoring Well	65-125	6/30/2021	5.345
2916	OCWD-M7A	2917	OCWD-M7A/1	ORANGE COUNTY WATER DISTRICT	6040722.972	2199455.757	Monitoring Well	70-135	7/1/2021	4.75
3004	OCWD-M8	3005	OCWD-M8/1	ORANGE COUNTY WATER DISTRICT	6036253.121	2199205.112	Monitoring Well	50-150	6/24/2021	4.403
3009	OCWD-M9	3011	OCWD-M9/2	ORANGE COUNTY WATER DISTRICT	6033874.971	2200507.549	Monitoring Well	135-155	6/30/2021	2.905
22659	OCWD-SA22R	22661	OCWD-SA22R/2	ORANGE COUNTY WATER DISTRICT	6036740.5	2194795.1	Monitoring Well	100-130	6/30/2021	2.618
3978	OCWD-T2	3980	OCWD-T2/2	ORANGE COUNTY WATER DISTRICT	6035679.306	2192640.337	Monitoring Well	70-170	6/24/2021	3.624
4804	OCWD-T3	4805	OCWD-T3/1	ORANGE COUNTY WATER DISTRICT	6035928.37	2192634.905	Monitoring Well	65-85	6/30/2021	2.581
3985	OCWD-T4	4846	OCWD-T4/1	ORANGE COUNTY WATER DISTRICT	6036181.511	2192629.058	Monitoring Well	68-168	6/30/2021	3.314
3982	OCWD-T5	3983	OCWD-T5/1	ORANGE COUNTY WATER DISTRICT	6035375.819	2190450.423	Monitoring Well	110-190	6/30/2021	4.479
20892	OCWD-YLR3	20893	OCWD-YLR3/1	ORANGE COUNTY WATER DISTRICT	6087613.912	2264061.986	Monitoring Well	31-36	6/30/2021	237.2
1052	OM-2A	1053	OM-2A/1	ORANGE COUNTY WATER DISTRICT	6064189.6	2231238.364	Monitoring Well	118-125	6/25/2021	63.638
1039	OM-4A	1040	OM-4A/1	ORANGE COUNTY WATER DISTRICT	6066713.864	2235618.971	Monitoring Well	112-117	6/23/2021	76.25
6519	OM-8A	6520	OM-8A/1	ORANGE COUNTY WATER DISTRICT	6068864.508	2240692.482	Monitoring Well	156-164	6/25/2021	89.55
20962	SAM-1	20964	SAM-1/2	ORANGE COUNTY WATER DISTRICT	6074659.6	2209328.2	Monitoring Well	132-147	6/30/2021	40.67
23285	SAM-10C	23286	SAM-10C/1	ORANGE COUNTY WATER DISTRICT	6075362.1	2201059	Monitoring Well	77.5-82.5	7/1/2021	31.8
23291	SAM-11D	23292	SAM-11D/1	ORANGE COUNTY WATER DISTRICT	6076595.5	2202810.9	Monitoring Well	90-100	6/30/2021	34.47
23297	SAM-13D	23298	SAM-13D/1	ORANGE COUNTY WATER DISTRICT	6073031.3	2202354.5	Monitoring Well	91.5-101.5	6/30/2021	32.14
20984	SAM-2	20986	SAM-2/2	ORANGE COUNTY WATER DISTRICT	6072812.2	2208121.4	Monitoring Well	121-131	6/30/2021	39.83
20958	SAM-3	20960	SAM-3/2	ORANGE COUNTY WATER DISTRICT	6074219.9	2207608.9	Monitoring Well	122-142	6/30/2021	39.53
20970	SAM-4	20972	SAM-4/2	ORANGE COUNTY WATER DISTRICT	6072905.5	2206698.6	Monitoring Well	120-135	6/30/2021	38.16
20966	SAM-5	20968	SAM-5/2	ORANGE COUNTY WATER DISTRICT	6072894	2205886.2	Monitoring Well	115-130	6/30/2021	37.31
20948	SAM-6	20950	SAM-6/2	ORANGE COUNTY WATER DISTRICT	6075457.3	2205983.5	Monitoring Well	114-134	<Null>	<Null>
23263	SAM-7C	23264	SAM-7C/1	ORANGE COUNTY WATER DISTRICT	6070824	2202542.5	Monitoring Well	106-111	7/1/2021	31.32
23301	SAM-8C	23302	SAM-8C/1	ORANGE COUNTY WATER DISTRICT	6072805.6	2199933	Monitoring Well	65.5-75.5	6/30/2021	28.61
23275	SAM-9C	23276	SAM-9C/1	ORANGE COUNTY WATER DISTRICT	6074482.7	2198350.3	Monitoring Well	58.5-63.5	6/30/2021	26.56
23824	SAR-14B	23825	SAR-14B/1	ORANGE COUNTY WATER DISTRICT	6099053.012	2261319.993	Monitoring Well	37-42	<Null>	<Null>
20926	SCS-11	20927	SCS-11/1	ORANGE COUNTY WATER DISTRICT	6070448.4	2228003	Monitoring Well	156-166	7/8/2021	48.71
20929	SCS-12	20930	SCS-12/1	ORANGE COUNTY WATER DISTRICT	6067610.6	2228198.9	Monitoring Well	170-180	7/8/2021	60.2
15392	SCS-6	15394	SCS-6/2	ORANGE COUNTY WATER DISTRICT	6081489.879	2232585.107	Monitoring Well	147-152.5	7/8/2021	85.86
15395	SCS-7	15397	SCS-7/2	ORANGE COUNTY WATER DISTRICT	6080943.41	2232168.833	Monitoring Well	125-140.5	7/8/2021	93.62
15398	SCS-8	15399	SCS-8/1	ORANGE COUNTY WATER DISTRICT	6081887.799	2233776.982	Monitoring Well	108-128.5	7/8/2021	120.23
18179	SCS-9	18180	SCS-9/1	ORANGE COUNTY WATER DISTRICT	6082464.896	2233574.788	Monitoring Well	153-173	7/8/2021	76
997	ABS-1	22665	ABS-1/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	6076226.851	2262977.612	Multiport Monitoring Well	MP3 (257)	7/7/2021	158.375
547	AMD-1	21135	AMD-1/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	6073916.932	2258572.091	Multiport Monitoring Well	MP3 (182)	6/30/2021	144.17
565	AMD-2	22202	AMD-2/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6066705.21	2254540.618	Multiport Monitoring Well	MP1 (157)	6/29/2021	99.56
6410	AMD-3	6433	AMD-3/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6057347.584	2256481.116	Multiport Monitoring Well	MP2 (135)	<Null>	<Null>
7295	AMD-5	7315	AMD-5/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6060070.244	2248962.576	Multiport Monitoring Well	MP2 (201)	6/28/2021	81.17
7293	AMD-6	7477	AMD-6/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6057374.729	2241092.645	Multiport Monitoring Well	MP2 (152)	6/28/2021	69.17
8596	AMD-7	8748	AMD-7/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6049188.026	2247218.215	Multiport Monitoring Well	MP1 (121)	6/28/2021	59.63
9682	AMD-8	9903	AMD-8/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6033488.697	2249624.328	Multiport Monitoring Well	MP2 (180)	7/12/2021	44.575
9831	BPM-1	9980	BPM-1/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6022348.508	2259541.566	Multiport Monitoring Well	MP1 (129)	7/12/2021	26.87
9832	BPM-2	10174	BPM-2/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6025195.413	2246739.597	Multiport Monitoring Well	MP1 (181)	7/12/2021	35.65
685	CB-1	8787	CB-1/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6044695.232	2253837.186	Multiport Monitoring Well	MP2 (143)	7/6/2021	53.15
5155	COSM-1	7143	COSM-1/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6055253.401	2197825.036	Multiport Monitoring Well	MP1 (92)	6/30/2021	2.01
18846	COSM-2	18860	COSM-2/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6052266.414	2199776.431	Multiport Monitoring Well	MP2 (115)	6/30/2021	8.62
719	FFS-1	14241	FFS-1/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6061436.461	2262022.62	Multiport Monitoring Well	MP1 (181)	7/6/2021	88.13
1291	FVM-1	15685	FVM-1/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6047178.815	2210990.613	Multiport Monitoring Well	MP2 (173)	6/22/2021	28.21
7297	GGM-1	10021	GGM-1/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6045688.299	2230864.24	Multiport Monitoring Well	MP1 (150)	7/8/2021	51.65
8923	GGM-2	9045	GGM-2/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6026525.607	2230233.156	Multiport Monitoring Well	MP1 (213)	6/22/2021	26.83
8592	GGM-3	8661	GGM-3/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6037298.069	2237458.988	Multiport Monitoring Well	MP1 (197)	7/8/2021	43.98

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Shallow Aquifer Wells (Model Layer 1)

STAID1	WELLNM	STAID	STANAME	OWNERNM	NAD83_X	NAD83_Y	GIS_SYMNM	PERF_ZONE	SHORTDATE	WLELEV_2021
7178	HBM-1	8433	HBM-1/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6031700.722	2216385.252	Multiport Monitoring Well	MP1 (91)	7/2/2021	24.52
7086	HBM-2	7218	HBM-2/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6036228.737	2196532.383	Multiport Monitoring Well	MP1 (112)	7/2/2021	3.49
9200	HBM-4	9219	HBM-4/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6034095.825	2197123.319	Multiport Monitoring Well	MP2 (120)	7/2/2021	2.99
9688	HBM-5	9873	HBM-5/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6045744.869	2193971.856	Multiport Monitoring Well	MP2 (76)	7/2/2021	9.36
15088	HBM-6	15239	HBM-6/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6025106.578	2204548.969	Multiport Monitoring Well	MP1 (53)	7/2/2021	-6.84
720	IDM-1	18976	IDM-1/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6099572.243	2207081.537	Multiport Monitoring Well	MP1 (86)	7/7/2021	92.85
9830	IDM-2	10059	IDM-2/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6080705.598	2209836.046	Multiport Monitoring Well	MP1 (129)	7/7/2021	48.9
541	KBS-2	10226	KBS-2/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6073053.762	2260992.439	Multiport Monitoring Well	MP2 (214)	6/21/2021	144.53
11949	LAM-1	12020	LAM-1/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6009581.587	2238043.705	Multiport Monitoring Well	MP1 (72)	6/15/2021	13.07
1345	MCAS-1	5841	MCAS-1/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6098255.481	2192973.357	Multiport Monitoring Well	MP2 (155)	7/6/2021	97.79
759	MCAS-2	5926	MCAS-2/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6100360.442	2191167.958	Multiport Monitoring Well	MP2 (135)	7/6/2021	106.75
1339	MCAS-3	5882	MCAS-3/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6104434.428	2191276.758	Multiport Monitoring Well	MP2 (166)	7/6/2021	114.92
758	MCAS-7	11826	MCAS-7/1/WB3/MP1	ORANGE COUNTY WATER DISTRICT	6093900.827	2194418.586	Multiport Monitoring Well	MP1 (92)	7/7/2021	83.2
756	SAR-1	9257	SAR-1/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6070684.206	2250425.314	Multiport Monitoring Well	MP1 (162)	6/29/2021	92.52
761	SAR-2	11984	SAR-2/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6069096.008	2245410.807	Multiport Monitoring Well	MP1 (141)	6/29/2021	99.88
762	SAR-3	9461	SAR-3/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6066892.02	2238409.284	Multiport Monitoring Well	MP1 (164)	6/24/2021	81.47
763	SAR-4	14628	SAR-4/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6065370.966	2233375.154	Multiport Monitoring Well	MP1 (123)	6/29/2021	70.47
1289	SAR-5	21217	SAR-5/1/WB3/MP2	ORANGE COUNTY WATER DISTRICT	6062597.607	2227874.211	Multiport Monitoring Well	MP2 (172)	6/30/2021	58.48
996	SAR-7	19998	SAR-7/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6078049.17	2256383.048	Multiport Monitoring Well	MP2 (171)	6/21/2021	183.21
559	SAR-8	22591	SAR-8/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	6076100.201	2255671.218	Multiport Monitoring Well	MP3 (161)	6/21/2021	204.32
7181	SAR-9	9796	SAR-9/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6058380.802	2221450.982	Multiport Monitoring Well	MP1 (150)	6/30/2021	49.087
9686	SBM-1	9723	SBM-1/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6016566.11	2224523.54	Multiport Monitoring Well	MP1 (79)	6/15/2021	8.535
1000	SC-1	21651	SC-1/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6089555.444	2242038.806	Multiport Monitoring Well	MP1 (47)	<Null>	<Null>
1001	SC-2	18744	SC-2/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	6086489.295	2237887.557	Multiport Monitoring Well	MP3 (148)	<Null>	<Null>
2888	SC-4	6293	SC-4/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6082605.785	2235080.546	Multiport Monitoring Well	MP1 (102)	3/10/2021	164.02
2854	SC-5	6327	SC-5/1/WB1/MP1	ORANGE COUNTY WATER DISTRICT	6077454.866	2225543.458	Multiport Monitoring Well	MP1 (124)	7/1/2021	59.96
9684	SC-6	9754	SC-6/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6066813.288	2216032.113	Multiport Monitoring Well	MP2 (202)	7/7/2021	47.93
1016	SCS-1	8863	SCS-1/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6088950.708	2237855.374	Multiport Monitoring Well	MP2 (94)	<Null>	<Null>
1014	SCS-2	22649	SCS-2/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6088207.123	2239962.183	Multiport Monitoring Well	MP1 (139)	<Null>	<Null>
1008	WBS-2A	10234	WBS-2A/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	6082321.431	2259606.923	Multiport Monitoring Well	MP2 (94)	6/21/2021	208.44
1011	WBS-4	19982	WBS-4/1/WB2/MP2	ORANGE COUNTY WATER DISTRICT	6080099.39	2256910.089	Multiport Monitoring Well	MP2 (122)	6/21/2021	193.21
1293	WMM-1	19877	WMM-1/1/WB2/MP1	ORANGE COUNTY WATER DISTRICT	6038251.554	2221751.195	Multiport Monitoring Well	MP1 (111)	7/8/2021	35.73
1124	OCWD-BESS	1152	OCWD-BESS/1	ORANGE COUNTY WATER DISTRICT	6080158.417	2258062.783	Other Active Production Well	172-189	7/7/2021	171.45
1399	OWOD-GG	1400	OWOD-GG/1	ORANGEWOOD ACADEMY	6057015.043	2226104.239	Other Active Production Well	159-179	6/28/2021	57.78
2268	W-2268	2270	W-2268/1	PRIVATE	6055379.538	2239905.999	Inactive Production Well	140-190	6/28/2021	65.1
2447	W-2447	2448	W-2447/1	PRIVATE	6039781.004	2230376.471	Inactive Production Well	157-178	6/30/2021	45.52
7046	W-7046	7047	W-7046/1	PRIVATE	6078609.174	2244437.793	Inactive Production Well	-	7/8/2021	83.04
23777	PRUD-MW49	23778	PRUD-MW49/1	PRUDENTIAL REALTY CORPORATION	6075571.865	2190248.213	Monitoring Well	22-32	<Null>	<Null>
23783	PRUD-TP07	23784	PRUD-TP07/1	PRUDENTIAL REALTY CORPORATION	6075439.364	2190268.695	Monitoring Well	22-32	<Null>	<Null>
23785	PRUD-TP10	23786	PRUD-TP10/1	PRUDENTIAL REALTY CORPORATION	6075138.851	2190153.723	Monitoring Well	35-45	<Null>	<Null>
22761	RAY-P07	22762	RAY-P07/1	RAYTHEON TECHNOLOGIES CORPORATION	6042051.6	2268371.59	Monitoring Well	107.7-129.6	6/30/2021	56.01
22763	RAY-P09	22764	RAY-P09/1	RAYTHEON TECHNOLOGIES CORPORATION	6042223.4	2268769.56	Monitoring Well	109.6-129.6	6/30/2021	68.63
1194	SANZ-C	1195	SANZ-C/1	SANCHEZ, AMELIA	6023494.753	2248016.248	Other Active Production Well	76-83	6/28/2021	42.58
1164	RODE-A	1165	RODE-A/1	SILICON SALVAGE	6035121.635	2259930.623	Other Active Production Well	178-208	6/28/2021	40.77
3743	TIC-127	3744	TIC-127/1	SOUTHERN CALIFORNIA EDISON	6098420.447	2188499.752	Monitoring Well	-	<Null>	<Null>
19683	BOE-MW31S	19684	BOE-MW31S/1	THE BOEING COMPANY	6017036.97	2217640.872	Monitoring Well	78-88	6/7/2021	-3.481
20244	BOE-EW102	20245	BOE-EW102/1	THE BOEING COMPANY	6017705	2219232.003	Other Active Production Well	62-81.7	<Null>	<Null>
1128	TMIX-O	1129	TMIX-O/1	TRANSIT MIXED CONCRETE COMPANY	6069953.158	2244552.046	Abandoned Well	76-288	6/29/2021	107.06
1370	T-NEWP	1371	T-NEWP/1	TUSTIN	6087882.616	2220782.263	Active Large-System Production Well	234-267	7/1/2021	31.06
21187	WRD-SEALBEACH-1	21188	WRD-SEALBEACH-1/1	WATER REPLENISHMENT DISTRICT	6002807.228	2229796.158	Monitoring Well	60-70	6/7/2021	-0.287
23796	XER-MW3	23797	XER-MW3/1	XEROX CORPORATION	6074925.4	2191231.3	Destroyed and Sealed Well	29-34	<Null>	<Null>
23801	XER-MW5	23802	XER-MW5/1	XEROX CORPORATION	6076231.9	2191234.6	Monitoring Well	34.5-39.5	<Null>	<Null>
23803	XER-OW50	23804	XER-OW50/1	XEROX CORPORATION	6074926.467	2191241.45	Monitoring Well	35-47	<Null>	<Null>
7027	YLWD-16	7028	YLWD-16/1	YORBA LINDA WATER DISTRICT	6123141.996	2265497.536	Destroyed and Sealed Well	40-60	<Null>	<Null>
7529	YLWD-17	7530	YLWD-17/1	YORBA LINDA WATER DISTRICT	6123146.156	2265420.578	Destroyed and Sealed Well	42-82	<Null>	<Null>
1520	YLWD-15	1521	YLWD-15/1	YORBA LINDA WATER DISTRICT	6085437.359	2260363.815	Standby Large-System Production Well	133-198	<Null>	<Null>

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Principal Aquifer Wells (Model Layer 2)

STAID1	WELLNM	STAID	STANAME	OWNERNM	GIS_SYMNM	NAD83_X	NAD83_Y	PERF_ZONE	SHORTDATE	WLELEV_2021	NOTES
15484	AVCC-P2	15485	AVCC-P2/1	ALTA VISTA COUNTRY CLUB	Other Active Production Well	6075388.705	2267012.656	210-770	6/29/2021	83.575	<Null>
903	A-39	904	A-39/1	ANAHEIM	Active Large-System Production Well	6029597.629	2248076.493	540-1280	6/24/2021	0.95	<Null>
8	A-40	109	A-40/1	ANAHEIM	Active Large-System Production Well	6042665.936	2241510.291	505-1220	6/25/2021	0.99	<Null>
2	A-42	102	A-42/1	ANAHEIM	Active Large-System Production Well	6076410.19	2260884.14	430-1180	6/24/2021	158.27	<Null>
3	A-44	106	A-44/1	ANAHEIM	Active Large-System Production Well	6075745.03	2262067.192	450-1130	6/24/2021	149.51	<Null>
18323	A-45	18324	A-45/1	ANAHEIM	Active Large-System Production Well	6064928.908	2240047.749	455-1410	6/24/2021	70.25	<Null>
9029	A-46	9030	A-46/1	ANAHEIM	Active Large-System Production Well	6063620.6	2247980.932	599-1529	6/24/2021	78.27	<Null>
3296	A-47	3297	A-47/1	ANAHEIM	Active Large-System Production Well	6043274.016	2253508.899	482-1375	6/25/2021	6.94	<Null>
20128	A-48	20129	A-48/1	ANAHEIM	Active Large-System Production Well	6039676.184	2252635.146	932-1344	6/25/2021	-8	<Null>
7175	A-49	7176	A-49/1	ANAHEIM	Active Large-System Production Well	6051692.012	2255804.997	580-1450	6/24/2021	42.3	<Null>
18380	A-51	18381	A-51/1	ANAHEIM	Active Large-System Production Well	6033547.226	2249423.825	525-965	6/25/2021	-13.82	<Null>
19546	A-52	19547	A-52/1	ANAHEIM	Active Large-System Production Well	6077704.821	2261093.873	570-1066	6/24/2021	169.8	<Null>
19371	A-53	19372	A-53/1	ANAHEIM	Active Large-System Production Well	6037376.558	2245173.272	945-1270	6/25/2021	-15	<Null>
20130	A-54	20131	A-54/1	ANAHEIM	Active Large-System Production Well	6057250.4	2249808.49	680-1480	6/24/2021	37.5	<Null>
15155	A-55	15156	A-55/1	ANAHEIM	Active Large-System Production Well	6057199.693	2240917.141	370-1300	6/24/2021	24.82	<Null>
20814	A-56	20815	A-56/1	ANAHEIM	Active Large-System Production Well	6049068.109	2246784.849	725-1300	6/24/2021	11	<Null>
22689	A-58	22690	A-58/1	ANAHEIM	Active Large-System Production Well	6076957.97	2260975.182	400-930	6/24/2021	157	<Null>
23093	A-59	23094	A-59/1	ANAHEIM	Active Large-System Production Well	6050447.318	2241983.774	740-1270	6/24/2021	18	<Null>
9	A-41	112	A-41/1	ANAHEIM	Inactive Production Well	6053236.333	2238146.843	437-1450	6/29/2021	17.41	<Null>
1	A-43	101	A-43/1	ANAHEIM	Inactive Production Well	6075927.929	2261453.161	530-1210	6/24/2021	155.86	<Null>
882	A-DMGC	883	A-DMGC/1	ANAHEIM	Other Active Production Well	6039662.685	2252561.822	430-482	6/25/2021	3	<Null>
11918	BP-BALL	11919	BP-BALL/1	BUENA PARK	Active Large-System Production Well	6022213.798	2245381.375	260-870	6/28/2021	-8.9	<Null>
11890	BP-BOIS	11891	BP-BOIS/1	BUENA PARK	Active Large-System Production Well	6035674.646	2258374.859	475-1355	6/30/2021	14.03	<Null>
6	BP-CABA	110	BP-CABA/1	BUENA PARK	Active Large-System Production Well	6024286.125	2262965.786	250-1010	6/28/2021	-24.6	<Null>
394	BP-FREE	901	BP-FREE/1	BUENA PARK	Active Large-System Production Well	6026742.413	2259834.394	260-1000	6/28/2021	-24.5	<Null>
13	BP-HOLD	103	BP-HOLD/1	BUENA PARK	Active Large-System Production Well	6024539.646	2250081.536	250-1000	7/1/2021	-6.4	<Null>
205	BP-KNOT	206	BP-KNOT/1	BUENA PARK	Active Large-System Production Well	6026889.096	2263326.166	260-1000	6/28/2021	-22.7	<Null>
19624	BP-LIND	19625	BP-LIND/1	BUENA PARK	Active Large-System Production Well	6033483.531	2254059.483	470-1221	7/1/2021	-11.5	<Null>
4	BP-SM	107	BP-SM/1	BUENA PARK	Active Large-System Production Well	6033035.282	2270048.001	308-1038	6/29/2021	60.3	<Null>
19013	CSF-1	19130	CSF-1/1/WB1/MP4	CA. STATE UNIV., FULLERTON	Multiport Monitoring Well	6064343.084	2270822.497	MP4 (454)	7/6/2021	95.19	<Null>
5133	OCWD-SA10	5136	OCWD-SA10/3	DEPARTMENT OF WATER RESOURCES	Monitoring Well	6039247.362	2190515.118	300-330	6/28/2021	-27.73	<Null>
75	EOCW-E	2624	EOCW-E/1	EAST ORANGE COUNTY WATER DISTRICT	Active Large-System Production Well	6084070.661	2234506.703	324-450	6/9/2021	40.6	<Null>
74	EOCW-W	2623	EOCW-W/1	EAST ORANGE COUNTY WATER DISTRICT	Active Large-System Production Well	6084006.305	2234482.779	315-450	6/9/2021	42.5	<Null>
1636	ANDR-A	3116	ANDR-A/1	ELTISTE, JAMIE	Other Active Production Well	6089089.85	2256920.388	-	6/29/2021	266.7	<Null>
2151	FV-10	2152	FV-10/1	FOUNTAIN VALLEY	Active Large-System Production Well	6050675.518	2207799.966	460-980	3/28/2021	-32.08	<Null>
2218	FV-11	2219	FV-11/1	FOUNTAIN VALLEY	Active Large-System Production Well	6043548.905	2210280.198	440-950	6/28/2021	-13.22	<Null>
15548	FV-12	15549	FV-12/1	FOUNTAIN VALLEY	Active Large-System Production Well	6048362.825	2212580.442	340-1070	6/28/2021	-19.8	<Null>
643	FV-6	1228	FV-6/1	FOUNTAIN VALLEY	Active Large-System Production Well	6052471.003	2208423.32	370-1110	6/27/2021	-57.6	<Null>
989	FV-8	990	FV-8/1	FOUNTAIN VALLEY	Active Large-System Production Well	6052244.232	2213617.679	312-844	6/23/2021	-22.77	<Null>
21043	FV-9	21044	FV-9/1	FOUNTAIN VALLEY	Active Large-System Production Well	6039667.163	2210310.989	415-1070	7/3/2021	-39.2	<Null>
6999	F-10	7000	F-10/1	FULLERTON	Active Large-System Production Well	6062173.417	2262322.138	460-1290	6/30/2021	78.92	<Null>
62	F-4	1066	F-4/1	FULLERTON	Active Large-System Production Well	6053113.41	2256243.518	315-405	<Null>	<Null>	No static water level
60	F-5	1064	F-5/1	FULLERTON	Active Large-System Production Well	6052548.597	2256107.709	350-400	6/30/2021	73.32	<Null>
61	F-6	1065	F-6/1	FULLERTON	Active Large-System Production Well	6052747.388	2256082.222	340-401	<Null>	<Null>	No static water level
58	F-8	1062	F-8/1	FULLERTON	Active Large-System Production Well	6052703.232	2256195.873	324-402	6/30/2021	53.02	<Null>
7	F-AIRP	111	F-AIRP/1	FULLERTON	Active Large-System Production Well	6036730.867	2265796.644	435-1080	6/30/2021	-0.98	<Null>
8250	F-CHRI2	8251	F-CHRI2/1	FULLERTON	Active Large-System Production Well	6043423.817	2259590.954	520-1330	6/30/2021	11	<Null>
18605	F-KIM1A	18606	F-KIM1A/1	FULLERTON	Active Large-System Production Well	6059437.543	2261596.705	500-1225	<Null>	<Null>	No static water level
2614	F-KIM2	2615	F-KIM2/1	FULLERTON	Active Large-System Production Well	6062988.653	2261590.596	320-626	6/30/2021	83.02	<Null>
14527	F-3A	14528	F-3A/1	FULLERTON	Inactive Production Well	6052567.9	2256330.735	580-1280	6/30/2021	43.62	<Null>
8556	F-COYO2	8557	F-COYO2/1	FULLERTON	Inactive Production Well	6040365.852	2271034.694	309-919	6/30/2021	85.12	<Null>
16	GG-16	120	GG-16/1	GARDEN GROVE	Active Large-System Production Well	6018579.01	2232461.498	304-864	6/30/2021	-17.92	<Null>
24	GG-20	126	GG-20/1	GARDEN GROVE	Active Large-System Production Well	6038073.339	2227032.571	360-912	7/2/2021	-3	<Null>
395	GG-22	929	GG-22/1	GARDEN GROVE	Active Large-System Production Well	6026676.395	2235110.939	416-1020	6/28/2021	-8	<Null>
970	GG-25	971	GG-25/1	GARDEN GROVE	Active Large-System Production Well	6047504.135	2225582.455	442-850	7/4/2021	-4	<Null>
968	GG-26	969	GG-26/1	GARDEN GROVE	Active Large-System Production Well	6055989.26	2226872.674	470-1060	6/27/2021	-7.5	<Null>
899	GG-27	900	GG-27/1	GARDEN GROVE	Active Large-System Production Well	6037663.073	2237687.515	520-1160	7/6/2021	-2	<Null>
21518	GG-31	21519	GG-31/1	GARDEN GROVE	Active Large-System Production Well	6049303.952	2233106.343	739-1373	7/7/2021	-12	<Null>
43	GG-19	2673	GG-19/1	GARDEN GROVE	Inactive Production Well	6046486.765	2237386.406	818-892	6/30/2021	12.66	<Null>
10	GG-21	113	GG-21/1	GARDEN GROVE	Inactive Production Well	6053483.401	2233322.843	428-1080	6/28/2021	10	<Null>
40	GG-23	2683	GG-23/1	GARDEN GROVE	Inactive Production Well	6049380.377	2233107.081	474-835	6/30/2021	21	<Null>
11910	GG-29	11911	GG-29/1	GARDEN GROVE	Standby Large-System Production Well	6058221.696	2231433.99	465-1110	6/28/2021	-8	<Null>
19548	GG-30	19549	GG-30/1	GARDEN GROVE	Standby Large-System Production Well	6058357.807	2234214.139	390-1146	6/28/2021	19.2	<Null>
23833	GSWC-CHF3	23834	GSWC-CHF3/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6080817.993	2228562.283	415-825	6/1/2021	2.66	<Null>
20695	GSWC-POR1	20696	GSWC-POR1/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6079506.635	2263540.675	350-895	<Null>	<Null>	No static water level
21249	GSWC-SCL5	21250	GSWC-SCL5/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6033365.183	2242754.29	915-1280	6/26/2021	-14	<Null>
913	SCWC-CBAL	914	SCWC-CBAL/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6020255.615	2245432.308	200-770	6/26/2021	-16.3	<Null>
905	SCWC-CSC	906	SCWC-CSC/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6019058.295	2249273.52	526-556	6/29/2021	-16	<Null>
15059	SCWC-LABL2	15060	SCWC-LABL2/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6010813.626	2245084.513	460-690	6/25/2021	-45	<Null>
909	SCWC-LAC3	910	SCWC-LAC3/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6009351.523	2240861.379	346-593	6/2/2021	-39.28	<Null>
2890	SCWC-LAFL	2891	SCWC-LAFL/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6009761.621	2241392.543	300-680	6/2/2021	-44.7	<Null>
932	SCWC-LAHO	933	SCWC-LAHO/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6013044.186	2239882.249	386-486	6/26/2021	-22.15	<Null>
938	SCWC-LAYT	939	SCWC-LAYT/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6006632.572	2231013.121	250-800	6/29/2021	-47.42	<Null>
83	SCWC-PBF4	1075	SCWC-PBF4/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6069384.796	2263342.45	275-520	5/25/2021	119	<Null>
66	SCWC-PLJ2	1070	SCWC-PLJ2/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6067609.83	2260053.948	402-492	6/25/2021	106	<Null>
15488	SCWC-PRU	15489	SCWC-PRU/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6069096.18	2266983.102	430-790	6/30/2021	98	<Null>
940	SCWC-SBCH	941	SCWC-SBCH/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6031904.764	2233300.581	200-570	<Null>	<Null>	Well in exclusion list
925	SCWC-SDAL	926	SCWC-SDAL/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6034900.671	2235490.72	500-542	6/28/2021	-1	<Null>
1530	SCWC-SLON	1531	SCWC-SLON/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6028180.861	2242547.915	-	6/26/2021	1	<Null>
927	SCWC-SORG	928	SCWC-SORG/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6031153.704	2237527.217	242-286	<Null>	<Null>	Well in exclusion list
919	SCWC-SSHR	920	SCWC-SSHR/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6036356.964	2241844.025	520-580	6/29/2021	14	<Null>
942	SCWC-SSYC	943	SCWC-SSYC/1	GOLDEN STATE WATER COMPANY	Active Large-System Production Well	6033362.684	2230788.849	500-546	6/16/2021	-5	<Null>
18790	RHWC-W2	18791	RHWC-W2/1	GOLDEN STATE WATER COMPANY	Inactive Production Well	6080901.573	2228585.131	474-753	6/1/2021	-4.2	<Null>
19579	SCWC-CVV2	19580	SCWC-CVV2/1	GOLDEN STATE WATER COMPANY	Inactive Production Well	6021484.347	2249526.359	480-981	6/29/2021	-16	<Null>
2616	SCWC-PBF3	2617	SCWC-PBF3/1	GOLDEN STATE WATER COMPANY	Inactive Production Well	6069378.014	2263398.289	220-475	5/25/2021	117	<Null>
9522	SCWC-YLCO2	9523	SCWC-YLCO2/1	GOLDEN STATE WATER COMPANY	Inactive Production Well	6091725.912	2261952.552	100-480	5/25/2021	254	<Null>
1147	HOLY-A	1148	HOLY-A/1	HOLY SEPULCHER CEMETERY	Other Active Production Well	6047567.386	2247438.547	334-364	6/28/2021	23.43	<Null>
1244	HB-10	1245	HB-10/1	HUNTINGTON BEACH	Active Large-System Production Well	6031343.851	2212699.814	232-942	6/30/2021	-39.55	<Null>
18384	HB-13	18385	HB-13/1	HUNTINGTON BEACH	Active Large-System Production Well	6021661.742	2221160.513	280-810	6/14/2021	-44.54	<Null>
23201	HB-1A	23202	HB-1A/1	HUNTINGTON BEACH	Active Large-System Production Well	6023131.185	2218817.882	410-805	4/29/2021	-42.324	<Null>
10208	HB-3A	10209	HB-3A/1	HUNTINGTON BEACH	Active Large-System Production Well	6031590.226	2208300.41	370-640	6/28/2021	-41.53	<Null>
27	HB-4	130	HB-4/1	HUNTINGTON BEACH	Active Large-System Production Well	6021540.371	2221406.93	252-804	6/28/2021	-30.04	<Null>
1252	HB-5	1253	HB-5/1	HUNTINGTON BEACH	Active Large-System Production Well	6036338.835	2208549.742	223-800	6/29/2021	-39.24	<Null>
1246	HB-6	1247	HB-6/1	HUNTINGTON BEACH	Active Large-System Production Well	6029305.314	2212450.473	246-810	6/15/2021	-44.55	<Null>
1261	HB-7	1262	HB-7/1	HUNTINGTON BEACH	Active Large-System Production Well	6022149.127	2221238.007	263-879	6/21/2021	-37.74	<Null>
28	HB-9	129	HB-9/1	HUNTINGTON BEACH	Active Large-System Production Well	6037364.908	2208498.213	556-996	6/30/2021	-55.58	<Null>
1248	HB-8	1249	HB-8/1	HUNTINGTON BEACH	Inactive Production Well	6027670.035	2209264.856	256-704	6/15/2021	-45.53	<Null>
1457	HB-MEA2	1458	HB-MEA2/1	HUNTINGTON BEACH	Other Active Production Well	6020702.13	2209754.143	480-510	6/29/2021	-44.67	<Null>
1643	TAOR-A	3123	TAOR-A/1	HUYNH, TUAN	Inactive Production Well	6067751.89	2255475.782	-	6/28/2021	90.52	<Null>
22	IRWD-1	124	IRWD-1/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6061580.041	2205422.106	410-860	6/23/2021	-85.8	<Null>
11476	IRWD-10	11477	IRWD-10/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6055993.429	2207529.468	419.07-939.6	<Null>	<Null>	No static water level
22342	IRWD-107R	22343	IRWD-107R/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6095711.53	2205898.451	275-1000	<Null>	<Null>	No static water level
393	IRWD-11	1224	IRWD-11/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6059766.912	2205005.285	410-870	6/23/2021	-98.3	<Null>
19366	IRWD-110	19367	IRWD-110/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6100371.561	2196315.961	555-1015	<Null>	<Null>	No static water level
22856	IRWD-115R	22857	IRWD-115R/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6093475.865	2207945.022	290-1080	<Null>	<Null>	No static water level
397	IRWD-12	991	IRWD-12/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6057023.616	2209371.259	580-1040	5/26/2021	-67.4	<Null>

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Principal Aquifer Wells (Model Layer 2)

STAID1	WELLNM	STAID	STANAME	OWNERNM	GIS_SYMNM	NAD83_X	NAD83_Y	PERF_ZONE	SHORTDATE	WLELEV_2021	NOTES
392	IRWD-13	1227	IRWD-13/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6056862.056	2205734.981	410-980	6/30/2021	-76	<Null>
1225	IRWD-14	1226	IRWD-14/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6057193.114	2207516.401	470-970	6/30/2021	-90.2	<Null>
7082	IRWD-15	7083	IRWD-15/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6058994.6	2207797.409	470-990	4/21/2021	-62.1	<Null>
14827	IRWD-16	14828	IRWD-16/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6055756.572	2207045.785	406.03-806.73	6/30/2021	-75.3	<Null>
11478	IRWD-17	11479	IRWD-17/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6056285.662	2208810.875	504.06-959.62	4/21/2021	-52.2	<Null>
21	IRWD-18	115	IRWD-18/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6060643.784	2208050.14	390-1080	<Null>	<Null>	No static water level
994	IRWD-2	995	IRWD-2/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6067589.167	2204114.565	385-855	4/21/2021	-75.9	<Null>
8372	IRWD-21	8373	IRWD-21/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6083385.042	2214485.399	290-970	6/29/2021	2.41	<Null>
8370	IRWD-22	8371	IRWD-22/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6083876.226	2214049.348	300-970	<Null>	<Null>	No static water level
11474	IRWD-3	11475	IRWD-3/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6072630.329	2206528.469	483.53-1249.9	6/23/2021	-64.9	<Null>
672	IRWD-4	993	IRWD-4/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6065784.295	2205666.545	440-910	<Null>	<Null>	No static water level
15490	IRWD-5	15491	IRWD-5/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6070026.423	2205985.727	554.42-1028.47	<Null>	<Null>	No static water level
8558	IRWD-6	8559	IRWD-6/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6067126.622	2207312.356	499-1124	3/23/2021	-51.4	<Null>
8560	IRWD-7	8561	IRWD-7/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6057958.676	2203766.228	359-660	6/23/2021	-86.8	<Null>
19412	IRWD-76	19413	IRWD-76/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6097532.587	2201980.705	450-900	<Null>	<Null>	No static water level
19414	IRWD-77	19415	IRWD-77/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6095951.099	2203527.216	330-980	<Null>	<Null>	No static water level
18510	IRWD-C8	18511	IRWD-C8/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6062825.396	2204153.762	1080-1982	<Null>	<Null>	Well in exclusion list
18512	IRWD-C9	18513	IRWD-C9/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6062422.93	2205055.852	1055-1930	<Null>	<Null>	Well in exclusion list
8929	IRWD-51	8930	IRWD-51/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6072287.787	2201236.375	310-880	6/29/2021	-51.7	<Null>
22065	IRWD-52	22066	IRWD-52/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6073545.847	2203710.984	635-1290	6/29/2021	-62.3	<Null>
1503	IRWD-98	1504	IRWD-98/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6080266.015	2190031.269	115-343	6/29/2021	-54.42	<Null>
22710	IRWD-OPA1	22711	IRWD-OPA1/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6086291.17	2237727.918	390-750	6/28/2021	41.5	<Null>
1379	TIC-109	1380	TIC-109/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6093513	2212849.72	240-1120	6/29/2021	16.9	<Null>
1381	TIC-112	1382	TIC-112/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6092052.48	2212026.724	240-1100	6/29/2021	15.23	<Null>
1377	TIC-114	1378	TIC-114/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6094747.508	2212848.22	300-960	6/29/2021	19.88	<Null>
1941	TIC-82	1942	TIC-82/1	IRVINE RANCH WATER DISTRICT	Monitoring Well	6090541.059	2199639.983	410-1002	6/29/2021	-8.83	<Null>
1343	IRWD-72	1344	IRWD-72/1	IRVINE RANCH WATER DISTRICT	Other Active Production Well	6090498.014	2215406.267	254-1151	6/29/2021	9.9	<Null>
1389	TIC-106	1390	TIC-106/1	IRVINE RANCH WATER DISTRICT	Other Active Production Well	6084967	2197177.989	405-715	3/23/2021	-45.1	<Null>
432	W-432	433	W-432/1	KATHY BONANNO	Inactive Production Well	6080325.38	2272580.463	117-137	6/30/2021	286.97	<Null>
1176	KNOT-BPBS	1515	KNOT-BPBS/1	KNOTT'S BERRY FARM	Active Small-System Production Well	6029633.814	2254234.979	430-630	6/29/2021	8.14	<Null>
12	LP-CITY	105	LP-CITY/1	LA PALMA	Active Large-System Production Well	6015567.916	2254199.963	290-1415	6/29/2021	-72.67	<Null>
5	LP-WALK	108	LP-WALK/1	LA PALMA	Active Large-System Production Well	6019189.082	2262316.73	489-919	6/25/2021	-25.45	<Null>
14284	MSG-BP10L	14285	MSG-BP10L/1	MCCOLL SITE GROUP	Monitoring Well	6037931.453	2272258.752	247-257	6/30/2021	103.92	<Null>
1505	MVCC-COSD2	1506	MVCC-COSD2/1	MESA VERDE COUNTRY CLUB	Other Active Production Well	6049566.742	2197240.664	200-450	6/30/2021	-65.825	<Null>
15780	MCWD-11	15781	MCWD-11/1	MESA WATER DISTRICT	Active Large-System Production Well	6055237.67	2197733.913	330-1000	7/7/2021	-86.57	<Null>
10138	MCWD-1B	10139	MCWD-1B/1	MESA WATER DISTRICT	Active Large-System Production Well	6058120.94	2200970.067	305-580	<Null>	<Null>	No static water level
31	MCWD-3B	2892	MCWD-3B/1	MESA WATER DISTRICT	Active Large-System Production Well	6053761.218	2202557.912	242-572	<Null>	<Null>	Well in exclusion list
1231	MCWD-5	1232	MCWD-5/1	MESA WATER DISTRICT	Active Large-System Production Well	6051212.891	2202686.998	400-940	<Null>	<Null>	No static water level
2135	MCWD-6	2136	MCWD-6/1	MESA WATER DISTRICT	Active Large-System Production Well	6055652.152	2197722.22	310-1025	<Null>	<Null>	No static water level
1233	MCWD-7	1234	MCWD-7/1	MESA WATER DISTRICT	Active Large-System Production Well	6053044.669	2200013.913	363-753	<Null>	<Null>	No static water level
23121	MESA-9B	23122	MESA-9B/1	MESA WATER DISTRICT	Active Large-System Production Well	6055224.568	2200729.295	350-580	<Null>	<Null>	No static water level
23	MCWD-2	125	MCWD-2/1	MESA WATER DISTRICT	Monitoring Well	6060220.541	2200931.5	300-650	7/7/2021	-88.14	<Null>
7747	MCWD-3BM	7748	MCWD-3BM/1	MESA WATER DISTRICT	Monitoring Well	6053810.232	2202578.466	530-570	7/7/2021	-67.5	<Null>
14833	NB-DOLD	14834	NB-DOLD/1	NEWPORT BEACH	Active Large-System Production Well	6041557.515	2205737.495	399-729	6/30/2021	-41.75	<Null>
14835	NB-DOLS	14836	NB-DOLS/1	NEWPORT BEACH	Active Large-System Production Well	6041637.348	2205746.699	201-356	<Null>	<Null>	Well in exclusion list
14837	NB-TAMD	14838	NB-TAMD/1	NEWPORT BEACH	Active Large-System Production Well	6037391.886	2206329.916	395-690	6/29/2021	-42.79	<Null>
14839	NB-TAMS	14840	NB-TAMS/1	NEWPORT BEACH	Active Large-System Production Well	6037391.924	2206247.365	170-360	<Null>	<Null>	Well in exclusion list
71	O-18	2625	O-18/1	ORANGE	Active Large-System Production Well	6073004.258	2233669.343	372-574	6/28/2021	44.64	<Null>
79	O-19	2618	O-19/1	ORANGE	Active Large-System Production Well	6072211.218	2241094.476	444-1014	6/28/2021	105.35	<Null>
2694	O-20	2696	O-20/1	ORANGE	Active Large-System Production Well	6065992.895	2234093.189	400-1130	6/28/2021	13.83	<Null>
81	O-21	1073	O-21/1	ORANGE	Active Large-System Production Well	6075241.088	2245598.993	482-1252	6/28/2021	90.16	<Null>
2921	O-22	3295	O-22/1	ORANGE	Active Large-System Production Well	6077271.09	2239348.179	342-802	6/28/2021	53.77	<Null>
7173	O-23	7174	O-23/1	ORANGE	Active Large-System Production Well	6084469.321	2236564.181	370-640	6/28/2021	23.32	<Null>
10140	O-24	10141	O-24/1	ORANGE	Active Large-System Production Well	6084080.037	2238925.34	420-800	6/28/2021	42.65	<Null>
15474	O-25	15475	O-25/1	ORANGE	Active Large-System Production Well	6078385.795	2233068.736	430-885	6/28/2021	-9.78	<Null>
18435	O-26	18436	O-26/1	ORANGE	Active Large-System Production Well	6061791.146	2233358.136	460-1170	6/28/2021	-2.58	<Null>
22860	O-27	22861	O-27/1	ORANGE	Active Large-System Production Well	6078303.303	2233680.531	425-890	6/28/2021	-45	<Null>
47	O-8	2652	O-8/1	ORANGE	Active Large-System Production Well	6069397.223	2240803.328	570-850	4/5/2021	53.07	<Null>
46	O-9	2656	O-9/1	ORANGE	Active Large-System Production Well	6069440.354	2241135.949	546-888	<Null>	<Null>	No static water level
22370	MBI-1	22371	MBI-1/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6055132.435	2212498.453	530-1190	7/1/2021	-38.54	<Null>
23015	MBI-2	23016	MBI-2/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6056141.1	2211006.5	646-1085	6/29/2021	-55.78	<Null>
23017	MBI-3	23018	MBI-3/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6056123.8	2212200.9	654-1114	6/29/2021	-42.47	<Null>
23019	MBI-4	23020	MBI-4/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6057084.9	2212185.2	650-1089	6/29/2021	-47.65	<Null>
23021	MBI-5	23022	MBI-5/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6057622.7	2211477.6	609-1059	6/29/2021	-53.62	<Null>
15492	OCWD-I24	15494	OCWD-I24/2	ORANGE COUNTY WATER DISTRICT	Injection Well	6046615.244	2199848.75	420-605	7/6/2021	-59.31	<Null>
18060	OCWD-I26C	18061	OCWD-I26C/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6048796.348	2200397.494	476-660	7/6/2021	-65.21	<Null>
19463	OCWD-I28C	19464	OCWD-I28C/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6036240.299	2199039.947	360-460	7/6/2021	-22.14	<Null>
19648	OCWD-I30C	19649	OCWD-I30C/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6034047	2200300.103	425-650	6/28/2021	-18.35	<Null>
19650	OCWD-I31C	19651	OCWD-I31C/1	ORANGE COUNTY WATER DISTRICT	Injection Well	6033606.9	2201013.303	440-590	7/6/2021	-22.46	<Null>
1018	AM-1	1019	AM-1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6090472.39	2264185.952	97-115	6/30/2021	245.03	<Null>
545	AM-10	546	AM-10/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6071304.771	2257813.261	217-235	7/7/2021	121.51	<Null>
557	AM-11	558	AM-11/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6072499.755	2255656.617	218-240	6/30/2021	121.98	<Null>
555	AM-12	556	AM-12/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6070962.221	2255565.488	210-225	7/7/2021	113.56	<Null>
553	AM-13	554	AM-13/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6072701.528	2256964.39	252-270	6/30/2021	128.38	<Null>
2740	AM-14	2741	AM-14/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6065935.798	2256505.388	297-315	6/30/2021	96.56	<Null>
2742	AM-15	2743	AM-15/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062582.08	2256912.924	300-317	6/25/2021	86.54	<Null>
2746	AM-16	2747	AM-16/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6057468.185	2255986.324	300-315	7/1/2021	70.09	<Null>
2750	AM-17	2751	AM-17/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6056078.923	2256637.855	290-308	6/25/2021	67.03	<Null>
2752	AM-18	2753	AM-18/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054337.392	2256704.097	291-309	7/1/2021	60.89	<Null>
1022	AM-2	1023	AM-2/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6091404.587	2263383.522	87-100	6/30/2021	246.46	<Null>
7535	AM-20	7536	AM-20/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054209.307	2247063.369	361-379	6/25/2021	34.97	<Null>
7001	AM-22	7002	AM-22/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6059519.306	2254484.798	339-353	6/25/2021	72.1	<Null>
7003	AM-23	7004	AM-23/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062009.413	2254628.535	330-347	6/25/2021	83.21	<Null>
7005	AM-24	7006	AM-24/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6058556.647	2251960.234	335-350	6/25/2021	69.28	<Null>
7009	AM-25	7010	AM-25/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6060774.466	2252487.982	340-358	6/25/2021	74.37	<Null>
7533	AM-26	7534	AM-26/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051909.723	2244283.122	377-383	7/1/2021	29.21	<Null>
7013	AM-27	7014	AM-27/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6064651.178	2249603.126	287-305	6/25/2021	82.55	<Null>
7015	AM-29	7016	AM-29/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062902.901	2259184.123	340-358	6/30/2021	88.5	<Null>
1020	AM-3	1021	AM-3/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6090425.411	2261850.384	91-107	6/30/2021	245.62	<Null>
7541	AM-30	7542	AM-30/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6046016.856	2255914.15	349-367	6/25/2021	41.38	<Null>
8919	AM-31	8920	AM-31/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6052262.726	2257664.465	335-353	6/25/2021	57.41	<Null>
7753	AM-32	7754	AM-32/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6052527.256	2252384.43	335-353	6/25/2021	50.68	<Null>
7523	AM-33	7524	AM-33/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6055430.54	2253987.665	354-372	6/25/2021	61.86	<Null>
7527	AM-34	7528	AM-34/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6049928.243	2250310.571	317-335	6/25/2021	39.01	<Null>
7755	AM-35	7756	AM-35/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6044316.748	2249355.364	332-350	6/25/2021	28.86	<Null>
7759	AM-37	7760	AM-37/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054347.18	2250152.867	349-367	6/25/2021	46.31	<Null>
7761	AM-38	7762	AM-38/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6058042.463	2246387.411	316-334	6/25/2021	35.25	<Null>
549	AM-4	550	AM-4/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6078257.417	2258629.141	187-205	7/7/2021	166.16	<Null>
20709	AM-47	20710	AM-47/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054333.5	2258316.7	227-242	6/25/2021	64.05	<Null>
20705	AM-48	20706	AM-48/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6069379.3	2259143.9	270-300	7/8/2021	113.68	<Null>
1024	AM-5	1025	AM-5/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6078674.697	2259936.321	230-245	7/7/2021	156.58	<Null>
23213	AM-54C	23214	AM-54C/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6055965.303	2259518	280-295	6/25/2021	69.46	<Null>
23563	AM-55B	23564	AM-55B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054292.1	2256036.6	375-395	7/8/2021	59.8	<Null>
23567	AM-56B	23569	AM-56B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6053578.9	2256950.9	380-400	7/8/2021	58.82	<Null>
551	AM-6	552	AM-6/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6075037.515	2257301.421	232-250	7/7/2021	143.29	<Null>
2734	AM-7	2735	AM-7/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6071731.515	2260900.336	210-225	7/7/2021	131.58	<Null>

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Principal Aquifer Wells (Model Layer 2)

STAID1	WELLNM	STAID	STANAME	OWNERNM	GIS_SYMNM	NAD83_X	NAD83_Y	PERF_ZONE	SHORTDATE	WLELEV_2021	NOTES
2736	AM-8	2737	AM-8/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6069027.597	2259867.528	268-285	7/7/2021	112.8	<Null>
15043	AMD-10	15045	AMD-10/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6072825.077	2260900.884	440-460	7/7/2021	135.71	<Null>
15053	AMD-11	15056	AMD-11/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6070695.395	2257252.242	600-620	6/30/2021	117.07	<Null>
19507	AMD-12	19510	AMD-12/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6071323.1	2260657.003	595-615	6/30/2021	126.14	<Null>
14585	AMD-9	14587	AMD-9/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6075825.081	2261784.701	450-470	7/7/2021	151.35	<Null>
7017	FM-1	7018	FM-1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6053154.441	2258736.246	348-356	6/25/2021	60.62	<Null>
18331	FM-10	18332	FM-10/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6057584.791	2262009.679	215-235	6/29/2021	79.5	<Null>
18335	FM-11	18336	FM-11/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054079.466	2261009.777	236-256	6/30/2021	69.03	<Null>
18339	FM-12	18340	FM-12/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6058076.487	2263025.088	206-226	6/29/2021	82.04	<Null>
18343	FM-13	18344	FM-13/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6064730.854	2262602.368	210-230	6/30/2021	93.15	<Null>
18347	FM-14	18348	FM-14/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6064606.249	2263073.772	234-254	7/1/2021	93.13	<Null>
18351	FM-15	18352	FM-15/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054099.553	2262606.493	218-238	6/29/2021	73.72	<Null>
18412	FM-16	18413	FM-16/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6063630.746	2262324.068	248-268	6/30/2021	88.76	<Null>
19626	FM-17	19627	FM-17/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6061492.436	2262019.765	250-270	6/30/2021	84.02	<Null>
19612	FM-18	19613	FM-18/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6049362.557	2263643.539	224-244	6/29/2021	62.44	<Null>
19622	FM-19C	19623	FM-19C/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051551.893	2262403.786	365-385	6/29/2021	57.84	<Null>
23462	FM-19D	23463	FM-19D/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051660.8	2262458.6	435-455	6/29/2021	59.85	<Null>
7021	FM-2	7022	FM-2/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6058816.966	2258623.398	320-338	6/25/2021	76.61	<Null>
20762	FM-20	20763	FM-20/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6053785.7	2263886.1	221-241	6/29/2021	72.51	<Null>
20766	FM-21	20767	FM-21/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6047750.6	2262684.3	260-270	6/29/2021	58.02	<Null>
20751	FM-22	20752	FM-22/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051135	2260372.1	242-262	7/8/2021	60.23	<Null>
23217	FM-22B	23218	FM-22B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051128.1	2260379.8	326-346	6/25/2021	56.32	<Null>
20882	FM-23	20883	FM-23/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054166.9	2260625	234-249	6/29/2021	69.17	<Null>
20699	FM-24	20700	FM-24/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051441.4	2258786	271-291	6/25/2021	57	<Null>
23219	FM-24B	23220	FM-24B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051418.9	2258788.7	338-358	6/25/2021	55.89	<Null>
23225	FM-29C	23226	FM-29C/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6049003.993	2262397.371	340-360	6/29/2021	49.19	<Null>
7025	FM-3	7026	FM-3/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6061451.851	2259514.599	257-263	6/30/2021	84.27	<Null>
23573	FM-30B	23574	FM-30B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6061056.8	2263552.8	370-390	6/29/2021	83.12	<Null>
23229	FM-31B	23230	FM-31B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054065.947	2261842.665	230-250	6/29/2021	70.23	<Null>
23449	FM-32B	23452	FM-32B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6045316.1	2263964.1	220-230	6/29/2021	56.28	<Null>
23577	FM-34B	23578	FM-34B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6057207.6	2265354.1	377-397	7/8/2021	66.54	<Null>
23898	FM-35C	23899	FM-35C/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062992.887	2262505.466	460.5-480.5	7/6/2021	85.12	<Null>
7519	FM-4	7520	FM-4/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6048406.619	2258792.993	327-345	6/25/2021	49.86	<Null>
9947	FM-6	9948	FM-6/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6053264.065	2274113.568	150-310	6/30/2021	175.2	<Null>
23215	FM-7B	23216	FM-7B/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6054304.1	2259270.6	329.5-344.5	6/25/2021	64.28	<Null>
18327	FM-9	18328	FM-9/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6063377.138	2262960.474	220-240	6/30/2021	88.97	<Null>
19009	IDM-3	19012	IDM-3/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6099726.882	2201438.084	652-672	6/28/2021	8.37	<Null>
19404	IDM-4	19407	IDM-4/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6103585.541	2200230.218	654-674	6/28/2021	51.87	<Null>
19478	IDP-2R	19480	IDP-2R/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6106015.21	2193086.752	300-340	6/28/2021	108.257	<Null>
721	KBS-1	998	KBS-1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6074374.124	2260345.831	209-219	7/1/2021	154.21	<Null>
1285	MCAS-10	1286	MCAS-10/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6096082.894	2198174.236	347-377	6/28/2021	9.88	<Null>
1360	MCAS-4	1361	MCAS-4/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6098189.884	2189446.916	181-238	6/28/2021	95.46	<Null>
10217	MCAS-5A	10218	MCAS-5A/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6101340.027	2187474.726	120-130	6/28/2021	118.26	<Null>
1355	MCAS-8	1356	MCAS-8/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6088737.288	2194284.922	392-410	6/28/2021	-63.35	<Null>
1287	MCAS-9	1288	MCAS-9/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6092651.761	2198312.255	372-445	6/28/2021	2.18	<Null>
23057	OCWD-34Y01	23061	OCWD-34Y01/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6001790.9	2226024.1	400-420	7/6/2021	-43.1	<Null>
11700	OCWD-36FP1Z	11701	OCWD-36FP1Z/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6001815.979	2221372.331	504-514	7/1/2021	-42.84	<Null>
2859	OCWD-AIR1	2861	OCWD-AIR1/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6037614.933	2265072.135	410-510	6/29/2021	-7.44	<Null>
22323	OCWD-BS10	22329	OCWD-BS10/6	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6013179.752	2219396.307	595-605	7/1/2021	-46.87	<Null>
22330	OCWD-BS11	22336	OCWD-BS11/6	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6008506.1	2221300	580-590	7/1/2021	-47.03	<Null>
22774	OCWD-BS12	22973	OCWD-BS12/6	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6015660.3	2214181.8	585-605	7/1/2021	-49.9	<Null>
23692	OCWD-BS13F	23693	OCWD-BS13F/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6009690	2214241.6	575-595	7/1/2021	-44.86	<Null>
22776	OCWD-BS14	22916	OCWD-BS14/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6003965.9	2221842.9	490-510	7/1/2021	-43.9	<Null>
23550	OCWD-BS24F	23554	OCWD-BS24F/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6005185.3	2219560	500-520	7/1/2021	-41.91	<Null>
2867	OCWD-CTG1	2869	OCWD-CTG1/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6061970.346	2206073.478	420-720	6/30/2021	-85.71	<Null>
2872	OCWD-CTG5	2873	OCWD-CTG5/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062530.714	2206394.591	420-620	8/4/2021	-81.04	<Null>
2876	OCWD-CTK1	2878	OCWD-CTK1/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062486.259	2205158.852	780-1015	6/30/2021	-81.99	<Null>
3307	OCWD-FC1	3308	OCWD-FC1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6072297.077	2252615.883	165-185	7/7/2021	104.96	<Null>
3305	OCWD-FH1	3306	OCWD-FH1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6081695.772	2257027.264	120-140	7/7/2021	213.83	<Null>
3303	OCWD-LV1	3304	OCWD-LV1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6085675.722	2259327.385	135-155	7/7/2021	237.5	<Null>
15127	OCWD-M38	15131	OCWD-M38/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6030736.262	2198146.213	336-346	6/30/2021	-27.7	<Null>
16021	OCWD-M39	16026	OCWD-M39/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6048139.112	2190636.716	250-270	6/28/2021	-16.46	<Null>
16654	OCWD-M40	16658	OCWD-M40/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6051222.286	2195005.215	330-520	6/28/2021	-81.04	<Null>
18425	OCWD-M41	18430	OCWD-M41/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6031312.152	2196141.497	370-390	6/30/2021	-27.74	<Null>
18418	OCWD-M42	18423	OCWD-M42/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6030956.495	2201880.558	500-520	6/24/2021	-30.94	<Null>
23769	OCWD-M43R	23774	OCWD-M43R/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6056258.4	2193225.9	530-550	6/28/2021	-82.54	<Null>
20371	OCWD-M44	20376	OCWD-M44/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6048200.8	2193011.3	295-305	6/28/2021	-58.37	<Null>
19640	OCWD-M45	19645	OCWD-M45/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6040339.8	2203350.603	780-790	6/30/2021	-56.92	<Null>
19482	OCWD-M46	19487	OCWD-M46/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6049299	2201186.803	890-910	6/28/2021	-61.24	<Null>
19634	OCWD-M47	19639	OCWD-M47/5	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6049915.7	2202379.503	940-960	6/28/2021	-61.7	<Null>
18766	OCWD-M48	18768	OCWD-M48/2	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6059972.844	2188953.882	175-195	6/28/2021	-73.7	<Null>
22842	OCWD-M52C	22843	OCWD-M52C/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6067045.9	2192841.2	210-230	6/24/2021	-69.15	<Null>
22786	OCWD-MRSH	22854	OCWD-MRSH/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6074220	2188672.3	199-219	6/29/2021	-28.15	<Null>
22659	OCWD-SA22R	22663	OCWD-SA22R/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6036740.5	2194795.1	310-330	6/30/2021	-28.24	<Null>
3978	OCWD-T2	3981	OCWD-T2/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6035679.306	2192640.337	300-360	6/24/2021	-27.11	<Null>
315	OCWD-W1	316	OCWD-W1/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6081387.171	2258988.611	-	7/7/2021	174.34	<Null>
22347	SAR-10	22351	SAR-10/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6055179.3	2212421.7	1100-1115	7/1/2021	-51.98	<Null>
22061	SAR-11	22064	SAR-11/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6055349.4	2211898	1100-1110	7/1/2021	-54.34	<Null>
23010	SAR-12	23014	SAR-12/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6056736.8	2210170.5	1045-1055	6/30/2021	-67.896	<Null>
23203	SAR-13	23207	SAR-13/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6057504.8	2210763.1	1045-1055	6/30/2021	-63.83	<Null>
1851	TIC-67	1852	TIC-67/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6100937.109	2211418.256	245-900	6/29/2021	73.58	<Null>
997	ABS-1	22665	ABS-1/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6076226.851	2262977.612	MP3 (257)	7/7/2021	158.375	<Null>
547	AMD-1	21137	AMD-1/1/WB2/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6073916.932	2258572.091	MP5 (331)	6/21/2021	143.45	<Null>
565	AMD-2	22205	AMD-2/1/WB2/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6066705.21	2254540.618	MP4 (512)	6/29/2021	99.11	<Null>
7031	AMD-4	7104	AMD-4/1/WB1/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6050716.117	2255097.562	MP4 (561)	6/28/2021	43.82	<Null>
7295	AMD-5	7320	AMD-5/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6060070.244	2248962.576	MP7 (754)	6/28/2021	69.39	<Null>
7293	AMD-6	7482	AMD-6/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6057374.729	2241092.645	MP7 (622)	6/28/2021	15.03	<Null>
8596	AMD-7	8754	AMD-7/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6049188.026	2247218.215	MP7 (580)	6/28/2021	15.36	<Null>
9682	AMD-8	9906	AMD-8/1/WB1/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6033488.697	2249624.328	MP5 (662)	7/12/2021	-8.705	<Null>
9831	BPM-1	9985	BPM-1/1/WB1/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6022348.508	2259541.566	MP6 (890)	7/12/2021	-42.1	<Null>
9832	BPM-2	10178	BPM-2/1/WB1/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6025195.413	2246739.597	MP5 (778)	7/12/2021	-11.49	<Null>
685	CB-1	8788	CB-1/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6044695.232	2253837.186	MP3 (443)	7/6/2021	30.09	<Null>
5155	COSM-1	7147	COSM-1/1/WB1/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6055253.401	2197825.036	MP5 (451)	6/30/2021	-87.65	<Null>
18846	COSM-2	18866	COSM-2/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6052266.414	2199776.431	MP8 (763)	6/30/2021	-80.87	<Null>
719	FFS-1	14243	FFS-1/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6061436.461	2262022.62	MP3 (530)	7/6/2021	81.44	<Null>
1291	FVM-1	15692	FVM-1/1/WB2/MP9	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6047178.815	2210990.613	MP9 (814)	6/22/2021	-47.21	<Null>
7297	GGM-1	10028	GGM-1/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6045688.299	2230864.24	MP8 (1074)	7/8/2021	-22.44	<Null>
8923	GGM-2	9049	GGM-2/1/WB1/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6026525.607	2230233.156	MP5 (954)	6/22/2021	-30.46	<Null>
8592	GGM-3	8666	GGM-3/1/WB1/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6037298.069	2237458.988	MP6 (1007)	7/8/2021	-17.34	<Null>
7178	HBM-1	8439	HBM-1/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6031700.722	2216385.252	MP7 (924)	7/2/2021	-43.89	<Null>
7086	HBM-2	7223	HBM-2/1/WB1/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6036228.737	2196532.383	MP6 (447)	7/2/2021	-25.01	<Null>
9200	HBM-4	9225	HBM-4/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6034095.825	2197123.319	MP8 (551)	7/2/2021	-20.86	<Null>
9688	HBM-5	9879	HBM-5/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6045744.869	2193971.856	MP8 (273)	7/2/2021	-52.65	<Null>
15088	HBM-6	15245	HBM-6/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6025106.578	2204548.969	MP7 (508)	7/2/2021	-37.1	<Null>
720	IDM-1	18979	IDM-1/1/WB2/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6099572.243	2207081.537	MP4 (436)	7/7/2021	28.49	<Null>
9830	IDM-2	10064	IDM-2/1/WB1/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6080705.598	2209836.046	MP6 (613)	7/7/2021	-71.94	<Null>

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Principal Aquifer Wells (Model Layer 2)

STAID1	WELLNM	STAID	STANAME	OWNERNM	GIS_SYMNM	NAD83_X	NAD83_Y	PERF_ZONE	SHORTDATE	WLELEV_2021	NOTES
541	KBS-2	10226	KBS-2/1/WB1/MP2	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6073053.762	2260992.439	MP2 (214)	6/21/2021	144.53	<Null>
11949	LAM-1	12028	LAM-1/1/WB1/MP9	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6009581.587	2238043.705	MP9 (1153)	6/15/2021	-56.23	<Null>
1345	MCAS-1	5853	MCAS-1/1/WB2/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6098255.481	2192973.357	MP6 (455)	7/6/2021	36.17	<Null>
759	MCAS-2	5935	MCAS-2/1/WB2/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6100360.442	2191167.958	MP5 (425)	7/6/2021	62.46	<Null>
1339	MCAS-3	5891	MCAS-3/1/WB2/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6104434.428	2191276.758	MP5 (426)	7/6/2021	89.45	<Null>
758	MCAS-7	11829	MCAS-7/1/WB3/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6093900.827	2194418.586	MP4 (442)	7/7/2021	-23.9	<Null>
756	SAR-1	9261	SAR-1/1/WB2/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6070684.206	2250425.314	MP5 (519)	6/29/2021	88.12	<Null>
761	SAR-2	11989	SAR-2/1/WB2/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6069096.008	2245410.807	MP6 (741)	6/29/2021	71.42	<Null>
762	SAR-3	9466	SAR-3/1/WB2/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6066892.02	2238409.284	MP6 (774)	6/24/2021	54.27	<Null>
763	SAR-4	14633	SAR-4/1/WB2/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6065370.966	2233375.154	MP6 (868)	6/29/2021	31.58	<Null>
1289	SAR-5	21220	SAR-5/1/WB3/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6062597.607	2227874.211	MP5 (766)	6/30/2021	-16.37	<Null>
561	SAR-6	10113	SAR-6/1/WB2/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6073313.538	2254365.369	MP4 (581)	6/21/2021	142.26	<Null>
996	SAR-7	20000	SAR-7/1/WB2/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6078049.17	2256383.048	MP4 (440)	6/21/2021	192.2	<Null>
7181	SAR-9	9802	SAR-9/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6058380.802	2221450.982	MP7 (877)	6/30/2021	-40.723	<Null>
9686	SBM-1	9729	SBM-1/1/WB1/MP7	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6016566.11	2224523.54	MP7 (916)	6/15/2021	-47.295	<Null>
1000	SC-1	21654	SC-1/1/WB2/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6089555.444	2242038.806	MP4 (197)	7/1/2021	213.44	<Null>
1001	SC-2	18747	SC-2/1/WB2/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6086489.295	2237887.557	MP6 (303)	7/1/2021	112.45	<Null>
1005	SC-3	8839	SC-3/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6081074.85	2229940.413	MP3 (577)	7/1/2021	29.49	<Null>
2888	SC-4	6296	SC-4/1/WB1/MP4	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6082605.785	2235080.546	MP4 (393)	7/1/2021	46.59	<Null>
2854	SC-5	6331	SC-5/1/WB1/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6077454.866	2225543.458	MP5 (670)	7/1/2021	4.73	<Null>
9684	SC-6	9758	SC-6/1/WB1/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6066813.288	2216032.113	MP6 (964)	7/7/2021	-60.78	<Null>
1016	SCS-1	8867	SCS-1/1/WB1/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6088950.708	2237855.374	MP6 (298)	7/1/2021	89.68	<Null>
1014	SCS-2	22653	SCS-2/1/WB2/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6088207.123	2239962.183	MP5 (329)	7/1/2021	72.99	<Null>
1011	WBS-4	19983	WBS-4/1/WB2/MP3	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6080099.39	2256910.089	MP3 (212)	6/21/2021	206.6	<Null>
1293	WMM-1	19884	WMM-1/1/WB2/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6038251.554	2221751.195	MP8 (985)	7/8/2021	-24.03	<Null>
1423	OCWD-D1	1424	OCWD-D1/1	ORANGE COUNTY WATER DISTRICT	Other Active Production Well	6046612.36	2200327.641	780-880	6/23/2021	-60.642	<Null>
1412	OCWD-D3	1413	OCWD-D3/1	ORANGE COUNTY WATER DISTRICT	Other Active Production Well	6046034.602	2201849.851	560-1000	6/23/2021	-58.66	<Null>
3797	OCWD-D4	3798	OCWD-D4/1	ORANGE COUNTY WATER DISTRICT	Other Active Production Well	6047147.793	2201759.429	531-979	6/23/2021	-61.08	<Null>
1798	NVLW-SB3	3275	NVLW-SB3/1	PURSCHE, ROY	Other Active Production Well	6011353.936	2219409.749	-	6/29/2021	-51.1	<Null>
1126	NOBL-O	1127	NOBL-O/1	R.J. NOBLE COMPANY	Other Active Production Well	6072535.517	2251285.626	290-474	6/29/2021	91.85	<Null>
22874	RAY-MW06	22875	RAY-MW06/1	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6042228.1	2268828.8	149.6-189.6	6/30/2021	33.58	<Null>
22408	RAY-MW32	22410	RAY-MW32/2	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6039287.583	2267257.657	969-999	6/30/2021	17.47	<Null>
22416	RAY-MW34B	22417	RAY-MW34B/1	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6039046.07	2268346.15	486-536	6/30/2021	18.29	<Null>
22420	RAY-MW35	22423	RAY-MW35/3	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6039878.34	2265861.26	990-1040	6/30/2021	12.69	<Null>
22757	RAY-MW39	22758	RAY-MW39/1	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6034604.76	2267260.25	982-1012	6/30/2021	14.6	<Null>
22759	RAY-MW40	22760	RAY-MW40/1	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6042465.71	2267070.62	930-970	6/30/2021	20.33	<Null>
975	SA-16	976	SA-16/1	SANTA ANA	Active Large-System Production Well	6066775.852	2220474.597	305-950	<Null>	<Null>	Well in exclusion list
964	SA-18	965	SA-18/1	SANTA ANA	Active Large-System Production Well	6065423.295	2227343.923	245-623	6/30/2021	6.21	<Null>
983	SA-20	984	SA-20/1	SANTA ANA	Active Large-System Production Well	6051943.524	2218208.729	390-940	6/29/2021	-18.5	<Null>
981	SA-21	982	SA-21/1	SANTA ANA	Active Large-System Production Well	6051992.474	2218775.287	400-960	6/29/2021	-17.7	<Null>
966	SA-24	967	SA-24/1	SANTA ANA	Active Large-System Production Well	6062495.013	2226820.521	352-654	6/30/2021	-4.27	<Null>
19	SA-29	117	SA-29/1	SANTA ANA	Active Large-System Production Well	6067350.619	2218664.363	450-1050	7/1/2021	-48.19	<Null>
985	SA-30	986	SA-30/1	SANTA ANA	Active Large-System Production Well	6051988.27	2217594.374	440-900	6/29/2021	-22.8	<Null>
979	SA-33	980	SA-33/1	SANTA ANA	Active Large-System Production Well	6067018.394	2218472.227	425-935	7/1/2021	-47.2	<Null>
3322	SA-34	3323	SA-34/1	SANTA ANA	Active Large-System Production Well	6062544.736	2203955.867	370-520	7/2/2021	-83	<Null>
8823	SA-35	8824	SA-35/1	SANTA ANA	Active Large-System Production Well	6058367.7	2224408.129	429.2-1480	5/24/2021	-29	<Null>
1993	SA-36	1994	SA-36/1	SANTA ANA	Active Large-System Production Well	6064973.942	2227415.821	570-1290	6/30/2021	-21.75	<Null>
8825	SA-37	8826	SA-37/1	SANTA ANA	Active Large-System Production Well	6061211.41	2214947.524	348-1480	5/24/2021	-48	<Null>
18391	SA-39	18393	SA-39/1	SANTA ANA	Active Large-System Production Well	6064925.485	2227035.79	590-1290	6/30/2021	-26.3	<Null>
19552	SA-41	19553	SA-41/1	SANTA ANA	Active Large-System Production Well	6067142.505	2220423.372	525-978	5/25/2021	-40.58	<Null>
956	SA-26	957	SA-26/1	SANTA ANA	Standby Large-System Production Well	6073873.971	2210851.779	330-1140	7/2/2021	-58.82	<Null>
532	SA-27	533	SA-27/1	SANTA ANA	Standby Large-System Production Well	6072868.882	2229547.215	396-1140	6/30/2021	-6.9	<Null>
70	SA-28	2629	SA-28/1	SANTA ANA	Standby Large-System Production Well	6073394.893	2229877.64	250-980	6/30/2021	11.5	<Null>
18	SA-31	118	SA-31/1	SANTA ANA	Standby Large-System Production Well	6078121.42	2217676.874	465-1240	6/22/2021	-11.32	<Null>
8817	SA-38	8818	SA-38/1	SANTA ANA	Standby Large-System Production Well	6077082.488	2229427.758	400-1270	6/30/2021	27	<Null>
19550	SA-40	19551	SA-40/1	SANTA ANA	Standby Large-System Production Well	6077600.85	2221373.519	550-1305	6/30/2021	-50.75	<Null>
1513	SACC-SA	1514	SACC-SA/1	SANTA ANA COUNTRY CLUB	Other Active Production Well	6062143.936	2190413.821	205-406	6/30/2021	-80.85	<Null>
26	SB-BC	123	SB-BC/1	SEAL BEACH	Active Large-System Production Well	6016910.323	2228579.652	370-1020	6/29/2021	-62	<Null>
1282	SB-BEV	1283	SB-BEV/1	SEAL BEACH	Active Large-System Production Well	6006691.531	2229990.738	400-800	5/26/2021	-58.14	<Null>
21089	SB-LAM	21090	SB-LAM/1	SEAL BEACH	Active Large-System Production Well	6012636.62	2232616.404	360-1170	6/29/2021	-50	<Null>
78	SID-3	2619	SID-3/1	SERRANO WATER DISTRICT	Active Large-System Production Well	6085523.367	2241664.186	296-584	6/30/2021	49	<Null>
7036	SID-4	7037	SID-4/1	SERRANO WATER DISTRICT	Active Large-System Production Well	6088277.371	2242027.33	290-520	<Null>	<Null>	No static water level
15486	SWD-5	15487	SWD-5/1	SERRANO WATER DISTRICT	Active Large-System Production Well	6085860.482	2241857.866	310-720	6/30/2021	53	<Null>
3801	W-3801	3802	W-3801/1	STATE OF CALIFORNIA	Inactive Production Well	6061820.651	2190918.886	254-407	6/30/2021	-80.36	<Null>
1927	TIC-194	1931	TIC-194/1	THE IRVINE COMPANY	Monitoring Well	6085062.044	2200644.721	562-726	6/29/2021	-62.48	<Null>
3524	TIC-25	3525	TIC-25/1	THE IRVINE COMPANY	Monitoring Well	6082128.447	2194002.252	666-760	6/29/2021	-62.21	<Null>
1829	TIC-50	1830	TIC-50/1	THE IRVINE COMPANY	Monitoring Well	6089719.969	2212322.221	475-1070	6/29/2021	19.34	<Null>
1331	TIC-99	1332	TIC-99/1	THE IRVINE COMPANY	Monitoring Well	6094081.516	2213753.527	346-650	6/29/2021	10.69	<Null>
18770	T-17S4	18771	T-17S4/1	TUSTIN	Active Large-System Production Well	6087962.147	2223505.698	200-480	7/1/2021	22	<Null>
950	T-COLU	951	T-COLU/1	TUSTIN	Active Large-System Production Well	6083806.737	2220457.042	560-1160	6/30/2021	-16	<Null>
22699	T-ED	22700	T-ED/1	TUSTIN	Active Large-System Production Well	6079918.435	2211393.25	500-840	7/1/2021	-58	<Null>
954	T-MS3	955	T-MS3/1	TUSTIN	Active Large-System Production Well	6083758.623	2217438.721	300-630	6/30/2021	32	<Null>
15470	T-MS4	15471	T-MS4/1	TUSTIN	Active Large-System Production Well	6084025.072	2217344.269	330-880	6/30/2021	9	<Null>
1370	T-NEWP	1371	T-NEWP/1	TUSTIN	Active Large-System Production Well	6087882.616	2220782.263	234-267	7/1/2021	31	<Null>
20304	T-PAS	20305	T-PAS/1	TUSTIN	Active Large-System Production Well	6080513.128	2217850.37	440-1225	6/30/2021	-11	<Null>
9204	T-VNBG	9205	T-VNBG/1	TUSTIN	Active Large-System Production Well	6083087.233	2223256.938	480-900	<Null>	<Null>	No static water level
958	T-WALN	959	T-WALN/1	TUSTIN	Active Large-System Production Well	6084028.458	2212002.398	397-995	7/2/2021	-40	<Null>
948	T-LIVI	949	T-LIVI/1	TUSTIN	Inactive Production Well	6085117.397	2221039.77	300-617	6/30/2021	21	<Null>
960	T-PANK	961	T-PANK/1	TUSTIN	Inactive Production Well	6087674.762	2213340.094	323-614	6/30/2021	10.88	<Null>
946	T-TUST	947	T-TUST/1	TUSTIN	Inactive Production Well	6079841.655	2224465.712	306-776	5/10/2021	0	<Null>
33	T-YORB	2898	T-YORB/1	TUSTIN	Inactive Production Well	6082254.093	2227714.437	385-850	6/30/2021	12	<Null>
2139	COS-PLAZ	3551	COS-PLAZ/1	UNKNOWN	Monitoring Well	6062779.265	2200089.756	-	6/30/2021	-82.38	<Null>
21187	WRD-SEALBEACH-1	21191	WRD-SEALBEACH-1/4	WATER REPLENISHMENT DISTRICT	Monitoring Well	6002807.228	2229796.158	775-795	6/7/2021	-61.51	<Null>
20132	WM-107A	20133	WM-107A/1	WESTMINSTER	Active Large-System Production Well	6036756.169	2221201.688	350-980	6/23/2021	-3.71	<Null>
18462	WM-11	18463	WM-11/1	WESTMINSTER	Active Large-System Production Well	6030376.492	2221521.749	325-790	6/28/2021	-16	<Null>
15462	WM-125	15463	WM-125/1	WESTMINSTER	Active Large-System Production Well	6019490.522	2226357.926	374-860	6/29/2021	-35	<Null>
1250	WM-3	1251	WM-3/1	WESTMINSTER	Active Large-System Production Well	6035334.153	2212273.162	285-365	<Null>	<Null>	Well in exclusion list
987	WM-4	988	WM-4/1	WESTMINSTER	Active Large-System Production Well	6041811.441	2216473.787	345-1125	6/30/2021	-10	<Null>
973	WM-6	974	WM-6/1	WESTMINSTER	Active Large-System Production Well	6040452.837	2221186.654	176-660	<Null>	<Null>	Well in exclusion list
19581	WM-75A	19582	WM-75A/1	WESTMINSTER	Active Large-System Production Well	6027529.048	2227543.038	410-996	7/1/2021	-18.75	<Null>
2351	WM-RES1	2352	WM-RES1/1	WESTMINSTER	Active Large-System Production Well	6034195.466	2226587.136	390-880	6/29/2021	-13.33	<Null>
25	WM-RES2	127	WM-RES2/1	WESTMINSTER	Active Large-System Production Well	6022510.924	2225649.817	340-937	6/28/2021	-36	<Null>
1549	WM-SC4	1550	WM-SC4/1	WESTMINSTER	Active Large-System Production Well	6024891.234	2228376.544	425-454	6/28/2021	-13	<Null>
1501	WOOD-INLK	1502	WOOD-INLK/1	WOODBRIDGE VILL HOMEOWNER ASSN	Inactive Production Well	6090903.001	2195025.511	370-890	6/28/2021	-33.24	<Null>
2602	YLWD-1	2603	YLWD-1/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6083180.423	2261475.297	90-340	6/24/2021	201.25	<Null>
2600	YLWD-10	2601	YLWD-10/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6082573.916	2261063.226	90-406	6/24/2021	199.95	<Null>
2598	YLWD-12	2599	YLWD-12/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6082579.233	2261460.266	80-498	6/24/2021	194.75	<Null>
18764	YLWD-18	18765	YLWD-18/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6082572.851	2261290.355	250-570	6/24/2021	202	<Null>
19554	YLWD-19	19555	YLWD-19/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6082841.553	2261300.166	280-581	6/24/2021	200.7	<Null>
21243	YLWD-20	21244	YLWD-20/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6083164.301	2258232.562	225-570	6/24/2021	227.32	<Null>
22794	YLWD-21	22795	YLWD-21/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6082500.179	2259535.434	210-510	6/24/2021	211.25	<Null>
2592	YLWD-5	2593	YLWD-5/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6083146.35	2261304.493	90-340	6/24/2021	200.5	<Null>
2596	YLWD-7	2597	YLWD-7/1	YORBA LINDA WATER DISTRICT	Standby Large-System Production Well	6082874.48	2261508.045	137-259	6/24/2021	197.25	<Null>

Wells Used to Develop 2021 Groundwater Contour Maps in Orange County Groundwater Basin

Deep Aquifer Wells (Model Layer 3)

STAID1	WELLNM	STAID	STANAME	OWNERNM	GIS_SYMNM	NAD83_X	NAD83_Y	PERF_ZONE	SHORTDATE	WLELEV	NAD83_X	NAD83_Y
19013	CSF-1	19132	CSF-1/1/WB1/MP6	CA. STATE UNIV., FULLERTON	Multiport Monitoring Well	6064343.084	2270822.497	MP6 (718)	7/6/2021	108.52	6064343.084	2270822.497
8556	F-COYO2	8557	F-COYO2/1	FULLERTON	Inactive Production Well	6040365.852	2271034.694	309-919	6/30/2021	85.12	6040365.852	2271034.694
1387	SNDR-SA	1388	SNDR-SA/1	I & G 4 HUTTON LLC-ASSOC.	Other Active Production Well	6070727.949	2200897.503	930-990	6/30/2021	-71.45	6070727.949	2200897.503
19366	IRWD-110	19367	IRWD-110/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6100371.561	2196315.961	555-1015	<Null>	<Null>	6100371.561	2196315.961
11474	IRWD-3	11475	IRWD-3/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6072630.329	2206528.469	483.53-1249.9	6/23/2021	-64.9	6072630.329	2206528.469
18510	IRWD-C8	18511	IRWD-C8/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6062825.396	2204153.762	1080-1982	<Null>	<Null>	6062825.396	2204153.762
18512	IRWD-C9	18513	IRWD-C9/1	IRVINE RANCH WATER DISTRICT	Active Large-System Production Well	6062422.93	2205055.852	1055-1930	<Null>	<Null>	6062422.93	2205055.852
22065	IRWD-52	22066	IRWD-52/1	IRVINE RANCH WATER DISTRICT	Inactive Production Well	6073545.847	2203710.984	635-1290	6/29/2021	-62.3	6073545.847	2203710.984
1941	TIC-82	1942	TIC-82/1	IRVINE RANCH WATER DISTRICT	Monitoring Well	6090541.059	2199639.983	410-1002	6/29/2021	-8.83	6090541.059	2199639.983
1391	ET-2	1392	ET-2/1	IRVINE RANCH WATER DISTRICT	Other Active Production Well	6090684.562	2199800.983	280-1080	<Null>	<Null>	6090684.562	2199800.983
1389	TIC-106	1390	TIC-106/1	IRVINE RANCH WATER DISTRICT	Other Active Production Well	6084967	2197177.989	405-715	<Null>	<Null>	6084967	2197177.989
15780	MCWD-11	15781	MCWD-11/1	MESA WATER DISTRICT	Active Large-System Production Well	6055237.67	2197733.913	330-1000	7/7/2021	-86.57	6055237.67	2197733.913
2135	MCWD-6	2136	MCWD-6/1	MESA WATER DISTRICT	Active Large-System Production Well	6055652.152	2197722.22	310-1025	<Null>	<Null>	6055652.152	2197722.22
1357	MCAS-6	1358	MCAS-6/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6094225.41	2191657.016	167-222	6/28/2021	76.17	6094225.41	2191657.016
2867	OCWD-CTG1	2871	OCWD-CTG1/4	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6061970.346	2206073.478	1060-1220	6/30/2021	-81.88	6061970.346	2206073.478
2872	OCWD-CTG5	2875	OCWD-CTG5/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062530.714	2206394.591	1040-1120	8/4/2021	-87.56	6062530.714	2206394.591
2876	OCWD-CTK1	2879	OCWD-CTK1/3	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6062486.259	2205158.852	1260-1315	6/30/2021	-83.03	6062486.259	2205158.852
22786	OCWD-MRSH	22854	OCWD-MRSH/1	ORANGE COUNTY WATER DISTRICT	Monitoring Well	6074220	2188672.3	199-219	6/29/2021	-28.15	6074220	2188672.3
547	AMD-1	21142	AMD-1/1/WB2/MP10	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6073916.932	2258572.091	MP10 (1394)	6/21/2021	139.96	6073916.932	2258572.091
565	AMD-2	22211	AMD-2/1/WB2/MP10	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6066705.21	2254540.618	MP10 (1444)	6/29/2021	104.23	6066705.21	2254540.618
7031	AMD-4	7111	AMD-4/1/WB1/MP11	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6050716.117	2255097.562	MP11 (1409)	6/28/2021	60.28	6050716.117	2255097.562
7295	AMD-5	7324	AMD-5/1/WB1/MP11	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6060070.244	2248962.576	MP11 (1324)	6/28/2021	82.65	6060070.244	2248962.576
8596	AMD-7	8761	AMD-7/1/WB1/MP14	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6049188.026	2247218.215	MP14 (1424)	6/28/2021	30.68	6049188.026	2247218.215
9682	AMD-8	9916	AMD-8/1/WB1/MP15	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6033488.697	2249624.328	MP15 (2014)	7/12/2021	-13.155	6033488.697	2249624.328
9831	BPM-1	9993	BPM-1/1/WB1/MP14	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6022348.508	2259541.566	MP14 (2109)	7/12/2021	-25.24	6022348.508	2259541.566
9832	BPM-2	10188	BPM-2/1/WB1/MP15	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6025195.413	2246739.597	MP15 (2173)	7/12/2021	-23.16	6025195.413	2246739.597
685	CB-1	8794	CB-1/1/WB2/MP9	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6044695.232	2253837.186	MP9 (1463)	7/6/2021	29.14	6044695.232	2253837.186
5155	COSM-1	7156	COSM-1/1/WB1/MP14	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6055253.401	2197825.036	MP14 (1599)	6/30/2021	-77.7	6055253.401	2197825.036
719	FFS-1	14248	FFS-1/1/WB2/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6061436.461	2262022.62	MP8 (1420)	7/6/2021	88.03	6061436.461	2262022.62
1291	FVM-1	15700	FVM-1/1/WB2/MP17	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6047178.815	2210990.613	MP17 (1587)	6/22/2021	-29.3	6047178.815	2210990.613
7297	GGM-1	10033	GGM-1/1/WB1/MP13	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6045688.299	2230864.24	MP13 (2011)	7/8/2021	-13.6	6045688.299	2230864.24
8923	GGM-2	9057	GGM-2/1/WB1/MP13	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6026525.607	2230233.156	MP13 (1994)	6/22/2021	-15.01	6026525.607	2230233.156
7178	HBM-1	8443	HBM-1/1/WB1/MP11	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6031700.722	2216385.252	MP11 (1464)	7/2/2021	-25.08	6031700.722	2216385.252
720	IDM-1	18984	IDM-1/1/WB2/MP9	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6099572.243	2207081.537	MP9 (993)	7/7/2021	-10.34	6099572.243	2207081.537
9830	IDM-2	10066	IDM-2/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6080705.598	2209836.046	MP8 (890)	7/7/2021	-53.81	6080705.598	2209836.046
11949	LAM-1	12031	LAM-1/1/WB1/MP12	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6009581.587	2238043.705	MP12 (1613)	6/15/2021	-36.83	6009581.587	2238043.705
758	MCAS-7	11831	MCAS-7/1/WB3/MP6	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6093900.827	2194418.586	MP6 (802)	7/7/2021	21.5	6093900.827	2194418.586
756	SAR-1	9269	SAR-1/1/WB2/MP13	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6070684.206	2250425.314	MP13 (1374)	6/29/2021	85.58	6070684.206	2250425.314
761	SAR-2	11995	SAR-2/1/WB2/MP12	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6069096.008	2245410.807	MP12 (1351)	6/29/2021	74.07	6069096.008	2245410.807
762	SAR-3	9471	SAR-3/1/WB2/MP11	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6066892.02	2238409.284	MP11 (1393)	6/24/2021	58.87	6066892.02	2238409.284
763	SAR-4	14637	SAR-4/1/WB2/MP10	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6065370.966	2233375.154	MP10 (1398)	6/29/2021	-9.56	6065370.966	2233375.154
1289	SAR-5	21226	SAR-5/1/WB3/MP11	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6062597.607	2227874.211	MP11 (1735)	6/30/2021	-15.3	6062597.607	2227874.211
7181	SAR-9	9807	SAR-9/1/WB1/MP12	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6058380.802	2221450.982	MP12 (1724)	6/30/2021	-28.443	6058380.802	2221450.982
9686	SBM-1	9730	SBM-1/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6016566.11	2224523.54	MP8 (1256)	6/15/2021	-28.045	6016566.11	2224523.54
1001	SC-2	6242	SC-2/1/WB2/MP10	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6086489.295	2237887.557	MP10 (664)	<Null>	<Null>	6086489.295	2237887.557
1005	SC-3	8841	SC-3/1/WB2/MP5	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6081074.85	2229940.413	MP5 (1022)	7/1/2021	48.56	6081074.85	2229940.413
2888	SC-4	6300	SC-4/1/WB1/MP8	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6082605.785	2235080.546	MP8 (830)	7/1/2021	44.34	6082605.785	2235080.546
2854	SC-5	6336	SC-5/1/WB1/MP10	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6077454.866	2225543.458	MP10 (1430)	7/1/2021	-27.75	6077454.866	2225543.458
9684	SC-6	9763	SC-6/1/WB1/MP11	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6066813.288	2216032.113	MP11 (1684)	7/7/2021	-50.96	6066813.288	2216032.113
1293	WMM-1	19892	WMM-1/1/WB2/MP16	ORANGE COUNTY WATER DISTRICT	Multiport Monitoring Well	6038251.554	2221751.195	MP16 (1745)	7/8/2021	-23.94	6038251.554	2221751.195
1883	TIC-91	1884	TIC-91/1	PRIVATE	Destroyed and Sealed Well	6075952.042	2204613.252	403-1208	<Null>	<Null>	6075952.042	2204613.252
22391	RAY-MW25	22392	RAY-MW25/1	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6042037.4	2268206.9	449.4-479.8	6/30/2021	30.11	6042037.4	2268206.9
22408	RAY-MW32	22411	RAY-MW32/3	RAYTHEON TECHNOLOGIES CORPORATION	Monitoring Well	6039287.583	2267257.657	1070-1100	6/30/2021	26.62	6039287.583	2267257.657
8817	SA-38	8818	SA-38/1	SANTA ANA	Standby Large-System Production Well	6077082.488	2229427.758	400-1270	6/30/2021	27	6077082.488	2229427.758
1873	TIC-93	1874	TIC-93/1	THE IRVINE COMPANY	Destroyed and Sealed Well	6080030.447	2205228.503	400-1120	<Null>	<Null>	6080030.447	2205228.503
1927	TIC-194	1931	TIC-194/1	THE IRVINE COMPANY	Monitoring Well	6085062.044	2200644.721	562-726	6/29/2021	-62.48	6085062.044	2200644.721
3524	TIC-25	3525	TIC-25/1	THE IRVINE COMPANY	Monitoring Well	6082128.447	2194002.252	666-760	6/29/2021	-62.21	6082128.447	2194002.252
1829	TIC-50	1830	TIC-50/1	THE IRVINE COMPANY	Monitoring Well	6089719.969	2212322.221	475-1070	6/29/2021	19.34	6089719.969	2212322.221
958	T-WALN	959	T-WALN/1	TUSTIN	Active Large-System Production Well	6084028.458	2212002.398	397-995	7/2/2021	-40	6084028.458	2212002.398
21187	WRD-SEALBEACH-1	21192	WRD-SEALBEACH-1/5	WATER REPLENISHMENT DISTRICT	Monitoring Well	6002807.228	2229796.158	1020-1040	6/7/2021	-39.7	6002807.228	2229796.158
3518	WOOD-ISLK	3519	WOOD-ISLK/1	WOODBRIDGE VILL HOMEOWNER ASSN	Inactive Production Well	6089676.955	2191898.777	210-800	6/28/2021	26.83	6089676.955	2191898.777

APPENDIX F

WATER SHORTAGE CONTINGENCY PLAN

MesaWater
DISTRICT

2025 Water Shortage Contingency Plan

FINAL DRAFT / May 2026

carollo® in collaboration with CDM Smith and Maddaus Water Management Inc.

2025 Water Shortage Contingency Plan

May 2026 / FINAL DRAFT

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Abbreviations

%	Percent
AF	Acre-Feet
AWSDA	Annual Water Supply and Demand Assessment
BPP	Basin Production Percentage
DDW	Division of Drinking Water
DRA	Drought Risk Assessment
DVL	Diamond Valley Lake
DWR	California Department of Water Resources
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FY	Fiscal Year
GAP	Green Acres Project
GRP	OCWD’s Groundwater Resilience Plan
GSP	Groundwater Sustainability Plan
IAWP	Interim Agricultural Water Program
M&I	Municipal and Industrial
MCL	Maximum Contaminant Level
Mesa Water	Mesa Water District
MET	Metropolitan Water District of Southern California
MG	Million Gallons
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MWDOC	Municipal Water District of Orange County
MWRF	Mesa Water Reliability Facility
NIMS	National Incident Management System
OC Basin	Orange County Groundwater Basin
OCWD	Orange County Water District
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PPT	Parts Per Trillion
Producers	Groundwater Producers
RL	Response Level
SEMS	California Standardized Emergency Management System
Supplier	Urban Water Supplier
SWP	State Water Project
UWMP	Urban Water Management Plan
Water Code	California Water Code

WEROC	Water Emergency Response Organization of Orange County
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM	Water Surplus and Drought Management Plan

SECTION 1 INTRODUCTION AND WSCP OVERVIEW

The Water Shortage Contingency Plan (WSCP) is a strategic planning document designed to prepare for and respond to water shortages. This WSCP complies with California Water Code (Water Code) Section 10632, which requires that every Urban Water Supplier (Supplier) shall prepare and adopt a WSCP as part of its Urban Water Management Plan (UWMP). This level of detailed planning and preparation is intended to help maintain reliable supplies and reduce the impacts of supply interruptions.

The WSCP is Mesa Water District's (Mesa Water) operating manual that is used to prevent catastrophic service disruptions through proactive, rather than reactive, management. A water shortage, when the water supply available is insufficient to meet the normally expected customer water use at a given point in time, may occur due to a number of reasons, such as drought, climate change, and catastrophic events. This plan provides a structured guide for Mesa Water to deal with water shortages, incorporating prescriptive information and standardized action levels, along with implementation actions in the event of a catastrophic supply interruption. This way, if and when shortage conditions arise, Mesa Water's governing body, its staff, and the public can easily identify and efficiently implement pre-determined steps to manage a water shortage. A well-structured WSCP allows real-time water supply availability assessment and structured steps designed to respond to actual conditions, enabling efficient management of any shortage with predictability and accountability.

The WSCP also describes Mesa Water's procedures for conducting an Annual Water Supply and Demand Assessment (AWSDA) that is required by Water Code Section 10632.1 and is to be submitted to the California Department of Water Resources (DWR) on or before July 1 of each year, or within 14 days of receiving final allocations from the State Water Project (SWP), whichever is later. Mesa Water's 2025 WSCP is included as an appendix to its 2025 UWMP which will be submitted to DWR by July 1, 2026. However, while developed in conjunction with the UWMP, this WSCP is a standalone document and can be amended, as needed, without amending the UWMP. Furthermore, the Water Code does not prohibit a Supplier from taking actions not specified in its WSCP, if needed, without having to formally amend its UWMP or WSCP.

1.1 Water Shortage Contingency Plan Requirements and Organization

The WSCP provides the steps and water shortage response actions to be taken in times of water shortage conditions. The WSCP has prescriptive elements, such as an analysis of water supply reliability; the water shortage response actions for each of the six standard water shortage levels that correspond to water shortage percentages ranging from 10 percent (%) to greater than 50%; an estimate of potential to close supply gap for each measure; protocols and procedures to communicate identified actions for any current or predicted water shortage conditions; procedures for an AWSDA; monitoring and reporting requirements to determine customer compliance; and reevaluation and improvement procedures for evaluating the WSCP.

This WSCP is organized into three main sections, with Section 3 aligned with Water Code Section 16032 requirements:

- **Section 1 Introduction and WSCP Overview** gives an overview of the WSCP fundamentals.
- **Section 2 Background Information** provides a background on Mesa Water's water service area.
- **Section 3 Water Shortage Contingency Preparedness and Response Planning.**
  - **Section 3.1 Water Supply Reliability Analysis** provides a summary of the water supply analysis and water reliability findings from the 2025 UWMP.
  - **Section 3.2 Annual Water Supply and Demand Assessment Procedures** provides a description of procedures to conduct and approve the AWSDA.
  - **Section 3.3 Six Standard Water Shortage Stages** explains the WSCP's six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50% shortages.
  - **Section 3.4 Shortage Response Actions** describes the WSCP's shortage response actions that align with the defined shortage levels.
  - **Section 3.5 Communication Protocols** addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding any current or predicted shortages and any resulting shortage response actions.
  - **Section 3.6 Compliance and Enforcement** describes customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions.
  - **Section 3.7 Legal Authorities** describes the legal authorities that enable Mesa Water to implement and enforce its shortage response actions.
  - **Section 3.8 Financial Consequences of the WSCP** provides a description of the financial consequences of and responses for drought conditions.
  - **Section 3.9 Monitoring and Reporting** describes 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.
  - **Section 3.10 WSCP Refinement Procedures** addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP.
  - **Section 3.11 Special Water Feature Distinction** provides a required definition for inclusion in a WSCP per the Water Code.
  - **Section 3.12 Plan Adoption, Submittal, and Availability** describes the process Mesa Water followed to adopt its WSCP.

1.2 Integration with Other Planning Efforts

As a retail water supplier in Orange County, Mesa Water considered other key entities in the development of this WSCP, including the Municipal Water District of Orange County (MWDOC) (regional wholesale supplier), the Metropolitan Water District of Southern California (MET) (regional wholesaler for Southern California and the direct supplier of imported water to MWDOC), and Orange County Water District (OCWD) (Orange County Groundwater Basin manager and provider of recycled water in North Orange County). As a MWDOC member agency, Mesa Water also developed this WSCP with input from several coordination efforts led by MWDOC.

Some of the key planning and reporting documents that were used to develop this WSCP are:

- **MWDOC's 2025 UWMP** provides the basis for the projections of the imported supply availability over the next 25 years for the District's service area.
- **MWDOC's 2025 WSCP** provides a water supply availability assessment and structured steps designed to respond to actual conditions that will help maintain reliable supplies and reduce the impacts of supply interruptions.
- **MWDOC's 2023 Orange County Water Reliability Study** is a planning document to help guide planning for future water supply reliability for water providers in Orange County and provide input on regional water supply issues for MET.
- **2025 Orange County Water Demand Projection Model Technical Memorandum** is a collaborative effort amongst MWDOC, OCWD, and all retail water suppliers in Orange County that developed water demand projections to produce regionally consistent forecasts across all Orange County water agencies.
- **OCWD's 2025 Groundwater Resilience Plan (GRP)** is an adaptive strategies management plan outlining strategic projects to secure reliable future water supplies in the Orange County Basin.
- **MET's 2025 UWMP** uses assumptions that fall within the plausible futures contemplated in MET's Integrated Water Resources Plan to evaluate MET's future imported water supply reliability.
- **MET's 2025 WSCP** provides a water supply availability assessment and guide for MET's intended actions during water shortage conditions.
- **OCWD's 2023-24 Engineer's Report** provides information on the groundwater conditions, water supply, and basin utilization of the OC Basin.
- **OCWD's 2022 Basin 8-1 Alternative** is an alternative to the Groundwater Sustainability Plan (GSP) for the OC Basin, provides significant information related to sustainable management of the basin in the past and hydrogeology of the basin, including groundwater quality and basin characteristics, and addresses DWR's recommendations to ensure long-term basin sustainability.

SECTION 2 BACKGROUND INFORMATION

Mesa Water is governed by a five-member Board of Directors is located in a community that originated in about 1906. After the Costa Mesa District Merger Law was signed on June 30, 1959, Mesa Water (formerly known as the Costa Mesa County Water District) commenced operations on January 1, 1960 by acquiring the assets and obligations and assumed the responsibility of consolidating the City of Costa Mesa's Water Department, Fairview County Water District, Newport Mesa Irrigation District, and Newport Mesa County Water District.

2.1 Mesa Water Service Area

Mesa Water's water service area covers approximately 16.318 square miles, along the coast of Southern California within the County of Orange and includes most of the City of Costa Mesa, portions of the City of Newport Beach and a small portion of unincorporated Orange County. Mesa Water operates seven wells, including seven clear water wells and two amber wells, two reservoirs with a total storage of 29 million gallons (MG), four metered imported water connections, and 15 emergency interconnections. Mesa Water's distribution system consists of one pressure zone with approximately and manages 328.4-mile of water mains system with approximately 25,032 service connections. A map of Mesa Water's water service area is shown in Figure 1.

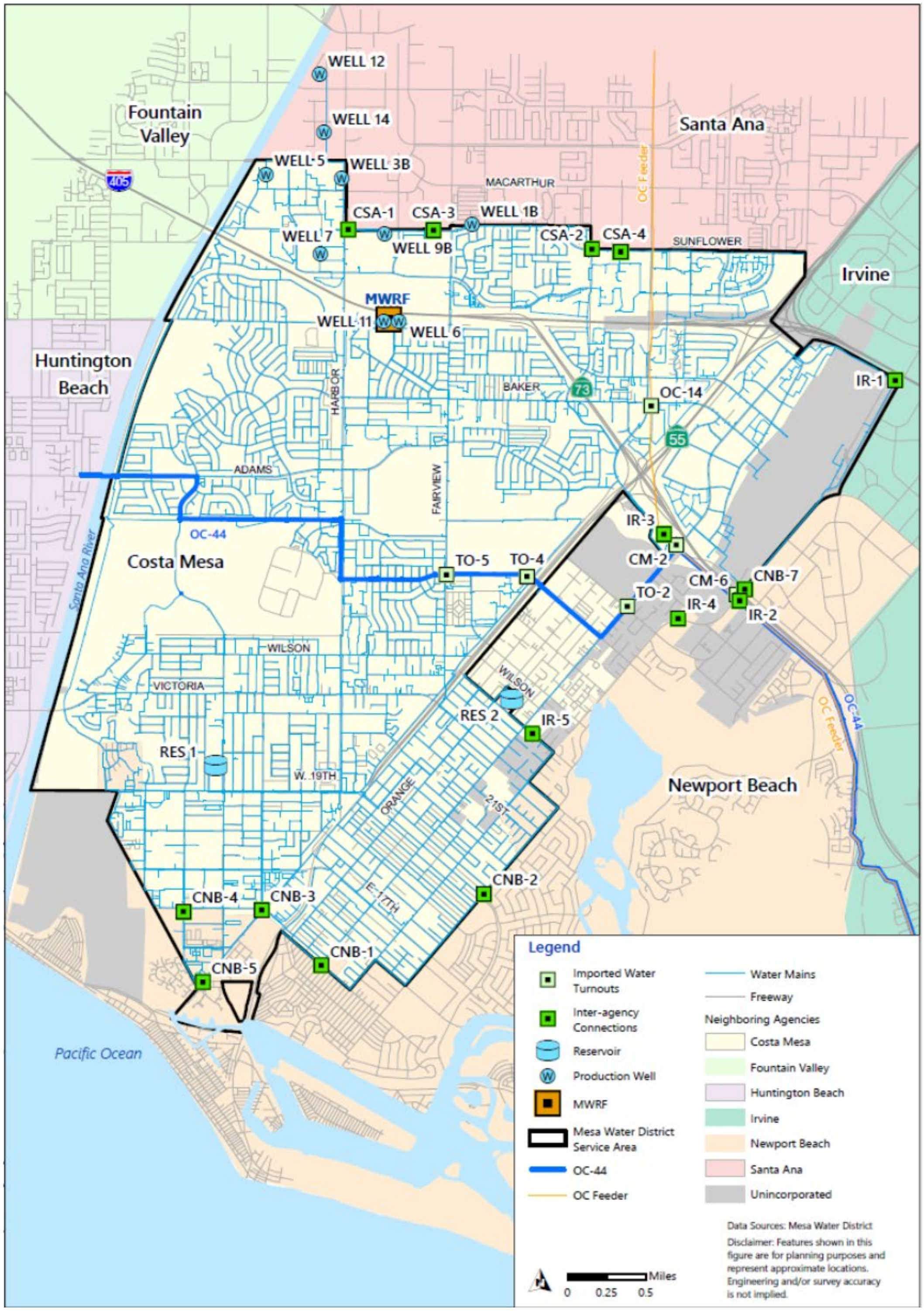


Figure 1 Mesa Water Service Area

Although Mesa Water supplements its water supply portfolio with recycled water, the WSCP only applies to its potable water supply. Mesa Water sells and distributes OCWD Green Acres Project (GAP) water to recycled water customers in its service area, as detailed in Section 6.6 of Mesa Water's 2025 UWMP (Mesa Water, 2026). Mesa Water will determine the recycled water demand reduction actions for recycled water based on the availability of supply and to meet necessary wastewater discharge permit requirements.

2.2 Relationship to Wholesalers

The Metropolitan Water District of Southern California: MET is the largest water wholesaler for domestic and municipal uses in California, serving approximately 19 million customers. MET wholesales imported water supplies to 26 member cities and water districts in six Southern California counties. Its service area covers the Southern California coastal plain, extending approximately 200 miles along the Pacific Ocean from the City of Oxnard in the north to the international boundary with Mexico in the south. This encompasses 5,200 square miles and includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Approximately 85 % of the population from the aforementioned counties reside within MET's boundaries.

MET is governed by a Board of Directors comprised of 38 appointed individuals with a minimum of one representative from each of MET's 26 member agencies. The allocation of directors and voting rights are determined by each agency's assessed valuation. Each member of the Board shall be entitled to cast one vote for each ten million dollars ($10,000,000) of assessed valuation of property taxable for district purposes, in accordance with Section 55 of the Metropolitan Water District Act. Directors can be appointed through the chief executive officer of the member agency or by a majority vote of the governing board of the agency. Directors are not compensated by MET for their service.

MET is responsible for importing water into the region through its operation of the Colorado River Aqueduct and its contract with the State of California for SWP supplies. Member agencies receive water from MET through various delivery points and pay for service through a rate structure made up of volumetric rates, capacity charges and readiness to serve charges. Member agencies provide estimates of imported water demand to MET annually in April regarding the amount of water they anticipate they will need to meet their demands for the next five years.

The Municipal Water District of Orange County: In Orange County, MWDOC and the cities of Anaheim, Fullerton, and Santa Ana are MET member agencies that purchase imported water directly from MET. Furthermore, MWDOC purchases both treated potable and untreated water from MET to supplement its retail agencies' local supplies.

Mesa Water is one of MWDOC's 27 member agencies that has the ability to purchase imported water from MWDOC if needed, however meets all of its demands from groundwater. Mesa Water's location within MWDOC's service area is shown in Figure 2.

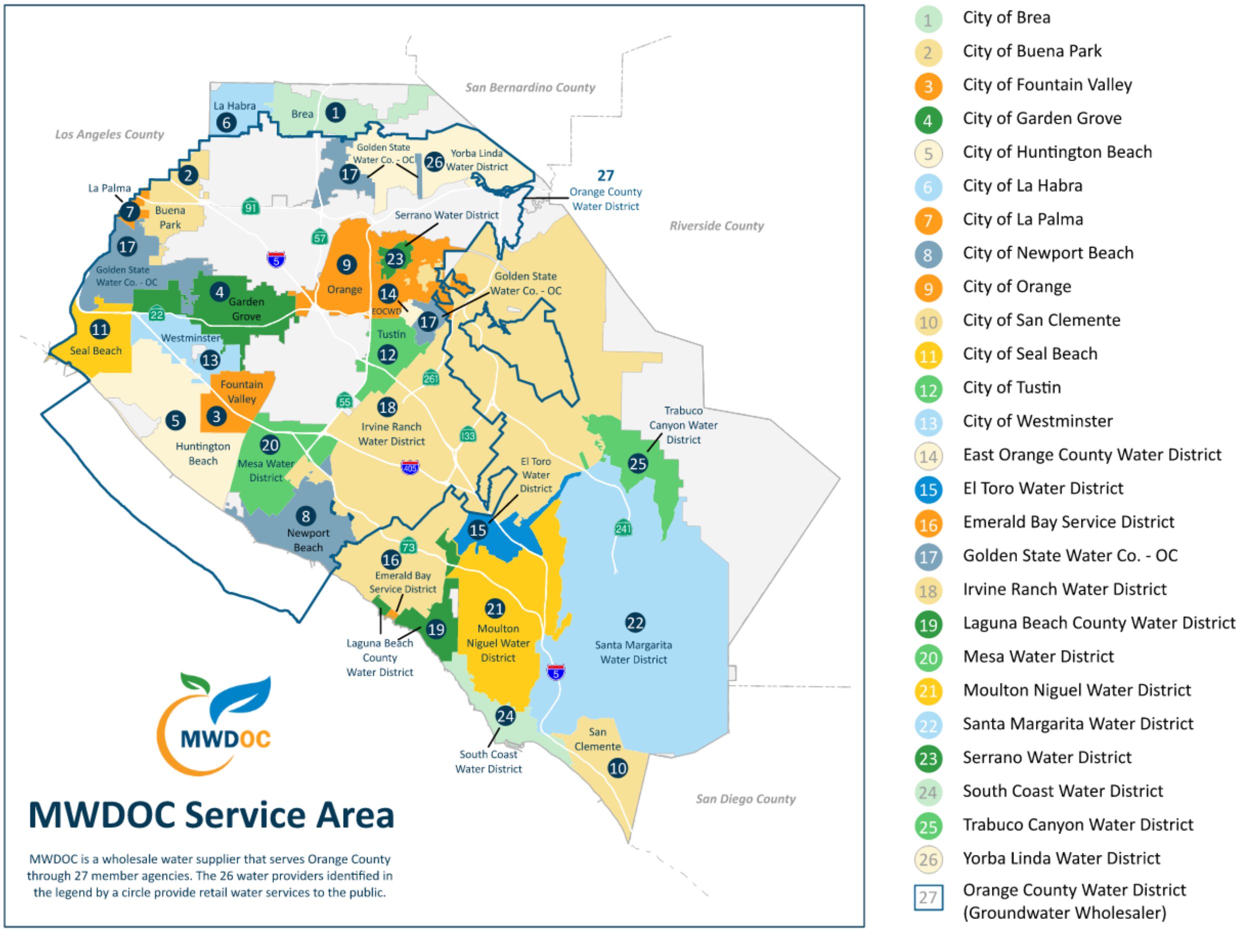


Figure 2 Regional Location of Mesa Water District and Other MWDOC Member Agencies

2.3 Relationship with Wholesaler Water Shortage Planning

The WSCP is designed to be consistent with MET's Water Surplus and Drought Management (WSDM) Plan, MWDOC's Water Supply Allocation Plan (WSAP), and other emergency planning efforts as described below. MWDOC's WSAP is integral to the WSCP's shortage response strategy in the event that MET or MWDOC determines that supply augmentation (including storage) and lesser demand reduction measures would not be sufficient to meet a projected shortage levels needed to meet demands.

2.3.1 MET Water Surplus and Drought Management Plan

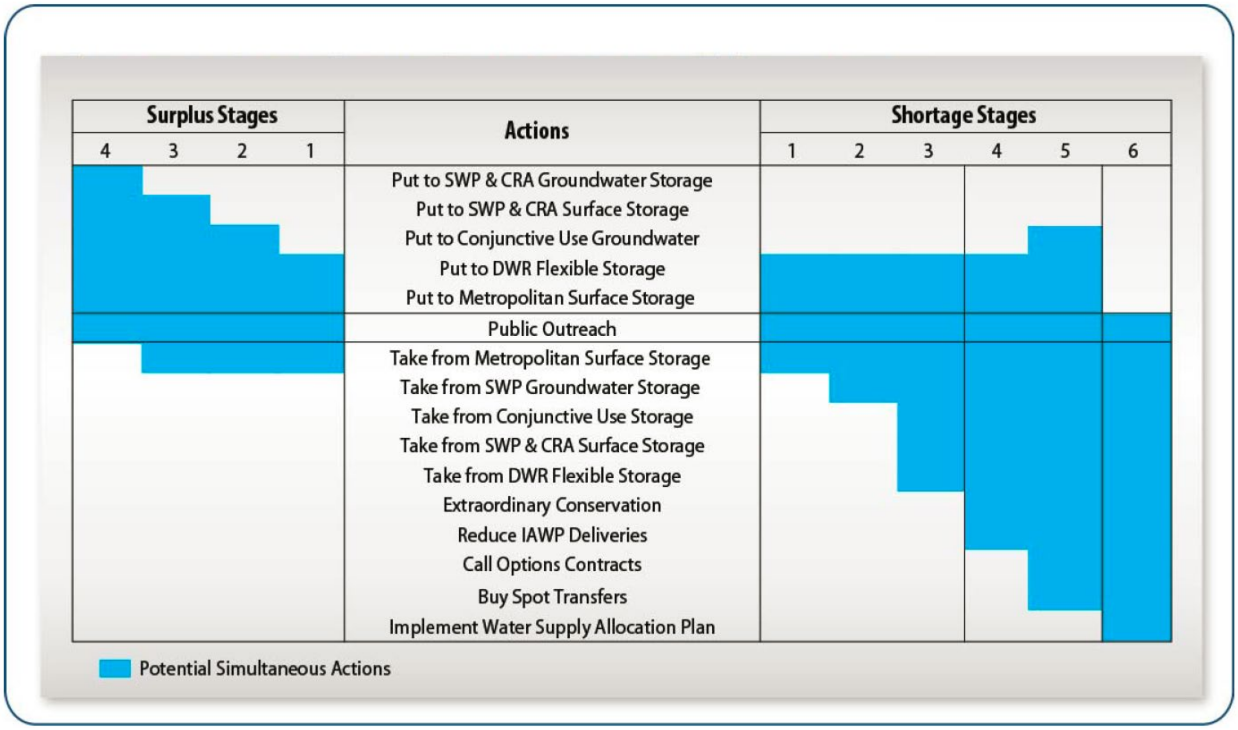
MET evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage annually. Each stage is associated with specific resource management actions to avoid extreme shortages to the extent possible and minimize adverse impacts to retail customers should an extreme shortage occur. The sequencing outlined in the WSDM Plan reflects anticipated responses towards MET's existing and expected resource mix.

Surplus stages occur when net annual deliveries can be made to water storage programs. Under the WSDM Plan, there are four surplus management stages that provides a framework for actions to take for surplus supplies. Deliveries in Diamond Valley Lake (DVL) and in SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage.

The WSDM Plan distinguishes between shortages, severe shortages, and extreme shortages. The differences between each term are listed below:

- **Shortage:** MET can meet full-service demands and partially meet or fully meet interruptible demands using stored water or water transfers as necessary (Stages 1-3).
- **Severe Shortage:** MET can meet full-service demands only by making withdrawals from storage, calling on its water transfers, and possibly calling for extraordinary conservation and reducing deliveries under the Interim Agricultural Water Program (IAWP) (Stages 4-5).
- **Extreme Shortage:** MET must allocate available imported supplies to full-service customers (Stage 6).

There are six shortage management stages to guide resource management activities. These stages are defined by shortfalls in imported supply and water balances in MET's storage programs. When MET must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Figure 3 gives a summary of actions under each surplus and shortage stages when an allocation plan is necessary to enforce mandatory cutbacks. The goal of the WSDM plan is to avoid Stage 6, an extreme shortage (MET, 2026b).



Surplus Stages				Actions	Shortage Stages					
4	3	2	1		1	2	3	4	5	6
■				Put to SWP & CRA Groundwater Storage						
■	■			Put to SWP & CRA Surface Storage						
■	■	■		Put to Conjunctive Use Groundwater					■	
■	■	■	■	Put to DWR Flexible Storage	■	■	■	■	■	
■	■	■	■	Put to Metropolitan Surface Storage	■	■	■	■	■	
■	■	■	■	Public Outreach	■	■	■	■	■	■
	■	■	■	Take from Metropolitan Surface Storage	■	■	■	■	■	■
				Take from SWP Groundwater Storage		■	■	■	■	■
				Take from Conjunctive Use Storage			■	■	■	■
				Take from SWP & CRA Surface Storage			■	■	■	■
				Take from DWR Flexible Storage			■	■	■	■
				Extraordinary Conservation				■	■	■
				Reduce IAWP Deliveries				■	■	■
				Call Options Contracts					■	■
				Buy Spot Transfers					■	■
				Implement Water Supply Allocation Plan						■

■ Potential Simultaneous Actions

Source: MET, 2026.

Figure 3 Resource Stages, Anticipated Actions, and Supply Declarations

MET's Board of Directors adopted a Water Supply Condition Framework in June 2008 to communicate the urgency of the region's water supply situation and the need for further water conservation practices. The framework has four conditions, each calling increasing levels of conservation. Descriptions for each of the four conditions are listed below:

- **Baseline Water Use Efficiency:** Ongoing conservation, outreach, and recycling programs to achieve permanent reductions in water use and build storage reserves.
- **Condition 1 Water Supply Watch:** Local agency voluntary dry-year conservation measures and use of regional storage reserves.
- **Condition 2 Water Supply Alert:** Regional call for cities, counties, member agencies, and retail water agencies to implement extraordinary conservation through drought ordinances and other measures to mitigate use of storage reserves.
- **Condition 3 Water Supply Allocation:** Implement MET's WSAP.

As noted in Condition 3, should supplies become limited to the point where imported water demands cannot be met, MET will allocate water through the WSAP (MET, 2026a).

2.3.2 MET Water Supply Allocation Plan

MET's imported supplies have been impacted by a number of water supply challenges as noted earlier. In case of extreme water shortage within the MET service area is the implementation of its WSAP.

MET's Board of Directors adopted the WSAP in February 2008 to fairly distribute a limited amount of water supply and applies it through a detailed methodology to reflect a range of local conditions and needs of the region's retail water consumers (MET, 2026a).

The WSAP includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation. MET's WSAP is the foundation for the urban water shortage contingency analysis required under Water Code Section 10632 and is part of MET's 2025 UWMP.

MET's WSAP was developed in consideration of the principles and guidelines in MET's 1999 WSDM Plan with the core objective of creating an equitable "needs-based allocation." The WSAP's formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of MET supplies of greater than 50% cutbacks. The formula takes into account a number of factors, such as the impact on retail customers, growth in population, changes in supply conditions, investments in local resources, demand hardening aspects of water conservation savings, recycled water, extraordinary storage and transfer actions, and groundwater imported water needs.

The formula is calculated in three steps: 1) base period calculations, 2) allocation year calculations, and 3) supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations – The first step in calculating a member agency's water supply allocation is to estimate their water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of supply and demand is calculated using data from the two most recent non-shortage years.

Step 2: Allocation Year Calculations – The next step in calculating the member agency's water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population growth and changes in local supplies.

Step 3: Supply Allocation Calculations – The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2.

In order to implement the WSAP, MET's Board of Directors makes a determination on the level of the regional shortage, based on specific criteria, typically in April. The criteria used by MET includes current levels of storage, estimated water supplies conditions, and projected imported water demands. The allocations, if deemed necessary, go into effect in July of the same year and remain in effect for a 12-month period. The schedule is made at the discretion of the Board of Directors (MET, 2026b).

As demonstrated by the findings in MET's 2025 UWMP both the Water Reliability Assessment and the Drought Risk Assessment (DRA) demonstrate that MET is projecting to be able to mitigate the challenges posed by hydrologic variability, potential climate change, and regulatory risk on its imported supply sources through the significant storage capabilities it has developed over the last two decades, both dry-year and emergency storage (MET, 2026b).

Although MET's 2025 UWMP forecasts that MET will be able to meet projected imported demands throughout the projected period from 2026 to 2050, uncertainty in supply conditions can result in MET needing to implement its WSAP to preserve dry-year storage and curtail demands (MET, 2026b).

2.3.3 MWDOC Water Supply Allocation Plan

To prepare for the potential allocation of imported water supplies from MET, MWDOC worked collaboratively with its 27 retail agencies to develop its own WSAP that was adopted in January 2009 and amended in 2016. The MWDOC WSAP outlines how MWDOC will determine and implement each of its retail agency's allocation during a time of shortage.

The MWDOC WSAP uses a similar method and approach, when reasonable, as that of the MET's WSAP. However, MWDOC's plan remains flexible to use an alternative approach when MET's method produces a significant unintended result for the member agencies. The MWDOC WSAP model follows five basic steps to determine a retail agency's imported supply allocation:

Step 1: Determine Baseline Information – The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the last two non-shortage years.

Step 2: Establish Allocation Year Information – In this step, the model adjusts for each retail agency's water need in the allocation year. This is done by adjusting the base period estimates for increased retail water demand based on population growth and changes in local supplies.

Step 3: Calculate Initial Minimum Allocation Based on MET's Declared Shortage Level – This step sets the initial water supply allocation for each retail agency. After a regional shortage level is established, MWDOC will calculate the initial allocation as a percentage of adjusted base period imported water needs within the model for each retail agency.

Step 4: Apply Allocation Adjustments and Credits in the Areas of Retail Impacts and Conservation – In this step, the model assigns additional water to address disparate impacts at the retail level caused by an across-the-board cut of imported supplies. It also applies a conservation credit given to those agencies that have achieved additional water savings at the retail level as a result of successful implementation of water conservation devices, programs, and rate structures.

Step 5: Sum Total Allocations and Determine Retail Reliability – This is the final step in calculating a retail agency's total allocation for imported supplies. The model sums an agency's total imported allocation with all of the adjustments and credits and then calculates each agency's retail reliability compared to its Allocation Year Retail Demand.

The MWDOC WSAP includes additional measures for plan implementation, including the following (MWDOC, 2016):

- **Appeal Process –** An appeals process to provide retail agencies the opportunity to request a change to their allocation based on new or corrected information. MWDOC anticipates that under most circumstances, a retail agency's appeal will be the basis for an appeal to MET by MWDOC.
- **Melded Allocation Surcharge Structure –** At the end of the allocation year, MWDOC would only charge an allocation surcharge to each retail agency that exceeded their allocation if MWDOC exceeds its total allocation and is required to pay a surcharge to MET. MET enforces allocations to retail agencies through an allocation surcharge to a retail agency that exceeds its total annual allocation at the end of the 12-month allocation period. MWDOC's surcharge would be assessed according to the retail agency's prorated share (acre-feet [AF] over usage) of MWDOC amount with MET. Surcharge funds collected by MET will be invested in its Water Management Fund, which is used to in part to fund expenditures in dry-year conservation and local resource development.
- **Tracking and Reporting Water Usage –** MWDOC will provide each retail agency with water use monthly reports that will compare each retail agency's current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.
- **Timeline and Option to Revisit the Plan –** The allocation period will cover 12 consecutive months, and the Regional Shortage Level will be set for the entire allocation period. MWDOC only anticipates calling for allocation when MET declares a shortage; and no later than 30 days from MET's declaration will MWDOC announce allocation to its retail agencies.

SECTION 3 WATER SHORTAGE CONTINGENCY PREPAREDNESS AND RESPONSE PLANNING

Mesa Water's WSCP is a detailed guide of how Mesa Water intends to act in the case of an actual water shortage condition. The WSCP anticipates a water supply shortage and provides pre-planned guidance for managing and mitigating a shortage. Regardless of the reason for the shortage, the WSCP is based on adequate details of demand reduction and supply augmentation measures that are structured to match varying degrees of shortage to ensure the relevant stakeholders understand what to expect during a water shortage situation.

3.1 Water Supply Reliability Analysis

Per Water Code Section 10632 (a)(1), the WSCP shall provide an analysis of water supply reliability conducted pursuant to Water Code Section 10635, and the key issues that may create a shortage condition when looking at Mesa Water's water asset portfolio.

Understanding water supply reliability, factors that could contribute to water supply constraints, availability of alternative supplies, and what effect these have on meeting customer demands provides Mesa Water with a solid basis on which to develop appropriate and feasible response actions in the event of a water shortage. For the 2025 UWMP, Mesa Water worked collaboratively with MWDOC, OCWD, and MWDOC's other retail water agencies to produce long-term projected water use over the next 25 years, in five-year increments, for each agency (MWDOC, 2025).

Mesa Water also conducted a DRA to evaluate a drought period that lasts five consecutive water years starting from the year following when the assessment is conducted (2026-2030). An analysis of both assessments determined that Mesa Water is capable of meeting all customers' demands from 2025 through 2050 for a normal year, a single dry year, and a drought lasting five consecutive years. Mesa Water receives the majority of its water supply from groundwater from the OC Basin, as well as supplemental supplies from local recycled water from the OCWD GAP that adds reliability for non-potable water demand.

As a result, there is no projected shortage condition due to drought that will trigger customer demand reduction actions unless Mesa Water exceeds its pumping capacity and until MWDOC notifies Mesa Water of insufficient imported supplies for supply augmentation in an emergency situation. More information is available in Mesa Water's 2025 UWMP Section 6 and 7 (Mesa Water, 2026).

3.2 Annual Water Supply and Demand Assessment Procedures

Per Water Code Section 10632.1, Mesa Water will conduct an AWSDA pursuant to subdivision (a) of Section 10632 and by July 1st of each year, beginning in 2022, submit an AWSDA with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the Supplier's WSCP.

Mesa Water must include in its WSCP the procedures used for conducting an AWSDA. The AWSDA is a determination of the near-term outlook for supplies and demands and how a perceived shortage may relate to WSCP shortage stage response actions in the current calendar year. This determination is based on information available to Mesa Water at the time of the analysis. Starting in 2022, the AWSDA is due by July 1 of every year.

This section documents the decision-making process required for formal approval of Mesa Water's AWSDA determination of water supply reliability each year and the key data inputs and the methodologies used to evaluate the water system reliability for the coming year, while considering that the year to follow would be considered dry.

3.2.1 Decision-Making Process

The following decision-making process describes the functional steps that Mesa Water will take to formally approve the AWSDA determination of water supply reliability each year.

3.2.1.1 Mesa Water Steps to Approve the AWSDA Determination

The AWSDA will be predicated on the OCWD Basin Production Percentage (BPP) and on MWDOC's AWSDA outcomes.

Mesa Water produces local groundwater from the OC Basin managed by OCWD. The OC Basin is not adjudicated and as such, pumping from the OC Basin is managed through a process that uses financial incentives to encourage Groundwater Producers (Producers) to pump a sustainable amount of water. The framework for the financial incentives is based on establishing the BPP, the percentage of each Producer's total water supply that comes from groundwater pumped from the OC Basin primary aquifer. The BPP is set uniformly for all Producers by the OCWD Board of Directors on an annual basis. Based on the projected water demand and modeled water supply, over the long-term, OCWD anticipates sustainably supporting a BPP of 85 %; however, volumes of groundwater and imported water may vary depending on OCWD's actual BPP projections. A supply reduction that may result from the annual BPP projection will be included in the AWSDA.

Mesa Water pumps from the OCWD primary aquifer to OCWD's allowable BPP. Mesa Water pumps from the lower amber-tinted aquifer to meet the remainder of its potable water demands. The amber-tinted water is treated at the Mesa Water Reliability Facility (MWRF) to remove color and odor. While Mesa Water has the ability to purchase imported water from MWDOC, Mesa Water has not needed to purchase imported water in the recent past. MWDOC surveys its member agencies annually for anticipated water demands and supplies for the upcoming year. MWDOC utilizes this information to plan for the anticipated imported water supplies for the MWDOC service area. This information is then shared and coordinated with MET and is incorporated into their analysis of their service area's annual imported water needs. Based on the year's supply conditions and WSDM actions, MET will present a completed AWSDA for its member agencies' review from which they will then seek Board approval in April of each year. Additionally, MET expects that any triggers or specific shortage response actions that result from the AWSDA will be approved by their Board at that time. Based upon MET's Assessment and taking into consideration information provided to MWDOC through the annual survey, MWDOC will provide an anticipated estimate of imported supplies for Mesa Water to incorporate into the AWSDA.

The Water District designee, will be responsible for approving the AWSDA in years when no shortage is identified and submitted to DWR by July 1. In years where a shortage is identified, the AWSDA will be presented to Board of Directors and submitted to DWR prior to the July 1 deadline.

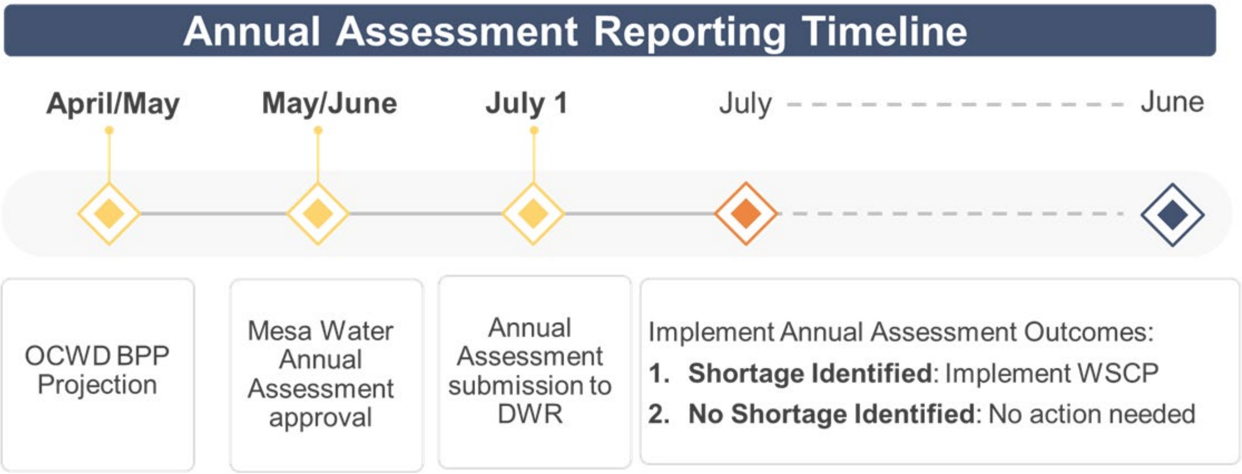


Figure 4 AWSDA Reporting Timeline

3.2.2 Data and Methodologies

The following paragraphs document the key data inputs and methodologies that are used to evaluate the water system reliability for the coming year, while considering that the year to follow would be considered dry.

3.2.2.1 Assessment Methodology

Mesa Water will evaluate water supply reliability for the current year and one dry year for the purpose of the AWSDA. The AWSDA determination will be based on considerations of unconstrained water demand, local water supplies, MWDOC imported water supplies, planned water use, and infrastructure considerations. The balance between projected in-service area supplies, coupled with MWDOC imported supplies, and anticipated unconstrained demand will be used to determine what, if any, shortage level is expected under the WSCP framework as presented in Figure 5. The WSCP's standard shortage levels are defined in terms of shortage percentages. Shortage percentages will be calculated by dividing the difference between water supplies and unconstrained demand by total unconstrained demand. This calculation will be performed separately for anticipated current year conditions and for assumed dry year conditions.

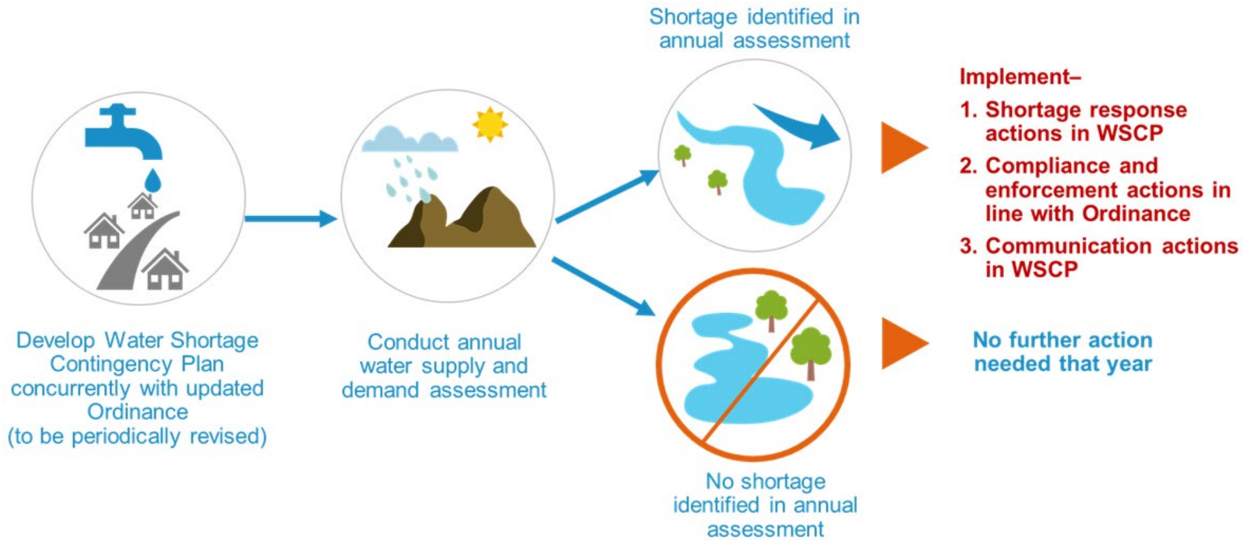


Figure 5 Water Shortage Contingency Plan AWSDA Framework

3.2.2.2 Locally Applicable Evaluation Criteria

Within Orange County, there are no significant local applicable criteria that directly affect reliability. Through the years, the water agencies in Orange County have made tremendous efforts to integrate their systems to provide flexibility to interchange with different sources of supplies. There are emergency agreements in place to ensure all parts of the County have an adequate supply of water. In the northern part of the County, agencies have the ability to meet a majority of their demands through groundwater with very little limitation, except for the OCWD BPP.

Mesa Water will also continue to monitor emerging supply and demand conditions related to supplemental imported water from MWDOC/MET and take appropriate actions consistent with the flexibility and adaptiveness inherent to the WSCP. Mesa Water's AWSDA was based on Mesa Water's service area, water sources, water supply reliability, and water use as described in Water Code Section 10631, including available data from state, regional, or local agency population, land use development, and climate change projections within the service area of Mesa Water. Some conditions that affect MWDOC's wholesale supply and demand, such as groundwater replenishment, surface water and local supply production, can differ significantly from earlier projections throughout the year.

If a major earthquake on the San Andreas Fault occurs, it has the potential to damage all three key regional water aqueducts and disrupt imported supplies for up to six months. The region would likely impose a water use reduction ranging from 25-35% until the system is repaired. However, MET has taken proactive steps to handle such disruption, such as constructing DVL, and prepositioning necessary reconstruction resources to quickly recover from such a seismic event, which mitigates potential impacts. DVL, along with other local reservoirs, can store a six to twelve-month supply of emergency water (MET, 2026a).

3.2.2.3 Water Supply

As detailed in Mesa Water's 2025 UWMP, Mesa Water meets its customers' demands with a combination of local groundwater and recycled water. Mesa Water's main source of water supply is groundwater from the OC Basin, with recycled water making up the rest of Mesa Water's water supply portfolio and imported water from MET through MWDOC available in the event of an emergency. In Fiscal Year (FY) 2024-25, Mesa Water relied on 94% groundwater, 6% recycled water, and 0% imported water. It is projected that by 2050, Mesa Water will continue to be 100% reliable on local supplies, with the water supply shifting to approximately 72% groundwater and 28% recycled water. Mesa Water can purchase MET imported water through MWDOC should the need arise (Mesa Water, 2026).

3.2.2.4 Unconstrained Customer Demand

The WSCP and AWSDA define unconstrained demand as expected water use prior to any projected shortage response actions that may be taken under the WSCP. Unconstrained demand is distinguished from observed demand, which may be constrained by preceding, ongoing, or future actions, such as emergency supply allocations during a multi-year drought. WSCP shortage response actions to constrain demand are inherently extraordinary; routine activities such as ongoing conservation programs and regular operational adjustments are not considered as constraints on demands.

Mesa Water's DRA reveals that its supply capabilities are expected to balance anticipated total water use and supply, assuming a five-year consecutive drought from FY 2025-26 through FY 2029-30 (Mesa Water, 2026). This is based on the water demand projection model, in a single dry year, demand is expected to increase by seven % above a normal year (MWDOC, 2025).

For Mesa Water, the five consecutive dry year demand scenario is based on the demand model's multiple dry year methodology. In accordance with the econometric demand model approach used to develop UWMP demand projections, a single hot/dry year was first identified based on weather conditions that produced the greatest demand response. Consecutive dry years were then represented by applying incremental scaling factors to this single hot/dry year demand to account for the compounding effects of persistent warm and dry conditions over time. These scaling factors show long-term relationships between regional water use and multi-year temperature and precipitation deficits and are applied sequentially to simulate second through fifth consecutive dry years. This approach is consistent with the demand modeling framework summarized in Chapter 7 of Mesa Water's UWMP.

3.2.2.5 Planned Water Use for Current Year Considering Dry Subsequent Year

Water Code Section 10632(a)(2)(B)(ii) requires the AWSDA to determine "current year available supply, considering hydrological and regulatory conditions in the current year and one dry year".

The AWSDA will include two separate estimates of Mesa Water's annual water supply and unconstrained demand using: 1) current year conditions, and 2) assumed dry year conditions. Accordingly, the AWSDA's shortage analysis will present separate sets of findings for the current year and dry year scenarios. The Water Code does not specify the characteristics of a dry year, allowing discretion to the Supplier. Mesa Water will use its discretion to refine and update its assumptions for a dry year scenario in each AWSDA as information becomes available and in accordance with best management practices.

Supply and demand analyses for the single-dry year case were based on conditions affecting the SWP as this supply availability fluctuates the most among MET's, and therefore MWDOC and Mesa Water's, sources of supply. Severe drought conditions in 2021-2022 affected must of the Western United States, including the Colorado River system, which caused its water supply decrease. As conditions worsened, Lake Mead and Lake Powell (the largest storage units in the system), had a combined total storage capacity of 25% in 2022, a significant decrease from 39% in 2021 (MWDOC, 2025).

The Orange County Water Demand Projection Model isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather conditions are reflected as a percentage increase in water demands from the normal year condition. For a single dry year condition (FY 2013-14), the model projects a 7% increase in demand for the OC Basin area where Mesa Water's service area is located (MWDOC, 2025). Detailed information of the model is included in Mesa Water's 2025 UWMP.

Mesa Water has documented that it is 100% reliable for single dry year demands from 2025 through 2050 with a demand increase of 7% from normal demand with significant reserves held by MET, local groundwater supplies, and conservation (Mesa Water, 2026).

3.2.2.6 Infrastructure Considerations

The AWSDA will include consideration of any infrastructure issues that may pertain to near-term water supply reliability, including repairs, construction, and environmental mitigation measures that may temporarily constrain capabilities, as well as any new projects that may add to system capacity. MWDOC closely coordinates with MET and its member agencies, including Mesa Water, on any planned infrastructure work that may impact water supply availability. Throughout each year, MET regularly carries out preventive and corrective maintenance of its facilities within the MWDOC service area that may require shutdowns to inspect and repair pipelines and facilities and support capital improvement projects. These shutdowns involve a high level of planning and coordination between MWDOC, MWDOC's member agencies, and MET to ensure that major portions of the distribution system are not out of service at the same time. Operational flexibility within MET's system and the cooperation of member agencies allow shutdowns to be successfully completed while continuing to meet all system demands.

Specifically for Mesa Water, as of March 2026 there are no foreseen near-term infrastructure issues that would impact supply.

3.2.2.7 Other Factors

For the AWSDA, any known issues related to water quality would be considered for their potential effects on water supply reliability. Mesa Water adheres to the regulatory requirements for groundwater monitoring. As of early 2026, Mesa Water wells are not affected by PFAS and are not part of routine regulatory monitoring for PFAS.

3.3 Six Standard Water Shortage Levels

Per Water Code Section 10632 (a)(3)(A), Mesa Water must include the six standard water shortage levels that represent shortages from the normal reliability as determined in the AWSDA or cross-reference their shortage levels to the standard levels. The shortage levels have been standardized to provide a consistent regional and statewide approach to conveying the relative severity of water supply shortage conditions. This is an outgrowth of the severe statewide drought of 2012-2016, and the widely recognized public communication and state policy uncertainty associated with the many different local definitions of water shortage levels.

The six standard water shortage levels correspond to progressively increasing estimated shortage conditions (up to 10, 20, 30, 40, 50, and greater than 50% shortage compared to the normal reliability condition) and align with the response actions the Supplier would implement to meet the severity of the impending shortages (Table 1).

Table 1 Cross-Reference for Standard vs Supplier Shortage Levels

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:			

3.4 Shortage Response Actions

Water Code Section 10632 (a)(4) requires the WSCP to specify shortage response actions that align with the defined shortage levels. Mesa Water has defined specific shortage response actions that align with the defined shortage levels in DWR Tables 8-2 and 8-3 (Appendix A). These shortage response actions were developed with consideration to the system infrastructure and operations changes, supply augmentation responses, customer-class or water use-specific demand reduction initiatives, and increasingly stringent water use prohibitions.

3.4.1 Supply Augmentation

The supply augmentation actions are described in DWR Table 8-2 (Appendix A). These augmentations represent short-term management objectives triggered by the MET's WSDM Plan and do not overlap with the long-term new water supply development or supply reliability enhancement projects. Supply Augmentation is made available to Mesa Water through MWDOC and MET. Mesa Water relies on MET's reliability portfolio of water supply programs including existing water transfers, storage and exchange agreements to supplement gaps in Mesa Water's supply/demand balance. MET has developed significant storage capacity (over 5 million AF) in reservoirs and groundwater banking programs both within and outside of the Southern California region. Additionally, MET can pursue additional water transfer and exchange programs with other water agencies to help mitigate supply/demand imbalances and provide additional dry-year supply sources.

MWDOC, and in turn its retail agencies, including Mesa Water, have access to supply augmentation actions through MET. MET may exercise these actions based on regional need, and in accordance with their WSCP, and may include the use of supplies and storage programs within the Colorado River, SWP, and in-region storage. Mesa Water has the ability to augment its supply by up to 100% by purchasing additional imported water through MWDOC or pumping additional groundwater in the OC Basin; however, both are subject to rate penalties from MWDOC and OCWD, respectively.

3.4.2 Demand Reduction

The demand reduction measures that would be implemented to address shortage levels are described in DWR Table 8-3 (Appendix A). This table indicates which actions align with specific defined shortage levels and estimates the extent to which the actions will reduce the gap between supplies and demands to deliver the outcomes necessary to meet the requirements of a given shortage level. This table also identifies the enforcement action, if any, associated with each demand reduction measure.

3.4.3 Operational Changes

During shortage conditions, operations may be affected by supply augmentation or demand reduction responses. Mesa Water will consider their operational procedures when it completes its AWSDA or as needed to identify changes that can be implemented to address water shortage on a short-term basis, such as temporarily altering maintenance cycles, deferring planned system outages, and adjusting the flow and routing of water through its system to more effectively distribute available supply across the service area.

3.4.4 Additional Mandatory Restrictions

Water Code Section 10632(a)(4)(D) calls for "additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions" to be included among the WSCP's shortage response actions. Mesa Water will identify additional mandatory restrictions as needed based on the existing Ordinance No. 33, Water Shortage Response Ordinance (Appendix B). Mesa Water intends to update any mandatory restrictions in a subsequently adopted ordinance which will supersede the existing ordinance.

3.4.5 Emergency Response Plan (Hazard Mitigation Plan)

A catastrophic water shortage would be addressed according to the appropriate water shortage level and response actions. It is likely that a catastrophic shortage would immediately trigger Shortage Level 6 and response actions have been put in place to mitigate a catastrophic shortage. In addition, there are several Plans that address catastrophic failures and align with the WSCP, including MET's WSDM and WSAP, the region's Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), and the Water Emergency Response Organization of Orange County (WEROC)'s Emergency Operations Plan (EOP).

3.4.5.1 MET's WSDM and WSAP

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

3.4.5.2 Water Emergency Response Organization of Orange County Emergency Operations Plan

In 1983, the Orange County water community identified a need to develop a plan on how agencies would respond effectively to disasters impacting the regional water distribution system. The collective efforts of these agencies resulted in the formation of WEROC to coordinate emergency response on behalf of all Orange County water and wastewater agencies, develop an emergency plan to respond to disasters, and conduct disaster training exercises for the Orange County water community. WEROC, administered by MWDOC, was established through the creation of an indemnification agreement among its member agencies to protect each other against civil liabilities and to facilitate the exchange of resources. WEROC is unique in its ability to provide a single point of contact for the representation of all water and wastewater utilities in Orange County during a disaster. This representation is to the county, state, and federal disaster coordination agencies. Within the Orange County Operational Area, WEROC is the recognized contact for emergency response for the water community, including Mesa Water.

As a member of WEROC, Mesa Water will follow WEROC's EOP in the event of an emergency and coordinate with WEROC to assess damage, initiate repairs, and request and coordinate mutual aid resources in the event that Mesa Water is unable to provide the level of emergency response support required by the situation.

The EOP defines the actions to be taken by WEROC Emergency Operations Center (EOC) staff to reduce the loss of water and wastewater infrastructure; to respond effectively to a disaster; and to coordinate recovery operations in the aftermath of any emergency involving extensive damage to Orange County water and wastewater utilities. The EOP includes activation notification protocol that will be used to contact partner agencies to inform them of the situation, activation status of the EOC, known damage or impacts, or resource needs. The EOP is a standalone document that is reviewed annually and approved by the MWDOC Board every three years.

WEROC is organized on the basis that each member agency is responsible for developing its own EOP in accordance with the California Standardized Emergency Management System (SEMS), National Incident Management System (NIMS), and Public Health Security and Bioterrorism Preparedness and Response Act of 2002 to meet specific emergency needs within its service area.

The WEROC EOC is responsible for assessing the overall condition and status of the Orange County regional water distribution and wastewater collection systems including MET facilities that serve Orange County. The EOC can be activated during an emergency situation resulting from both natural and man-made causes, and can be activated through automatic, manual, or standby for activation.

WEROC recognizes four primary phases of emergency management, which include:

- **Preparedness:** Planning, training, and exercises that are conducted prior to an emergency to support and enhance response to an emergency or disaster.
- **Response:** Activities and programs designed to address the immediate and short-term effects of the onset of an emergency or disaster that helps to reduce effects on water infrastructure and speed recovery. This includes alert and notification, EOC activation, direction and control, and mutual aid.
- **Recovery:** This phase involved restoring systems to normal, in which short-term recovery actions are taken to assess the damage and return vital life-support systems to minimum operating standards, while long-term recovery actions have the potential to continue for many years.
- **Mitigation/Prevention:** These actions prevent the occurrence of an emergency or reduce the area's vulnerability in ways that minimize the adverse impacts of a disaster or emergency.

The EOC Action Plans provide frameworks for EOC staff to respond to different situations with the objectives and steps required to complete them, which will in turn serve the WEROC member agencies. In the event of an emergency that results in a catastrophic water shortage, Mesa Water will declare a water shortage condition of up to Level 3 for the impacted area depending on the severity of the event, and coordination with WEROC is anticipated to begin at Level 4 or greater (WEROC, 2021).

3.4.5.3 Mesa Water District Emergency Response Plan

Mesa Water will also refer to its current American Water Infrastructure Act Risk and Resilience Assessment and Emergency Response Plan in the event of a catastrophic supply interruption.

3.4.6 Seismic Risk Assessment and Mitigation Plan

Per the Water Code Section 10632.5, Suppliers are required to assess seismic risk to water supplies as part of their WSCP. The plan also must include the mitigation plan for the seismic risk(s). Given the great distances that imported supplies travel to reach Orange County, 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, the infrastructure in place to deliver supplies is susceptible to damage from earthquakes and other disasters.

In lieu of conducting a seismic risk assessment specific to Mesa Water's 2025 UWMP, Mesa Water has included the most recent regional MJHMP, prepared by MWDOC, as required under the federal Disaster Mitigation Act of 2000 (Public Law 106-390).

MWDOC's MJHMP identifies that the overarching goals of the Hazard Mitigation Plan were the same for all of its member agencies, which include:

- Goal 1: Minimize vulnerabilities of critical infrastructure to minimize damages and loss of life and injury to human life caused by hazards.
- Goal 2: Minimize security risks to water and wastewater infrastructure.
- Goal 3: Minimize interruption to water and wastewater utilities.
- Goal 4: Improve public outreach, awareness, education, and preparedness for hazards in order to increase community resilience.
- Goal 5: Eliminate or minimize wastewater spills and overflows.
- Goal 6: Protect water quality and supply, critical aquatic resources, and habitat to ensure a safe water supply.
- Goal 7: Strengthen Emergency Response Services to ensure preparedness, response, and recovery during any major or multi-hazard event (MWDOC, 2024).

MWDOC's MJHMP evaluates hazards applicable to all jurisdictions in its entire planning area, prioritized based on probability, location, maximum probable extent, and secondary impacts. The identification of hazards is highly dependent on the location of facilities within Mesa Water's jurisdiction and takes into consideration the history of the hazard and associated damage, information provided by agencies specializing in a specific hazard, and relies upon Mesa Water's expertise and knowledge.

Earthquake fault rupture and seismic hazards, including ground shaking and liquefaction, are among the highest ranked hazards to the region as a whole because of its long history of earthquakes, with some resulting in considerable damage. A significant earthquake along one of the major faults could cause substantial casualties, extensive damage to infrastructure, fires, damages and outages of water and wastewater facilities, and other threats to life and property.

Nearly all of Orange County is at risk of moderate to extreme ground shaking, with liquefaction possible throughout much of Orange County but the most extensive liquefaction zones occur in coastal areas. Given the region's seismic activity, there is no doubt that communities within Orange County will continue to experience future earthquake events, and it is a reasonable assumption that a major event will occur within a 30-year timeframe.

The mitigation actions identify the hazard, proposed mitigation action, location/facility, local planning mechanism, risk, cost, timeframe, possible funding sources, status, and status rationale, as applicable. Mitigation actions for Mesa Water for seismic risks may include (MWDOC, 2024):

- Evaluate the installation of seismic valves at critical sites.
- Rehabilitation and replacement program for asbestos cement pipe for earthquake protection.
- Use information gained from seismic hazard mapping to assess risk. Mesa Water uses state-produced Seismic Hazard Maps in planning, and will continue to encourage the public to increase its own hazard awareness via MyHazards.
- Secure aboveground assets in all buildings, booster stations, pressure reducing stations, emergency interties, water systems, and pipelines.
- Encourage public and private buildings to be designed with structural bracing, shutters, and laminated glass in window panes to minimize damage (MWDOC, 2024).

3.4.7 Shortage Response Action Effectiveness

For each specific Shortage Response Action identified in the WSCP, the plan also estimates the extent to which that action will reduce the gap between supplies and demands identified in DWR Tables 8-2 and 8-3 (Appendix A). To the extent feasible, Mesa Water has estimated percentage savings for the chosen suite of shortage response actions, which can be anticipated to deliver the expected outcomes necessary to meet the requirements of a given shortage level.

3.5 Communication Protocols

Timely and effective communication is a key element of the WSCP implementation. In the context of water shortage response, the purpose may be an emergency water shortage situation, such as may result from an earthquake, or a longer-term, non-emergency, shortage condition, such as may result from a drought. In an emergency, Mesa Water will activate the communication protocol detailed in the Emergency Response Plan. In a non-emergency water shortage situation, Mesa Water will implement the communication protocols described below.

Per Water Code Section 10632 (a)(5), Mesa Water has established communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments regarding any current or predicted shortages as determined by the AWSDA described pursuant to Section 10632.1; any shortage response actions triggered or anticipated to be triggered by the AWSDA described pursuant to Section 10632.1; and any other relevant communications.

Non-emergency water shortage communication protocols are focused on communicating the water shortage contingency planning actions that can be derived from the results of the AWSDA, and it would likely trigger based upon the decision-making process in Section 3.2. Prior to water shortage level declaration, Mesa Water will pursue outreach to inform customers of water shortage levels and definitions, targeted water savings for each drought stage, guidelines that customers are to follow during each level, and sources of current information on Mesa Water’s supply and demand response status.

The type and degree of communication will vary with each shortage level in order to inform stakeholders of the current water shortage level status and associated shortage response actions, as defined in Section 3.4.1. Predefined communication objectives and tools will ensure Mesa Water’s ability to message necessary events and information to ensure compliance with shortage response actions. These communication objectives and tools are summarized in Table 2.

Mesa Water’s Public Affairs department will lead public information and outreach efforts in close coordination with other MWDOC and MET. Mesa Water will share information and provide guidance to its customers as well as monitor the customer response and attitude toward both voluntary and mandatory customer response guidelines. Mesa Water’s customer outreach is required to successfully achieve targeted water savings during each shortage level.

Table 2 Communication Procedures

Shortage level	Communication Objectives	Communication Tools
1	Compliance with response actions, 10% reduction in water use	Communications at this stage will highlight water efficiency best practices and will include the following communication tools and tactics, but are not limited to: ▪ Information on Mesa Water's website ▪ Information in Mesa Water's newsletter, News on Tap
2	Compliance with response actions, 20% reduction in water use	Communications at this stage will highlight water efficiency best practices and will include the following communication tools and tactics, but are not limited to: ▪ Same as shortage Level 1, in addition to: ▪ Social Media ▪ Educational outreach (via community events or partnerships)
3	Compliance with response actions, 30% reduction in water use	In conjunction with Table 3-1: Water Shortage Contingency Plan Levels, this stage is now a water shortage emergency. Same as shortage Level 1-2, in addition to: ▪ Text and email notification alerts via Mesa Water Notify ▪ Water bill inserts ▪ Direct mail to homes and businesses (postcards or other mailers) ▪ Direct communication with high water users ▪ Press release/ media outreach ▪ Communication coordination with local emergency or water member agencies, including but not limited to WEROC, ACWA, OCWD, MWDOC, for messaging and broader county communications plan ▪ Communication coordination with City of Costa Mesa and other related agencies (Police Dept, Fire Dept, as needed) ▪ Communication coordination with area Hospitals, Newport-Mesa Unified School District, Colleges, Costa Mesa Chamber of Commerce and other key stakeholders and partners
4	Compliance with response actions, 40% reduction in water use	Same as shortage Level 1-3, in addition to: ▪ Radio and/or public service announcements ▪ Increased presence at local events ▪ Publications and handouts

Shortage level	Communication Objectives	Communication Tools
5	Compliance with response actions, 50% reduction in water use	Same as shortage Level 1-4, in addition to: ▪ Neighborhood Canvasing ▪ Neighborhood Meetings or Pop-ups ▪ Advertisements (print and digital) in local publications, key businesses and landmarks ▪ Increased communication coordination with local emergency or water member agencies, including but not limited to WEROC, ACWA, OCWD, MWDOC ▪ Increased communication coordination with City of Costa Mesa and other related agencies (Police Dept, Fire Dept as needed)
6	Compliance with response actions, >50% reduction in water use	Same as shortage Level 1-5, in addition to: ▪ Increased Neighborhood Canvasing ▪ Increased Neighborhood Meetings or Pop-ups

3.6 Compliance and Enforcement

Per the Water Code Section 10632 (a)(6), Mesa Water has defined customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions. Communication procedures to ensure customer compliance are described in Section 3.5 Communication Protocols and customer enforcement, appeal, and exemption procedures are defined in the existing Ordinance No. 33, Water Shortage Response Ordinance (Appendix B). Mesa Water intends to update any enforcement procedures in a subsequently adopted ordinance which will supersede the existing ordinance.

3.7 Legal Authorities

Per Water Code Section 10632 (a)(7)(A), Mesa Water has provided a description of the legal authorities that empower Mesa Water to implement and enforce its shortage response in Ordinance No. 33, Water Shortage Response Ordinance (Appendix B).

Per Water Code Section 10632 (a)(7) (B), Mesa Water shall declare a water shortage emergency condition to prevail within the area whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

Per Water Code Section 10632 (a)(7)(C), Mesa Water shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558). Table 3 identifies the contacts for all cities or counties for which the Supplier provides service in the WSCP, along with developed coordination protocols, can facilitate compliance with this section of the Water Code in the event of a local emergency as defined in subpart (c) of Government Code Section 8558.

Table 3 Agency Contacts and Coordination Protocols

Contact	Agency	Coordination Protocols
Public Works Director	Orange County Public Works Department	Phone/email
City Manager	City of Costa Mesa	Phone/email
City Manager	City of Newport Beach	Phone/email

3.8 Financial Consequences of WSCP

Per Water Code Section 10632(a)(8), Suppliers must include a description of the overall anticipated financial consequences to the Supplier of implementing the WSCP. This description must include potential reductions in revenue and increased expenses associated with implementation of the shortage response actions. This should be coupled with an identification of the anticipated mitigation actions needed to address these financial impacts.

During a catastrophic interruption of water supplies, prolonged drought, or water shortage of any kind, Mesa Water will experience a reduction in revenue due to reduced water sales. Throughout this period of time, expenditures may increase or decrease with varying circumstances. Expenditures may increase in the event of significant damage to the water system, resulting in emergency repairs. Expenditures may also decrease as less water is pumped through the system, resulting in lower power costs. Water shortage mitigation actions will also impact revenues and require additional costs for drought response activities such as increased staff costs for tracking, reporting, and communications.

Mesa Water receives water revenue from a service charge and a commodity charge based on consumption. The service charge recovers costs associated with providing water to the serviced property. The service charge does not vary with consumption, and the commodity charge is based on water usage. Rates have been designed to recover the full cost of water service in the charges. Therefore, the total cost of purchasing water would decrease as the usage or sale of water decreases. In the event of a drought emergency, Mesa Water will impose excessive water use penalties on its customers, which may include additional costs associated with reduced water revenue, staff time taken for penalty enforcement, and advertising the excessive use penalties. The excessive water use penalties are further described in Ordinance No. 33, Water Shortage Contingency Response Ordinance (Appendix B).

However, there are significant fixed costs associated with maintaining a minimal level of service. Mesa Water will monitor projected revenues and expenditures should an extreme shortage and a large reduction in water sales occur for an extended period of time. To overcome these potential revenue losses and/or expenditure impacts, Mesa Water may use reserves. If necessary, Mesa Water may reduce expenditures by delaying implementation of its Capital Improvement Program and equipment purchases to reallocate funds to cover the cost of operations and critical maintenance, adjust the work force, implement a drought surcharge, and/or make adjustments to its water rate structure.

Based on current water rates, a volumetric cutback of 50% and above of water sales may lead to a range of reductions in revenues. The impacts to revenues will depend on a proportionate reduction in variable costs related to supply, pumping, and treatment for the specific shortage event. Mesa Water has reserve funding to mitigate a short-term water shortage situation.

3.9 Monitoring and Reporting

Per Water Code Section 10632(a)(9), Mesa Water is required to provide a description of the monitoring and reporting requirements and procedures that have been implemented to ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

Monitoring and reporting key water use metrics is fundamental to water supply planning and management. Monitoring is also essential in times of water shortage to ensure that the response actions are achieving their intended water use reduction purposes, or if improvements or new actions need to be considered (see Section 3.10). Monitoring for customer compliance tracking is also useful in enforcement actions.

Under normal water supply conditions, potable water production figures are recorded monthly. Monthly reports are prepared and monitored. This data will be used to measure the effectiveness of any water shortage contingency level that may be implemented. Mesa Water has installed endpoints on the meters with the largest use to allow Mesa Water and the customers to see real time water use in 15-minute intervals. This data will facilitate Mesa Water's understanding of the effectiveness of conservation measures. As levels of water shortage are declared by MET and MWDOC, Mesa Water will follow implementation of those levels as appropriate based on Mesa Water's risk profile provided in UWMP Chapter 6 and continue to monitor water demand levels. When MET calls for extraordinary conservation, MET's Drought Program Officer will coordinate public information activities with MWDOC and monitor the effectiveness of ongoing conservation programs.

Mesa Water will participate in monthly member agency manager meetings with both MWDOC and OCWD to monitor and discuss monthly water allocation charts. This will enable Mesa Water to be aware of imported and groundwater use on a timely basis as a result of specific actions taken responding to Mesa Water's WSCP.

3.10 WSCP Refinement Procedures

Per Water Code Section 10632 (a)(10), Mesa Water must provide 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.

Mesa Water's WSCP is prepared and implemented as an adaptive management plan. Mesa Water will use the monitoring and reporting process defined in section 3.9 to refine the WSCP. In addition, if certain procedural refinements or new actions are identified by Mesa Water staff, or suggested by customers or other interested parties, Mesa Water will evaluate their effectiveness, incorporate them into the WSCP, and implement them quickly at the appropriate water shortage level.

It is envisioned that the WSCP will be periodically re-evaluated to ensure that its shortage risk tolerance is adequate and the shortage response actions are effective and up to date based on lessons learned from implementing the WSCP. The WSCP will be revised and updated during the UWMP update cycle to incorporate updated and new information. For example, new supply augmentation actions will be added, and actions that are no longer applicable for reasons such as program expiration will be removed. However, if revisions to the WSCP are warranted before the UWMP is updated, the WSCP will be updated outside of the UWMP update cycle. In the course of preparing the AWSDA each year, Mesa Water staff will consider the functionality of the overall WSCP and will prepare recommendations for Mesa Water's Board of Directors if changes are found to be needed.

3.11 Special Water Feature Distinction

Per Water Code Section 10632 (b), Mesa Water has defined 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, in Ordinance No. 33, Water Shortage Response Ordinance (Appendix B).

3.12 Plan Adoption, Submittal, and Availability

Per Water Code Section 10632 (a)(c), Mesa Water provided notice of the availability of the Public Review Draft 2025 UWMP and 2025 WSCP and notice of the public hearing to consider adoption of the WSCP. The Public Review Drafts of the 2025 UWMP and the 2025 WSCP were posted prominently on Mesa Water's website in advance of the public hearing on June 24, 2026. Copies of the Draft WSCP were also made available for public inspection at Mesa Water's Headquarters and public hearing notifications were published in local newspapers. A copy of the published Notice of Public Hearing is included in Appendix C.

Mesa Water held the public hearing for the Draft 2025 UWMP and Draft WSCP on June 24, 2026, at Mesa Water's Board meeting. Mesa Water's Board reviewed and approved the 2025 UWMP and the WSCP at its June 24, 2026 meeting after the public hearing. See Appendix D for the resolution approving the WSCP.

By July 1, 2026, Mesa Water's adopted 2025 UWMP and WSCP was filed with DWR, California State Library, and the County of Orange. Mesa Water will make the WSCP available for public review on its website no later than 30 days after filing with DWR. Based on DWR's review of the WSCP, Mesa Water will make any amendments to its adopted WSCP, as required and directed by DWR.

If Mesa Water revises its WSCP after UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

SECTION 4 REFERENCES

Mesa Water District (Mesa Water). (2026, July). *2025 Urban Water Management Plan*.

Metropolitan Water District of Southern California (MET). (2026a). 2025 *Water Shortage Contingency Plan*.

Metropolitan Water District of Southern California (MET). (2026b). *2025 Urban Water Management Plan.*

Municipal Water District of Orange County. (2023, July). *2023 Orange County Water Reliability Study.*

Municipal Water District of Orange County. (2024). *Multi-Jurisdictional Hazard Mitigation Plan.*

Municipal Water District of Orange County. (2025, December 30). *Orange County Water Demand Projection Model Technical Memorandum.*

Water Emergency Response Organization of Orange County (WEROC). (2025). *WEROC 2025 Annual Report.*

APPENDIX A DWR SUBMITTAL TABLES

Submittal Table 8-1: Cross-Reference for Standard vs Supplier Shortage Levels

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:			

Submittal Table 8-2: Supply Augmentation and Other Actions

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 through 6	Other Purchases	Percentage	0 - 100%	Additional groundwater pumping in the Orange County Groundwater Basin
1 through 6	Other Purchases	Percentage	0 - 100%	Additional imported water purchases through MWDOC
1 through 6	Other Purchases	Percentage	0 - 100%	Interties with City of Santa Ana, City of Newport Beach, and IRWD
DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.				
NOTES: Additional Imported Water Purchases to meet the supply gap may have financial ramifications per the MET's Water Supply Allocation Plan. Additional Groundwater Pumping in the Orange County Groundwater Basin is subject to OCWD's policies and may be subject to financial ramifications.				

Submittal Table 8-3: Demand Reduction Actions

Submittal Table 8-3 Retail: Demand Reduction Actions Water Code Section 10632(a)(4)(B) 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					
0	Landscape - Prohibit certain types of landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	Watering or irrigation of nonfunctional turf (NFT) on State and local government properties, commercial, industrial and institutional owned landscapes, homeowners' associations common area landscapes, and local government facilities in disadvantaged communities (DAC) is prohibited. See Note 1 below.	No
0	Landscape - Other landscape restriction or prohibition		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Irrigation During Rain Events:** The application of potable water to outdoor landscapes during and up to forty-eight (48) hours after measurable rainfall is prohibited.	Yes
0	Landscape - Prohibit certain types of landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Irrigated Medians:** The use of potable water to irrigate ornamental turf on public street medians is prohibited.	Yes
0	Landscape - Restrict or prohibit runoff from landscape irrigation		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Excessive Water Flow or Runoff:** No person shall cause or allow watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive runoff from the property. Additionally, to the extent prohibited by any Statewide statute, or regulation adopted by any State agency with jurisdiction to adopt such regulations, including, but no limited to, the State Water Resources Control Board, no person shall cause or allow water to flow or runoff their property onto adjacent property, non-irrigated areas, private and public walkways, driveways, roadways, gutters or ditches, parking lots, or structures.	Yes
0	Other - Prohibit use of potable water for washing hard surfaces		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.	Yes
0	Water Features - Restrict water use for decorative water features, such as fountains		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Re-circulating Water Required for Water Fountains and Decorative Water Features:** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.	Yes
0	Other - Require automatic shut of hoses		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device that causes it to cease dispensing water immediately when not in use. This subsection does not apply to any commercial car washing facility.	Yes
0	Other		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Installation of Single Pass Cooling Systems:** Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water District.	Yes
0	CII - Other CII restriction or prohibition		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	Yes
0	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		On-going Long Term-Conservation Savings Measure. Not applicable to Water Shortage Contingency Plan quantifiable savings.	**Commercial Car Wash Systems:** All commercial conveyor car wash systems must utilize re-circulating water systems or must secure a waiver of this requirement from Mesa Water District.	Yes

Submittal Table 8-3 Retail: Demand Reduction Actions **Water Code Section 10632(a)(4)(B) 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)		
1	Landscape - Limit landscape irrigation to specific times	Percentage	5%	**Limits on Watering Hours:** Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.	Yes
1	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of five (5) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within ninety-six (96) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
2	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of four (4) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within seventy-two (72) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
3	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within forty-eight (48) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
3	Water Features - Restrict water use for decorative water features, such as fountains	Percentage	2%	**Limits on Filling Ornamental Fountains, Lakes, and Ponds**: Filling or re-filling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level under this Conservation Program.	Yes
4	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes

Submittal Table 8-3 Retail: Demand Reduction Actions
Water Code Section 10632(a)(4)(B) 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)		
4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Percentage	3%	**Obligation to Fix Leaks, Breaks or Malfunctions**: All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within twenty-four (24) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with Mesa Water District.	Yes
5	Landscape - Limit landscape irrigation to specific days	Percentage	10%	**Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of one (1) day per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
5	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Percentage	3%	**Car Washing at Commercial Facilities Only:** Washing of motor vehicles, trailers, boats, aircraft and other types of mobile equipment shall be done only at a commercial car wash with water recycling facilities. No restrictions apply where the health, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables.	Yes
5	Other water feature or swimming pool restriction	Percentage	2%	**No Initial Filling or Re-Filling of Swimming Pools & Spas:** Filling and Re-Filling of residential swimming pools or outdoor spas with water is prohibited.	Yes
6	Landscape - Prohibit all landscape irrigation	Percentage	10%	**No Watering or Irrigating:** Watering or irrigating of lawn, landscape, or other vegetated area is prohibited. This restriction does not apply to the following categories of use: Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self–closing water shut-off nozzle or device; Maintenance of existing landscape necessary for fire protection; Maintenance of existing landscape for soil erosion control; Maintenance of plant materials identified to be rare or essential to the well-being of protected species. Maintenance of landscape within active public parks and playing fields, day care centers, golf course greens, and school grounds, provided that such irrigation does not exceed a maximum of two (2) days per week according to the schedule established in Section 8(b)(1) and time restrictions in Section 6(a); Actively irrigated environmental mitigation projects.	Yes

DWR NOTES: Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Submittal Table 2-3.

NOTES: Note 1: NFT irrigation requirements begin January 1, 2027 for State and local government properties, January 1, 2028 for commercial, industrial and institutional owned landscapes, January 1, 2029 for homeowners' associations common area landscapes, and January 1, 2031 for local government properties in disadvantaged communities (DAC).

APPENDIX B

ORDINANCE NO. 33, WATER SHORTAGE RESPONSE ORDINANCE

Below is the weblink to the current ordinance (last accessed on April 17, 2026)
https://www.mesawater.org/save-water/conservation-requirements

APPENDIX C

NOTICE OF PUBLIC HEARING (PENDING)

APPENDIX D

ADOPTED WSCP RESOLUTION (PENDING)

APPENDIX G

WATER USE EFFICIENCY IMPLEMENTATION REPORT

Orange County

Water Use Efficiency Programs Savings and Implementation Report

Retrofits and Acre-Feet Water Savings for Program Activity

Program	Program Start Date	Retrofits Installed in	Month Indicated		Current Fiscal Year		Overall Program		
			Interventions	Water Savings	Interventions	Water Savings	Interventions	Annual Water Savings[4]	Cumulative Water Savings[4]
High Efficiency Clothes Washer Program	2002	October-25	82	0.22	350	2.28	131,459	4,312	64,060
High Efficiency Toilet (HET) Program	2005	October-25	17	0.06	65	2.76	62,010	2,292	32,257
Flow Monitoring Devices (FMD) Program	2021	October-25	10	0.04	39	0.37	1,045	52.25	158.24
Commercial Plumbing Fixture Rebate Program	2002	October-25	3	0.05	164	1.07	119,829	5,295	89,451
Water Savings Incentive Program (WSIP)	2006	October-25	0	0.00	1	16.47	51	1,286	11,460
Turf Replacement Program[3]	2010	October-25	5,929	0.07	424,613	15.01	29,979,610	4,049	51,438
Landscape Design Rebate Program (formerly LDAP)	2019	October-25	4	-	15	-	1,181	-	-
Tree Rebate Program	2024	October-25	38	-	200	-	461	-	-
Spray-to-Drip Program[3]	2014	October-25	9,687	0.11	410,712	11.50	5,740,148	779	2,295
Smart Timer Program - Irrigation Timers	2004	October-25	63	0.88	426	16.60	36,100	9,152	96,656
Rotating Nozzles Rebate Program	2007	October-25	103	0.41	297	1.12	586,364	2,891	28,030
Rain Barrels Rebate Program	2013	October-25	2	0.00	8	0.00	9,077	17	162
Recycled Water Retrofit (ORP)	2015	October-25	0	0.00	0	0.00	194	3,901	32,806
Water Smart Landscape Program [1]	1997						12,677	10,621	72,668
Home Water Certification Program	2013						312	7.339	15.266
Synthetic Turf Rebate Program	2007						685,438	96	469
Ultra-Low-Flush-Toilet Programs [2]	1992						363,926	13,452	162,561
Home Water Surveys [2]	1995						11,867	160	1,708
Showerhead Replacements [2]	1991						270,604	1,667	19,083
Total Water Savings All Programs				**2**	**836,890**	**67**	**38,012,352**	**60,029**	**665,276**

(1) Water Smart Landscape Program participation is based on the number of water meters receiving monthly Irrigation Performance Reports.

(2) Cumulative Water Savings Program To Date totals are from a previous Water Use Efficiency Program Effort.

(3) Turf Replacement and Spray-to-Drip Interventions are listed as square feet.

[4] Cumulative & annual water savings represents both active program savings and passive savings that continues to be realized due to plumbing code changes over time.

Prepared by Municipal Water District of Orange County

HIGH EFFICIENCY CLOTHES WASHERS INSTALLED BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	Total	Current FY Water Savings Ac/Ft (Cumulative)	Cumulative Water Savings across all Fiscal Years	15 yr. Lifecycle Savings Ac/Ft
Brea	33	29	25	17	9	2,174	1.54	1,068.10	1,125
Buena Park	36	39	17	11	3	1,803	1.08	828.16	933
East Orange	4	3	4	-	-	214	0.22	111.44	111
El Toro	29	30	34	23	7	1,804	2.11	846.36	933
Fountain Valley	22	26	35	26	5	2,671	2.10	1,375.79	1,382
Garden Grove	69	56	43	33	8	4,092	2.67	1,989.00	2,117
Golden State	97	93	88	43	15	5,834	5.43	2,784.80	3,019
Huntington Beach	83	69	89	59	21	9,075	5.61	4,808.55	4,696
Irvine Ranch	473	373	308	265	75	29,229	18.97	13,273.38	15,124
La Habra	35	31	27	20	6	1,652	1.70	736.32	855
La Palma	10	3	11	6	2	530	0.66	241.21	274
Laguna Beach	17	9	11	13	4	1,065	0.72	557.57	551
Mesa Water	31	30	32	40	10	2,891	1.94	1,462.13	1,496
Moulton Niguel	255	205	191	177	59	12,404	12.01	5,662.74	6,418
Newport Beach	22	27	27	18	2	2,873	1.78	1,557.19	1,487
Orange	49	45	42	26	5	4,342	2.55	2,263.71	2,247
San Clemente	43	34	53	28	12	3,069	3.35	1,519.74	1,588
Santa Margarita	220	212	196	186	38	11,406	11.98	5,311.29	5,902
Seal Beach	7	10	9	3	-	691	0.61	345.43	358
Serrano	3	3	3	4	-	391	0.18	212.22	202
South Coast	24	24	22	11	7	1,795	1.31	922.50	929
Trabuco Canyon	15	19	10	18	2	922	0.66	456.76	477
Tustin	31	33	27	14	2	1,894	1.69	943.74	980
Westminster	40	34	27	30	7	2,948	1.67	1,476.05	1,525
Yorba Linda	52	52	42	26	8	4,176	2.62	2,175.21	2,161
MWDOC Totals	**1,705**	**1,489**	**1,373**	**1,097**	**307**	**111,525**	**85.17**	**53,750.16**	**21,546**
Anaheim	135	147	121	79	23	11,818	7.59	6,491.59	6,115
Fullerton	66	70	51	39	12	4,324	3.34	2,127.38	2,237
Santa Ana	167	104	40	47	8	3,792	2.59	1,690.71	1,962
Non-MWDOC Totals	**368**	**321**	**212**	**165**	**43**	**19,934**	**13.51**	**10,309.68**	**3,851**
Orange County Totals	**2,073**	**1,810**	**1,585**	**1,262**	**350**	**131,459**	**98.68**	**64,059.84**	**25,397**

[1]Totals include hidden rows for agencies that no longer exist

Prepared by the Municipal Water District of Orange County

HIGH EFFICIENCY TOILETS (HETs) INSTALLED BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	Total	Cumulative Water Savings across all Fiscal Years
Brea	0	2	6	2	0	**470**	**214.63**
Buena Park	5	0	114	3	0	**813**	**367.71**
East Orange	0	2	0	0	0	**91**	**43.15**
El Toro	2	1	0	0	0	**2,063**	**1,050.49**
Fountain Valley	1	3	6	1	0	**848**	**457.34**
Garden Grove	1	4	17	4	0	**1,524**	**794.96**
Golden State	3	18	27	12	0	**2,882**	**1,480.89**
Huntington Beach	3	0	3	0	0	**2,928**	**1,443.94**
Irvine Ranch	30	22	21	11	5	**17,508**	**9,741.86**
Laguna Beach	0	0	3	2	0	**403**	**202.75**
La Habra	0	6	1	0	1	**602**	**342.64**
La Palma	0	0	3	1	0	**235**	**115.46**
Mesa Water	0	0	0	2	0	**1,645**	**999.67**
Moulton Niguel	10	7	2	6	3	**5,814**	**2,577.25**
Newport Beach	3	0	1	0	1	**739**	**364.73**
Orange	2	1	24	3	0	**2,234**	**1,079.13**
San Clemente	4	6	2	1	0	**907**	**447.42**
Santa Margarita	18	9	10	4	0	**3,437**	**1,519.23**
Seal Beach	1	0	0	0	0	**858**	**604.21**
Serrano	0	0	0	0	0	**124**	**55.20**
South Coast	4	3	0	5	0	**1,042**	**486.41**
Trabuco Canyon	5	1	4	0	0	**366**	**153.94**
Tustin	0	2	0	3	0	**1,530**	**914.42**
Westminster	0	11	9	3	0	**1,362**	**746.57**
Yorba Linda	0	5	0	0	0	**1,272**	**658.81**
MWDOC Totals	95	103	253	63	10	**52,235**	**27,117.06**
Anaheim	3	33	331	74	52	**6,404**	**3,465.63**
Fullerton	5	11	35	5	3	**1,142**	**547.48**
Santa Ana	5	3	117	66	0	**2,229**	**1,127.05**
Non-MWDOC Totals	13	47	483	145	55	**9,775**	**5,140.16**
Orange County Totals	**108**	**150**	**736**	**208**	**65**	**62,010**	**32,257.22**

[1]Totals include hidden rows for agencies that no longer exist

Prepared by Municipal Water District of Orange County

FLOW MONITORING DEVICES INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	Total Program	Cumulative Water Savings across all Fiscal Years
Brea	2	3	1	3	**1**	**10**	**1.00**
Buena Park	0	0	0	0	**1**	**1**	**0.02**
East Orange	0	0	0	0	**0**	**0**	**-**
El Toro	0	0	0	0	**0**	**0**	**-**
Fountain Valley	1	0	0	2	**0**	**3**	**0.30**
Garden Grove	0	0	0	0	**0**	**0**	**-**
Golden State	375	1	1	0	**0**	**377**	**78.33**
Huntington Beach	0	0	0	6	**0**	**6**	**0.42**
Irvine Ranch	4	3	3	23	**5**	**38**	**2.83**
La Habra	0	0	0	1	**0**	**1**	**0.07**
La Palma	0	0	0	0	**0**	**0**	**-**
Laguna Beach	0	0	0	4	**0**	**4**	**0.32**
Mesa Water	0	1	1	5	**0**	**7**	**0.26**
Moulton Niguel	0	0	0	0	**0**	**0**	**-**
Newport Beach	0	0	1	1	**1**	**3**	**0.17**
Orange	3	7	5	9	**0**	**24**	**2.40**
San Clemente	0	0	0	3	**2**	**5**	**0.13**
Santa Margarita	122	38	129	78	**16**	**383**	**44.67**
Seal Beach	0	3	1	1	**0**	**5**	**0.46**
Serrano	0	1	1	1	**0**	**3**	**0.24**
South Coast	103	2	0	0	**3**	**108**	**21.75**
Trabuco Canyon	0	0	0	0	**0**	**0**	**-**
Tustin	0	0	0	2	**1**	**3**	**0.08**
Westminster	0	0	0	0	**0**	**0**	**-**
Yorba Linda	0	0	1	4	**0**	**5**	**0.22**
MWDOC Totals	**610**	**59**	**144**	**143**	**30**	**986**	**153.65**

Anaheim	0	3	2	6	**6**	**17**	**1.03**
Fullerton	3	12	8	16	**3**	**42**	**3.56**
Santa Ana	0	0	0	0	**0**	**0**	**-**
Non-MWDOC Totals	**3**	**15**	**10**	**22**	**9**	**59**	**4.58**

Orange County Totals	**613**	**74**	**154**	**165**	**39**	**1,045**	**158.24**

COMMERCIAL PLUMBING FIXTURES INSTALLED BY AGENCY[1][2]

through MWDOC and Local Agency Conservation Programs

Agency	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	Totals	Cumulative Water Savings across all Fiscal Years
Brea	0	0	138	0	0	**1,973**	**1,214**
Buena Park	0	0	48	0	164	**2,844**	**2,403**
East Orange CWD RZ	0	0	0	0	0	**0**	**0**
El Toro WD	0	136	0	0	0	**2,652**	**1,397**
Fountain Valley	0	0	0	0	0	**2,165**	**1,424**
Garden Grove	574	0	209	0	0	**3,976**	**3,214**
Golden State WC	0	0	0	0	0	**3,124**	**3,664**
Huntington Beach	235	0	280	0	0	**3,957**	**3,441**
Irvine Ranch WD	2	644	0	0	0	**31,128**	**18,724**
La Habra	0	0	0	0	0	**984**	**1,093**
La Palma	0	0	0	113	0	**788**	**361**
Laguna Beach CWD	0	0	0	0	0	**446**	**589**
Mesa Water	0	251	18	161	0	**4,815**	**4,307**
Moulton Niguel WD	0	414	241	0	0	**7,594**	**3,430**
Newport Beach	0	0	0	3	0	**3,449**	**2,974**
Orange	0	359	151	0	0	**6,915**	**4,174**
San Clemente	0	0	0	0	0	**753**	**747**
Santa Margarita WD	0	212	0	112	0	**2,571**	**949**
Seal Beach	0	0	0	0	0	**816**	**841**
Serrano WD	0	0	0	0	0	**0**	**0**
South Coast WD	0	154	0	0	0	**1,474**	**1,147**
Trabuco Canyon WD	0	0	0	0	0	**11**	**27**
Tustin	0	41	88	0	0	**2,195**	**1,846**
Westminster	0	190	59	0	0	**1,850**	**1,986**
Yorba Linda	1	0	0	0	0	**1,017**	**1,144**
MWDOC Totals	**812**	**2,401**	**1,232**	**389**	**164**	**87,757**	**61,763**
Anaheim	0	648	175	1,194	0	**19,067**	**14,636**
Fullerton	0	331	839	3	0	**4,965**	**3,707**
Santa Ana	72	30	26	600	0	**8,040**	**9,344**
Non-MWDOC Totals	**72**	**1,009**	**1,040**	**1,797**	**0**	**32,072**	**27,688**
Orange County Totals	**884**	**3,410**	**2,272**	**2,186**	**164**	**119,829**	**89,451**

[1] Retrofit devices include ULF Toilets and Urinals, High Efficiency Toilets and Urinals, Multi-Family and Multi-Family 4-Liter HETs, Zero Water Urinals, High Efficiency Clothes Washers, Cooling Tower Conductivity Controllers, Ph Cooling Tower Conductivity Controllers, Flush Valve Retrofit Kits, Pre-rinse Spray heads, Hospital X-Ray Processor Recirculating Systems, Steam Sterilizers, Food Steamers, Water Pressurized Brooms, Laminar Flow Restrictors, and Ice Making Machines.

[2]Totals include hidden rows for agencies that no longer exist

WATER SAVINGS INCENTIVE PROJECTS BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	Totals	Cumulative Water Savings
Brea	0	0	0	0	0	0	0
Buena Park	0	0	0	0	0	2	911
East Orange	0	0	0	0	0	0	0
El Toro	0	0	0	0	0	1	62
Fountain Valley	0	0	0	0	0	1	197
Garden Grove	0	0	0	0	0	2	26
Golden State	0	0	0	0	0	2	379
Huntington Beach	0	0	0	0	0	6	1,893
Irvine Ranch	0	1	10	0	1	24	1,724
La Habra	0	0	0	0	0	1	3
La Palma	0	0	0	0	0	0	0
Laguna Beach	0	0	0	0	0	0	0
Mesa Water	0	0	0	0	0	0	0
Moulton Niguel	0	0	0	0	0	0	0
Newport Beach	0	0	0	1	0	2	229
Orange	0	0	0	0	0	5	1,223
San Clemente	0	0	0	0	0	0	0
Santa Margarita	0	0	0	0	0	0	0
Seal Beach	0	0	0	0	0	0	0
Serrano	0	0	0	0	0	0	0
South Coast	0	0	0	0	0	2	1,148
Trabuco Canyon	0	0	0	0	0	0	0
Tustin	0	0	0	0	0	0	0
Westminster	0	0	0	0	0	1	715
Yorba Linda	0	0	0	0	0	0	0
MWDOC Totals	**0**	**1**	**10**	**1**	**1**	**49**	**8,509**

Anaheim	0	0	0	0	0	0	0
Fullerton	0	0	0	0	0	1	1,587
Santa Ana	0	0	0	0	0	1	1,363
Non-MWDOC Totals	**0**	**0**	**0**	**0**	**0**	**2**	**2,951**

Orange County Totals	**0**	**1**	**10**	**1**	**1**	**51**	**11,460**

[1] Acre feet of savings determined during a one year monitoring period.

If monitoring data is not available, the savings estimated in agreement is used.

TURF REPLACEMENT BY AGENCY[1][2]

through MWDOC and Local Agency Conservation Programs

Agency	FY 21/22		FY 22/23		FY 23/24		FY 24/25		FY 25/26		Total Program		Cumulative Water Savings across all Fiscal Years
	Res.	Comm.	Res.	Comm.	Res.	Comm.	Res.	Comm.	Res.	Comm.	Res	Comm.	
Brea	6,066	0	13,979	6,598	8,997	40,459	930	32,570	1,230	0	**267,328**	**601,425**	**1,704**
Buena Park	3,094	0	14,435	0	9,798	54,144	2,085	71,385	1,112	0	**138,788**	**143,645**	**285**
East Orange	5,000	0	12,116	7,914	2,589	0	0	0	0	0	**67,825**	**7,914**	**126**
El Toro	3,153	2,379	18,364	7,739	8,780	31,396	1,270	43,948	435	0	**180,991**	**667,721**	**1,572**
Fountain Valley	14,031	0	11,871	3,260	11,427	1,394	7,329	7,739	1,343	0	**185,953**	**74,817**	**399**
Garden Grove	1,228	0	16,756	0	17,356	0	3,967	0	0	32,614	**327,228**	**150,017**	**786**
Golden State	0	0	2,614	0	3,716	603	9,977	1,044	3,027	0	**601,236**	**396,514**	**2,092**
Huntington Beach	32,411	19,914	44,842	89,264	29,038	64,199	20,037	72,389	4,407	0	**723,943**	**721,928**	**2,373**
Irvine Ranch	20,397	54,418	72,550	399,559	32,342	332,433	28,573	288,486	6,975	44,002	**1,651,243**	**4,606,441**	**10,864**
La Habra	4,183	3,263	15,254	6,654	13,062	65,496	5,980	0	0	0	**119,162**	**165,432**	**298**
La Palma	0	0	0	0	0	0	0	0	0	0	**15,141**	**59,760**	**207**
Laguna Beach	2,905	0	5,702	0	1,161	0	723	0	0	0	**87,378**	**48,788**	**307**
Mesa Water	29,375	0	34,191	55,661	21,321	97,512	11,922	86,176	1,035	8,804	**549,482**	**592,182**	**1,505**
Moulton Niguel	37,648	115,313	59,372	394,839	29,606	311,146	23,335	128,512	11,919	118,880	**1,928,474**	**4,125,941**	**10,503**
Newport Beach	823	99,613	6,247	24,470	7,118	37,101	3,461	13,099	0	0	**147,127**	**722,282**	**1,458**
Orange	22,783	2,816	50,016	102,170	41,474	8,807	12,794	66,221	8,260	0	**640,919**	**580,790**	**2,184**
San Clemente	6,466	67,354	15,942	156,022	11,950	17,008	1,380	107,624	748	3,652	**458,425**	**889,650**	**2,290**
Santa Margarita	8,694	41,534	44,083	132,194	23,349	65,782	15,718	175,702	2,334	87,539	**1,009,793**	**1,805,341**	**4,979**
Seal Beach	4,226	0	2,901	0	627	13,614	0	4,427	0	0	**47,654**	**38,418**	**123**
Serrano	0	0	7,183	0	0	0	0	0	0	0	**190,123**	**4,403**	**449**
South Coast	1,409	76,798	7,575	85,956	3,937	67,910	3,325	69,866	0	55,315	**352,560**	**949,239**	**2,201**
Trabuco Canyon	6,817	50,000	5,379	106,068	3,459	50,000	2,244	0	1,864	0	**100,720**	**366,313**	**547**
Tustin	21,688	5,698	36,476	0	28,841	16,386	12,632	0	4,958	1,226	**488,951**	**84,639**	**969**
Westminster	4,614	0	8,042	0	10,392	4,932	9,036	14,932	0	0	**148,122**	**78,397**	**374**
Yorba Linda	6,529	10,068	25,784	50,488	15,576	36,482	4,691	57,084	1,646	21,288	**581,139**	**320,813**	**1,566**
MWDOC Totals	**243,540**	**549,168**	**531,674**	**1,628,856**	**335,916**	**1,316,804**	**181,409**	**1,241,204**	**51,293**	**373,320**	**11,375,120**	**18,595,276**	**51,423**
Anaheim	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**-**
Fullerton	0	0	0	0	0	0	0	0	0	0	**0**	**9,214**	**15**
Santa Ana	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**-**
Non-MWDOC Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9,214**	**15**
Orange County Totals	**243,540**	**549,168**	**531,674**	**1,628,856**	**335,916**	**1,316,804**	**181,409**	**1,241,204**	**51,293**	**373,320**	**11,375,120**	**18,604,490**	**51,438**

[1]Installed device numbers are listed as square feet

[2]Totals include hidden rows for agencies that no longer exist

LANDSCAPE DESIGN REBATE PROGRAM BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY21/22		FY22/23		FY23/24		FY24/25		FY25/26		Total Program	
	LDAP	LMAP	LDAP	LMAP	LDAP	LMAP	LDAP	LMAP	LDAP	LMAP	LDAP	LMAP
Brea	3	2	10	2	1	1	0	0	0	0	**20**	**8**
Buena Park	5	1	5	2	1	1	1	0	0	0	**17**	**6**
East Orange	1	1	2	0	0	0	0	0	0	0	**4**	**1**
El Toro	11	0	6	6	4	1	0	0	1	0	**35**	**9**
Fountain Valley	8	4	13	3	5	4	0	0	0	0	**43**	**12**
Garden Grove	6	0	11	2	2	1	1	0	0	0	**20**	**3**
Golden State	0	0	2	1	3	1	1	0	0	0	**6**	**2**
Huntington Beach	38	18	34	19	9	5	3	0	0	0	**130**	**59**
Irvine Ranch	40	8	16	16	4	15	8	0	2	0	**92**	**53**
La Habra	7	0	8	3	0	0	1	0	0	0	**27**	**4**
La Palma	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Laguna Beach	1	0	2	0	0	0	0	0	0	0	**3**	**0**
Mesa Water	14	6	18	11	4	6	0	0	0	0	**63**	**32**
Moulton Niguel	25	5	11	14	1	6	10	0	7	0	**71**	**41**
Newport Beach	3	0	6	2	0	2	1	0	0	0	**13**	**5**
Orange	22	3	22	6	10	6	0	0	2	0	**76**	**20**
San Clemente	4	1	4	1	0	4	0	0	0	0	**13**	**11**
Santa Margarita	11	4	19	12	4	6	5	0	1	0	**71**	**33**
Seal Beach	1	1	3	3	0	1	0	0	0	0	**7**	**9**
Serrano	0	0	0	0	0	0	0	0	0	0	**1**	**0**
South Coast	4	0	2	1	1	2	1	0	0	0	**13**	**5**
Trabuco Canyon	4	0	4	3	0	0	1	0	0	0	**13**	**7**
Tustin	10	3	12	5	2	4	1	0	2	0	**54**	**16**
Westminster	6	1	4	2	1	0	0	0	0	0	**17**	**4**
Yorba Linda	8	1	6	6	0	3	0	0	0	0	**21**	**11**
MWDOC Totals	**232**	**59**	**220**	**120**	**52**	**69**	**34**	**0**	**15**	**0**	**830**	**351**

Anaheim	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**
Fullerton	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**
Santa Ana	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**
Non-MWDOC Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Orange County Totals	**232**	**59**	**220**	**120**	**52**	**69**	**34**	**-**	**15**	**-**	**830**	**351**

Prepared by the Municipal Water District of Orange County

TREE REBATE PROGRAM BY MONTH

through MWDOC and Local Agency Conservation Programs

Month	FY23/24	FY24/25	FY25/26	Total Program
	Trees	Trees	Trees	Trees
July	0	9	36	**45**
August	0	15	60	**75**
September	0	18	44	**62**
October	0	9	22	**31**
November	0	17	38	**55**
December	0	28	0	**28**
January	0	23	0	**23**
February	0	24	0	**24**
March	0	18	0	**18**
April	0	24	0	**24**
May	0	33	0	**33**
June	3	40	0	**43**
Orange County Totals	**3**	**258**	**200**	**461**

Prepared by the Municipal Water District of Orange County

SPRAY-TO-DRIP BY AGENCY[1][2]

through MWDOC and Local Agency Conservation Programs

Agency	FY 21/22		FY 22/23		FY 23/24		FY 24/25		FY 25/26		Total Program		Cumulative Water Savings across all Fiscal Years
	Res.	Comm.	Res.	Comm.	Res.	Comm.	Res.	Comm.	Res.	Comm.	Res	Comm.	
Brea	949	0	9,294	7,830	9,289	29,866	1,097	0	1,361	0	26,114	68,529	**51.25**
Buena Park	354	3,365	2,921	0	4,103	18,548	1,296	12,504	0	0	10,263	38,231	**13.24**
East Orange	5,000	0	6,314	0	0	0	0	0	0	0	11,314	0	**5.17**
El Toro	1,175	0	11,911	7,939	4,185	1,761	0	8,735	3,499	13,831	25,354	101,149	**78.93**
Fountain Valley	10,271	0	2,275	0	7,357	2,506	4,472	6,093	492	0	30,066	29,455	**31.20**
Garden Grove	0	0	0	0	0	0	0	0	0	0	2,125	0	**3.08**
Golden State	0	0	2,905	0	6,812	0	10,057	0	867	0	21,641	0	**6.22**
Huntington Beach	17,600	0	22,073	58,877	16,370	42,300	7,505	98,964	674	0	82,246	214,933	**79.59**
Irvine Ranch	14,046	30,118	50,139	208,019	25,863	432,567	41,127	365,869	16,987	92,888	197,601	1,384,354	**492.74**
La Habra	3,343	1,447	8,236	5,779	11,730	46,659	10,643	0	0	0	36,973	53,885	**24.62**
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
Laguna Beach	2,426	0	4,065	0	1,204	0	0	0	0	0	12,494	0	**8.97**
Mesa Water	13,073	7,972	22,386	49,775	15,877	32,313	5,050	17,021	0	20,132	81,353	139,657	**76.00**
Moulton Niguel	0	66,612	0	144,223	0	258,353	0	103,990	0	74,445	15,125	973,871	**478.88**
Newport Beach	457	49,456	6,573	5,845	6,890	21,725	3,247	0	0	0	20,563	129,270	**88.70**
Orange	6,426	72,290	27,414	28,224	42,171	0	9,702	43,373	5,938	50,000	101,247	207,039	**87.39**
San Clemente	3,135	45,000	7,612	15,368	11,314	45,172	0	12,231	0	0	31,775	126,276	**54.30**
Santa Margarita	655	72,052	32,804	138,469	15,638	18,306	15,903	192,177	628	64,065	131,878	726,424	**443.61**
Seal Beach	0	0	3,509	0	0	3,623	0	16,280	0	0	3,509	19,903	**4.06**
Serrano	0	0	2,183	0	0	0	0	0	0	0	5,487	0	**4.88**
South Coast	0	130,495	10,339	11,560	2,166	2,490	2,653	16,832	0	27,076	22,571	253,609	**129.29**
Trabuco Canyon	0	0	997	0	1,881	0	0	0	2,050	0	6,676	0	**1.91**
Tustin	19,787	5,305	24,575	0	15,977	0	15,884	1,397	1,786	1,977	97,646	14,140	**50.60**
Westminster	0	0	1,557	0	7,383	437	2,014	18,162	0	0	12,737	33,938	**22.84**
Yorba Linda	3,772	15,982	12,413	48,824	11,705	46,606	758	54,499	1,289	30,727	35,839	200,763	**54.35**
MWDOC Totals	**102,469**	**500,094**	**272,495**	**730,732**	**217,915**	**1,003,232**	**131,408**	**968,127**	**35,571**	**375,141**	**1,024,722**	**4,715,426**	2,294.69
Anaheim	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Fullerton	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Santa Ana	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Non-MWDOC Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Orange County Totals	**102,469**	**500,094**	**272,495**	**730,732**	**217,915**	**1,003,232**	**131,408**	**968,127**	**35,571**	**375,141**	**1,024,722**	**4,715,426**	**2,294.69**

[1]Installed device numbers are listed as square feet

[2]Totals include hidden rows for agencies that no longer exist

ROTATING NOZZLES INSTALLED BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY 20/21	FY 21/22			FY 22/23			FY 23/24			FY 24/25			FY 25/26			Total Program			Cumulative Water Savings across all Fiscal Years
	Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	
	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	
Brea	0	0	0	0	47	0	0	15	0	0	0	1,130	0	0	0	0	634	3,879	0	109.84
Buena Park	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	573	173	2,535	1,090.25
East Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	781	0	0	29.82
El Toro	0	0	0	0	0	0	0	0	1,919	0	0	0	0	0	0	0	3,435	48,141	890	2,049.60
Fountain Valley	0	36	0	0	0	0	0	0	0	0	75	0	0	0	0	0	1,030	283	0	38.09
Garden Grove	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	1,117	299	0	52.49
Golden State	0	0	0	0	15	0	0	0	0	0	109	0	0	15	0	0	3,896	11,080	0	476.69
Huntington Beach	0	0	0	0	79	0	0	72	0	0	98	0	0	0	0	0	4,154	12,526	2,681	1,843.84
Irvine Ranch	0	462	0	0	196	0	0	411	195	0	309	0	0	42	0	0	49,708	94,541	2,004	6,851.52
La Habra	0	0	0	0	15	0	0	15	0	0	0	0	0	0	0	0	542	1,236	900	485.01
La Palma	0	0	0	0	15	0	0	18	0	0	0	0	0	0	0	0	122	2,890	0	80.50
Laguna Beach	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,139	2,896	0	518.51
Mesa Water	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	2,137	385	343	265.61
Moulton Niguel	0	300	0	0	131	421	1,270	463	0	0	99	0	0	0	0	0	15,515	20,974	4,215	2,567.99
Newport Beach	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46,723	21,413	0	2,507.21
Orange	0	0	0	0	184	0	0	96	0	0	38	0	0	0	0	0	3,615	1,072	0	173.66
San Clemente	0	80	0	0	0	210	0	0	170	0	0	230	0	20	0	0	10,314	8,148	1,343	1,178.27
Santa Margarita	0	132	0	0	197	0	0	353	495	0	168	0	0	90	0	0	17,618	7,416	611	1,212.58
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155	10,298	0	325.45
Serrano	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,405	0	0	139.43
South Coast	0	0	0	0	69	510	0	0	480	0	0	440	0	0	0	0	8,199	20,300	0	899.76
Trabuco Canyon	0	50	0	0	20	0	0	0	0	0	0	0	0	130	0	0	2,286	5,130	0	247.96
Tustin	0	0	0	0	0	0	0	42	0	0	75	0	0	0	0	0	3,650	1,058	0	182.14
Westminster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	556	0	0	19.87
Yorba Linda	0	95	0	0	16	0	0	63	0	0	0	0	0	0	0	0	6,289	4,359	500	656.84
MWDOC Totals	**0**	**1,155**	**0**	**0**	**1,005**	**1,141**	**1,270**	**1,548**	**3,259**	**0**	**1,046**	**1,800**	**0**	**297**	**0**	**0**	**204,008**	**288,986**	**16,022**	**24,665.22**
Anaheim	0	147	0	0	33	0	0	0	0	0	54	0	0	0	0	0	4,327	49,799	105	2,073.59
Fullerton	0	131	0	0	152	0	0	66	0	0	0	0	0	0	53	0	3,534	11,362	1,484	1,065.03
Santa Ana	0	50	0	0	42	0	0	0	0	0	0	0	0	0	0	0	985	5,752	0	225.86
Non-MWDOC Totals	**0**	**328**	**0**	**0**	**227**	**0**	**0**	**66**	**0**	**0**	**54**	**0**	**0**	**0**	**53**	**0**	**8,846**	**66,913**	**1,589**	**3,364.47**
Orange County Totals	**0**	**1,483**	**0**	**0**	**1,232**	**1,141**	**1,270**	**1,614**	**3,259**	**0**	**1,100**	**1,800**	**0**	**297**	**53**	**0**	**212,854**	**355,899**	**17,611**	**28,029.69**

[1]Totals include hidden rows for agencies that no longer exist

SMART TIMERS INSTALLED BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY21/22		FY22/23		FY23/24		FY24/25		FY25/26		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm.	
Brea	25	4	18	0	18	8	16	0	4	0	357	92	1,003.86
Buena Park	10	2	13	0	39	1	16	0	4	0	195	56	454.27
East Orange	4	0	0	0	10	0	4	0	0	0	56	1	86.37
El Toro	23	1	21	77	18	175	10	178	6	0	305	794	4,218.01
Fountain Valley	24	6	28	0	13	0	24	0	1	0	324	60	554.60
Garden Grove	15	5	28	6	23	1	15	0	6	0	305	55	483.89
Golden State	65	16	63	0	68	2	35	0	10	0	807	231	2,084.63
Huntington Beach	52	18	78	2	72	20	47	8	22	5	864	439	3,182.51
Irvine Ranch	320	104	257	223	319	4	240	87	67	38	5,359	3,175	25,547.63
La Habra	11	1	13	0	7	5	14	1	4	0	153	52	460.42
La Palma	6	0	5	0	8	0	3	0	1	0	65	2	36.29
Laguna Beach	5	2	9	0	10	0	5	1	4	0	575	23	575.95
Mesa Water	18	4	25	14	28	8	11	0	4	0	548	240	1,945.71
Moulton Niguel	381	104	156	38	121	91	72	71	30	15	3,185	1,340	9,404.64
Newport Beach	16	21	9	15	14	16	13	0	1	0	1,163	505	5,146.92
Orange	39	12	47	0	53	16	28	0	16	1	816	250	2,240.71
San Clemente	14	41	29	1	28	19	14	16	8	3	1,289	541	5,310.62
Santa Margarita	184	75	177	12	283	35	244	5	73	29	3,059	1,992	15,163.25
Seal Beach	5	0	3	0	8	0	6	0	1	0	57	87	609.11
Serrano	7	1	10	0	3	0	6	0	3	0	107	3	61.87
South Coast	5	1	11	8	9	1	9	13	6	5	358	252	2,307.32
Trabuco Canyon	17	2	18	0	21	0	11	0	1	0	297	159	1,751.55
Tustin	29	5	41	0	27	0	25	2	6	0	427	88	860.58
Westminster	11	0	17	0	18	0	7	0	2	0	203	44	471.20
Yorba Linda	85	16	64	1	45	7	61	0	16	0	996	235	2,150.89
MWDOC Totals	**1,380**	**446**	**1,140**	**397**	**1,263**	**409**	**936**	**382**	**296**	**96**	**22,185**	**10,861**	**87,530.56**

Anaheim	74	19	83	1	82	0	69	2	18	0	1,066	581	5,461.90
Fullerton	50	17	42	0	59	0	24	13	10	0	660	239	2,111.68
Santa Ana	18	2	15	0	24	6	13	0	6	0	251	257	1,552.14
Non-MWDOC Totals	**142**	**38**	**140**	**1**	**165**	**6**	**106**	**15**	**34**	**0**	**1977**	**1077**	**9,125.71**

Orange County Totals	**1,522**	**484**	**1,280**	**398**	**1,428**	**415**	**1,042**	**397**	**330**	**96**	**24,162**	**11,938**	**96,656**

[1]Totals include hidden rows for agencies that no longer exist

Prepared by the Municipal Water District of Orange County

RAIN BARRELS INSTALLED BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	Total Program	Cumulative Water Savings across all Fiscal Years
Brea	0	2	0	4	0	95	1.66
Buena Park	1	0	2	0	0	201	3.61
East Orange	1	3	0	2	0	50	0.84
El Toro	3	0	2	1	0	125	2.13
Fountain Valley	2	10	5	1	0	421	7.37
Garden Grove	7	8	10	3	0	393	6.79
Golden State	2	19	9	2	0	573	9.91
Huntington Beach	6	14	9	5	1	1,261	23.92
Irvine Ranch	14	18	25	15	2	1,135	19.57
La Habra	1	10	1	1	0	86	1.47
La Palma	2	0	2	0	0	12	0.17
Laguna Beach	5	4	0	0	0	459	9.07
Mesa Water	4	6	3	3	0	384	6.87
Moulton Niguel	10	15	12	2	0	468	8.05
Newport Beach	0	2	1	0	0	78	1.35
Orange	6	5	11	3	1	421	7.36
San Clemente	5	6	4	0	0	189	3.37
Santa Margarita	4	9	4	7	0	389	6.85
Santiago	0	0	0	0	0	0	-
Seal Beach	0	2	0	0	0	73	1.39
Serrano	2	0	0	0	0	42	0.77
South Coast	2	0	0	2	0	188	3.61
Trabuco Canyon	1	3	0	1	0	64	1.13
Tustin	2	8	4	0	0	268	4.70
Westminster	0	7	17	1	0	298	4.61
Yorba Linda	0	8	6	0	3	250	4.40
MWDOC Totals	80	159	127	53	7	8,218	146.53

Anaheim	3	8	5	4	0	340	5.90
Fullerton	0	6	4	4	0	244	4.29
Santa Ana	0	9	5	5	1	274	4.79
Non-MWDOC Totals	3	23	14	13	1	858	14.98

Orange County Totals	83	182	141	66	8	9,076	161.51

[1]Totals include hidden rows for agencies that no longer exist

RECYCLED WATER ON-SITE RETROFITS BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	Total	Cumulative Water Savings across all Fiscal Years
Brea	0	0	0	0	0	**0**	**0**
Buena Park	0	0	0	0	0	**0**	**0**
East Orange CWD	0	0	0	0	0	**0**	**0**
El Toro WD	4	0	0	0	0	**47**	**10,651**
Fountain Valley	0	0	0	0	0	**0**	**0**
Garden Grove	0	0	0	0	0	**0**	**0**
Golden State WC	0	0	0	0	0	**0**	**0**
Huntington Beach	0	0	0	0	0	**0**	**0**
Irvine Ranch WD	0	1	1	1	0	**13**	**2,735**
La Habra	0	0	0	0	0	**0**	**0**
La Palma	0	0	0	0	0	**0**	**0**
Laguna Beach CWD	0	0	0	0	0	**0**	**0**
Mesa Water	0	0	0	0	0	**1**	**322**
Moulton Niguel WD	0	0	0	2	0	**44**	**1,131**
Newport Beach	0	0	0	0	0	**1**	**1,301**
Orange	0	0	0	0	0	**0**	**0**
San Clemente	0	0	0	0	0	**23**	**7,172**
Santa Margarita WD	0	1	1	0	0	**37**	**4,495**
Seal Beach	0	0	0	0	0	**0**	**0**
Serrano WD	0	0	0	0	0	**0**	**0**
South Coast WD	0	1	3	1	0	**19**	**1,909**
Trabuco Canyon WD	0	0	0	0	0	**1**	**2,297**
Tustin	0	0	0	0	0	**0**	**0**
Westminster	0	0	0	0	0	**0**	**0**
Yorba Linda WD	0	0	0	0	0	**0**	**0**
MWDOC Totals	4	3	5	4	0	**193**	**32,420**

Anaheim	0	0	0	0	0	**1**	**386**
Fullerton	0	0	0	0	0	**0**	**0**
Santa Ana	0	0	0	0	0	**0**	**0**
Non-MWDOC Totals	0	0	0	0	0	**1**	**386**

Orange County Totals	**4**	**3**	**5**	**4**	**0**	**194**	**32,806**

APPENDIX H

WATER DEMAND PROJECTION MEMORANDA

APPENDIX H.1

CAPITAL IMPROVEMENT PLAN UPDATE TECHNICAL MEMORANDUM 1: WATER DEMAND

Capital Improvement Program Update

TECHNICAL MEMORANDUM 1

Water Demand

FINAL / October 2025

Mesa Water
DISTRICT©

Capital Improvement Program Update

TECHNICAL MEMORANDUM 1

Water Demand

FINAL / October 2025

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TM 1 WATER DEMAND

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Abbreviations

AF	acre-feet
AFY	acre-feet per year
FY	fiscal year
gpcd	gallons per capita per day
gpm	gallons per minute
Mesa Water	Mesa Water District
mgd	million gallons per day
MWRF	Mesa Water Reliability Facility
SCADA	supervisory control and data acquisition

TM 1 WATER DEMAND

1.1 Purpose

This technical memorandum describes Mesa Water District's (Mesa Water's) existing potable and recycled water demands and demand forecasting. The existing water demand includes discussion of historical potable and recycled water consumption, production, unaccounted for water, and peaking factors. The future water demand consists of per-capita water use and demand projections through year 2035 utilizing population-based forecasting methodology that considers Regional Housing Need Allocation requirements. The ongoing water conservation measures and the anticipated impacts these measures will have on Mesa Water's future water demands are also described. In addition, potable water service alternatives are developed for the 43 existing irrigation customers served by the Green Acres Project recycled water.

Mesa Water’s service area is approximately 16.3 square miles and encompasses portions of the City of Costa Mesa, City of Newport Beach, and unincorporated Orange County (primarily John Wayne Airport). Approximately 90.3 percent of the service area is the City of Costa Mesa, while the City of Newport Beach and unincorporated Orange County account for approximately 3.6 percent and 6.1 percent, respectively. Mesa Water serves approximately 93.6 percent of the City of Costa Mesa’s area.

1.2 Existing Potable Water Demands

Water demand consists of metered water sales and unaccounted for water that leaves the distribution system through unmetered connections (such as fire hydrants), maintenance flushing, reservoir cleaning, leaks at pipe joints, or through pipe breaks. Water demands occur throughout the distribution system based on the number and type of consumers in each location. Mesa Water meters all their customer accounts. The difference between production and consumption defines the estimated non-revenue water. A description of historical water consumption and the estimated amount of unaccounted for water is presented below. Peaking factors, which are indicators of the variation in demand on a seasonal and daily basis, are also discussed.

1.2.1 Historical Demands

Mesa Water provided historical customer billing records by customer class for the fiscal year (FY) 2021 through 2024. The historical metered water use for this time period is summarized yearly in Table 1.1 in acre-feet per year (AFY) by billing classification and is graphically depicted in Figure 1.1. FY 2022 had the highest demand in recent years, approximately 15,500 AFY for potable water, and was used to represent existing demands in this technical memorandum. Monthly metered water use for FY 2022 is summarized in Table 1.2 and shown in Figure 1.2. Daily metered water use data was not available.

The billing data presented in Figure 1.1 indicates that the total consumption for FYs 2021 and 2022 are similar, followed by a slight decrease in FY 2023 and 2024. As shown in Figure 1.2, billing data for FY 2022 shows that multi-family residential demands were the largest proportion of demands at 35 percent.

Together with single family residential demands at 32 percent, the residential water use comprises 67 percent of Mesa Water's total water demand. Commercial water use accounts for the next largest category, representing 22 percent. Governmental users accounted for 10 percent of total water use, while industrial and irrigation users accounted for only 1 percent of annual consumption. Monthly billing data shows that all meter classifications increase their usage during the summer months to some degree. Summer usage is increased most by irrigation users while commercial users show a smaller increase.

Table 1.1 Annual Water Demand by Class(1)

Billing Classification(2)	FY 2021 (AFY)	FY 2022 (AFY)	FY 2023 (AFY)	FY 2024 (AFY)
Single Family Residential	5,153	4,893	4,293	4,278
Multi-Family Residential	5,559	5,412	5,038	5,088
Commercial	3,112	3,402	3,146	3,181
Government	1,256	1,472	1,163	1,099
Industrial	254	253	226	235
Irrigation	9	14	1	2
Other	23	45	15	21
Subtotal Potable Water	15,367	15,491	13,883	13,904
Recycled Water	1,084	1,020	781	585
Total	16,451	15,491	13,883	13,904

Notes:

(1) Source: billing data provided by Mesa Water.

(2) Mesa Water's billing database includes 41 classifications; the 41 classifications were grouped by usage type as follows: Single Family: SA, SB, SD, SF, SI and SJ, Multi-Family: MA, MB, MD, MF, MI, MJ, TA, TB, TD, TF, TI, and TJ, Commercial: CA, CB, CD, CF, CI, and CJ, Government: GA, GB, GD, GF, GI, and GJ, Industrial: IA, IB, ID, IF, II, and IJ, Irrigation: AB and AI, Other: HA, XX and ZZ.

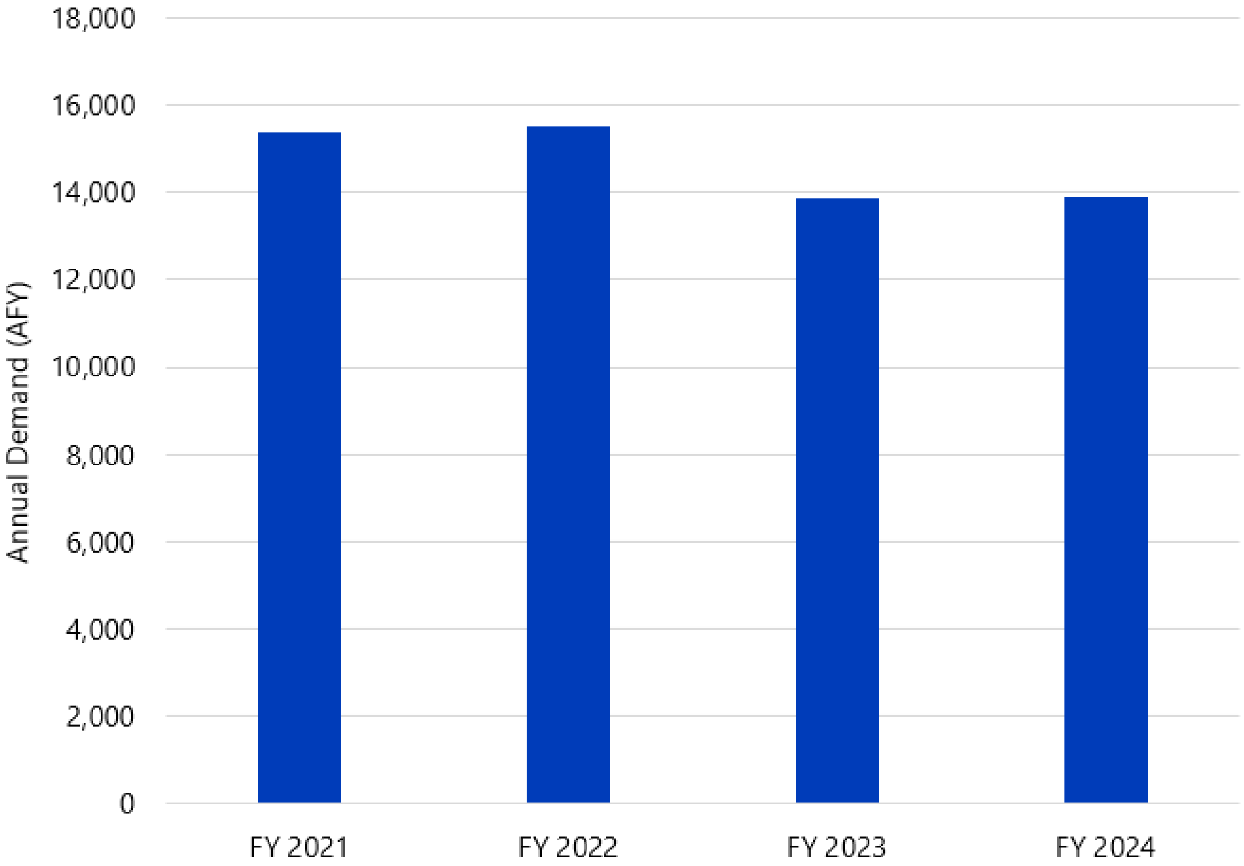


Figure 1.1 Total Annual Water Demand

Table 1.2 FY 2022 Monthly Water Demand by Class (AFY)(1)

Billing Classification	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Single Family Residential	599	381	563	365	485	279	427	257	422	312	458	344
Multi-Family Residential	435	542	419	538	405	443	379	468	374	505	396	506
Commercial	339	313	327	301	298	239	249	223	272	270	304	268
Government	141	194	137	141	86	81	98	79	125	117	125	145
Industrial	7	39	6	40	7	32	8	31	5	37	6	35
Irrigation	2	5	3	1	0	0	0	0	1	0	1	0
Other	5	0	8	0	9	1	6	1	8	0	2	5
Total	**1,529**	**1,473**	**1,464**	**1,386**	**1,290**	**1,075**	**1,168**	**1,060**	**1,206**	**1,243**	**1,292**	**1,303**

Notes:

(1) Includes fire, construction, abandoned, and unknown. For class breakdown of remaining classifications see Table 1.1.

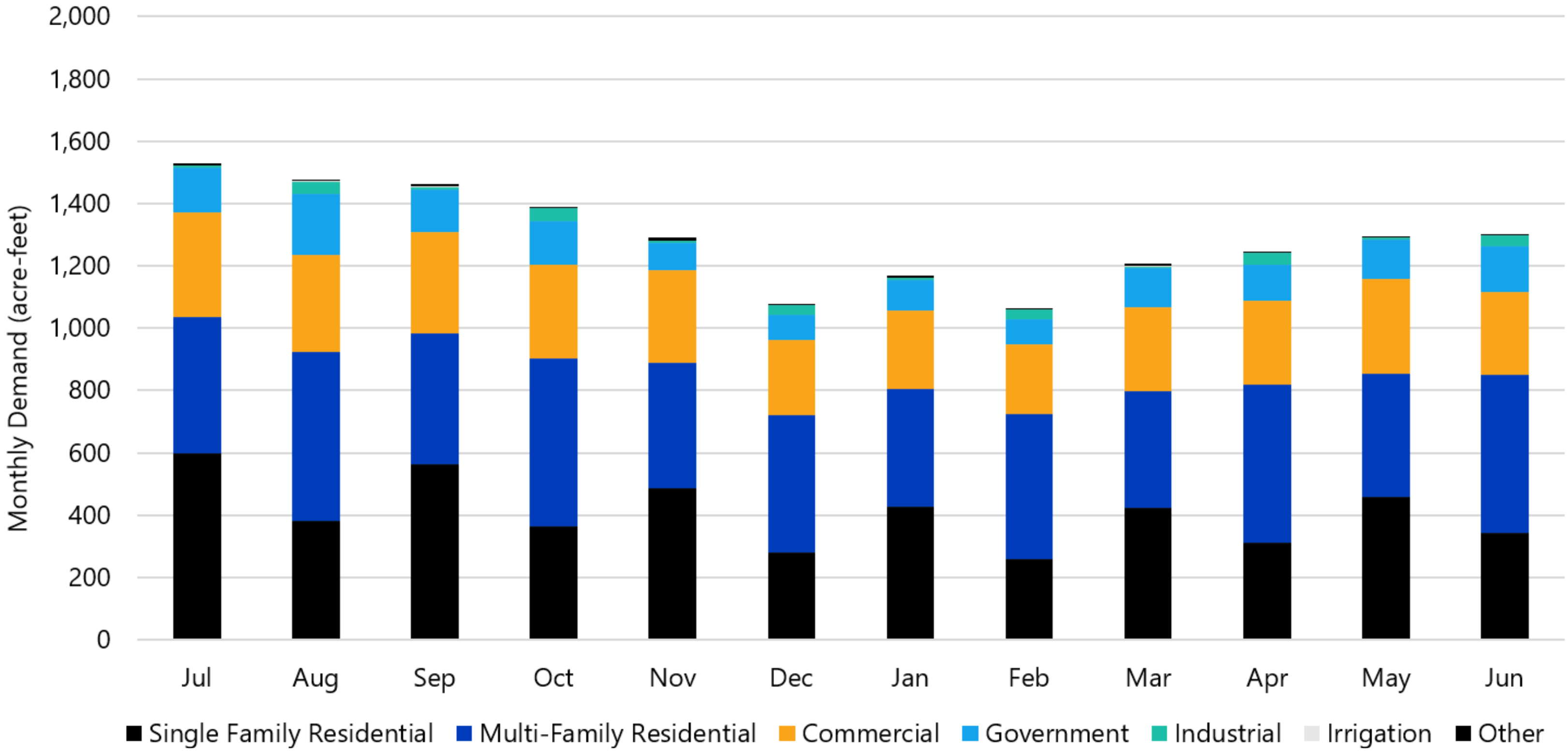


Figure 1.2 FY 2022 Water Demand by Customer Class

1.2.2 Historical Production

Mesa Water obtains potable water through pumping groundwater from the Orange County Groundwater Basin and has additional supply available through imported water and inter-agency connections. Amber colored groundwater is pumped through two deep-water wells owned and operated by Mesa Water which is then treated at the Mesa Water Reliability Facility (MWRF). Seven clear water wells provide the majority of the potable supply within Mesa Water's service area. Recycled water is also used to serve a small portion of the demands. The historical water production from FYs 2021 through 2024 is presented in Table 1.3 and graphically depicted in Figure 1.3.

Table 1.3 Historical Production

FY	Clear Wells (1) (AFY)	Amber Wells (AFY)	Imported Water (AFY)	Total Potable Supply (AFY)	Recycled Water (AFY)
2021	12,672	3,878	66	**16,617**	1,084
2022	12,560	3,766	3	**16,329**	1,020
2023	12,474	2,305	10	**14,788**	781
2024	12,647	2,213	0	**14,860**	585
Average	**12,588**	**3,040**	**20**	**15,649**	**867**

Notes:
(1) Excludes wells that go through the MWRF.

The average annual potable water supply between the FYs of 2021 and 2024 is 15,649 AFY with the majority being sourced from clear groundwater wells. A slight decrease in total supply appeared between the years 2022 to 2023 then remained relatively consistent throughout the following year. Recycled water is used to serve non-potable customers using irrigation services through the Green Acres Project.

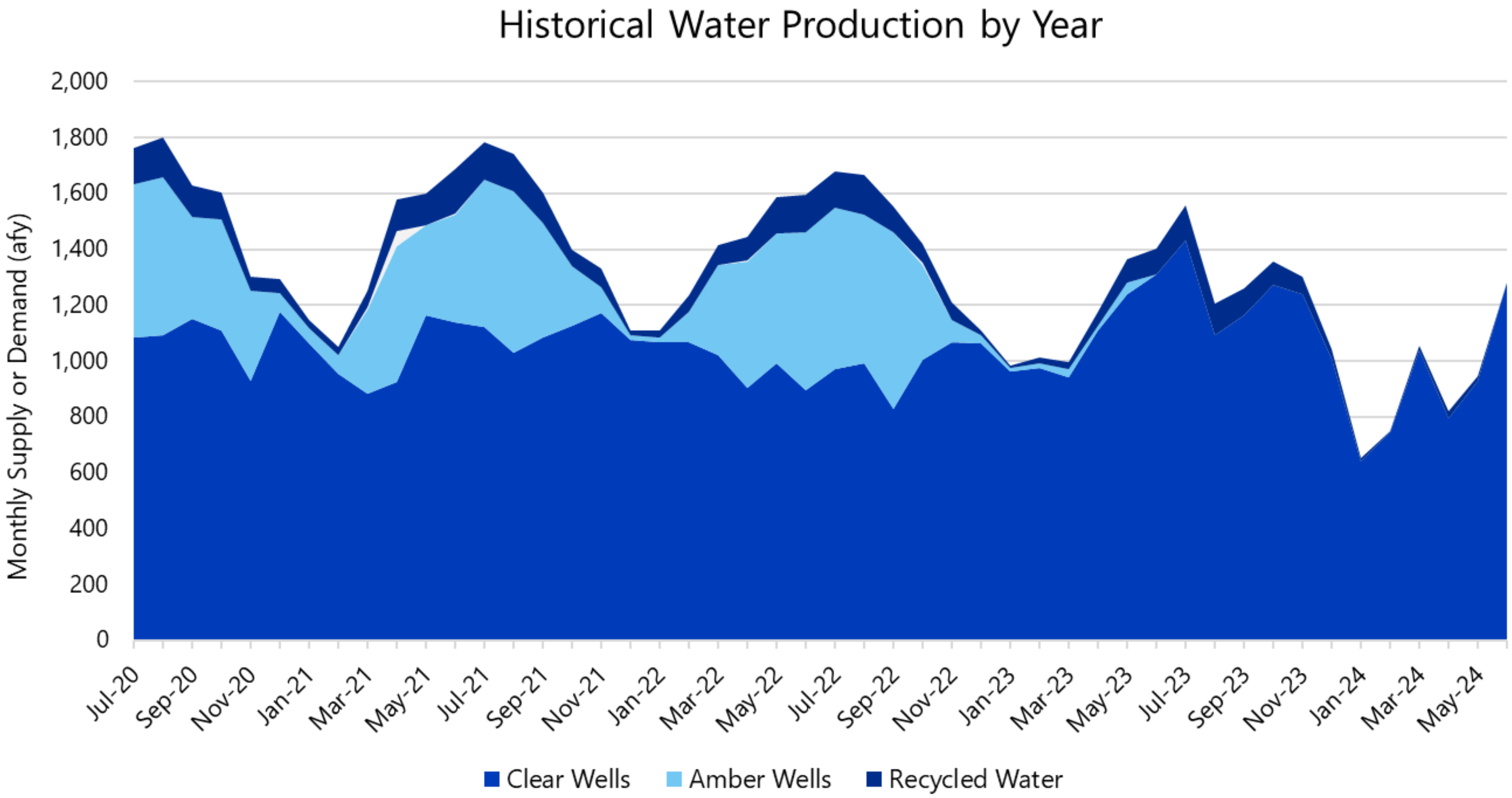


Figure 1.3 Historical Water Production by FY

1.2.2.1 Non-Revenue Water

The difference between water production and consumption (billed to customers) is defined as non-revenue water. This can be attributed to leaking pipes, unmetered or unauthorized water use, inaccurate meters, or other events causing water to be withdrawn from the system and not measured. Specific events of non-revenue water include hydrant flushing, street cleaning, system flushing, sewer cleaning, and firefighting. Mesa Water's total production, consumption, and non-revenue water for FYs 2021 through 2024 are summarized in Table 1.4.

Table 1.4 Historical Non-Revenue Water

FY	Total Production (AFY)	Water Consumption (AFY)	Non-Revenue Water (AFY)	Non-Revenue Water (Percentage)
2021	16,617	15,367	1,250	7.5
2022	16,329	15,491	838	5.1
2023	14,788	13,883	905	6.1
2024	14,860	13,904	956	6.4
Average	**15,649**	**14,661**	**987**	**6.3**

The non-revenue water for well-operated systems is typically less than 10 percent. As shown in Table 1.4, Mesa Water's estimated historical non-revenue water over this period is 6.3 percent, which is well within the generally accepted range of non-revenue water for an efficiently operated system.

1.2.3 Peaking Factors

Peaking factors are typically used to determine the water demands for conditions other than average daily demand conditions. Peaking factors account for fluctuations in demand on a seasonal or hourly basis. For example, during hot summer days, water use is typically higher than on a colder winter day due to increased irrigation demands.

Common peaking factors include factors for maximum daily demand and minimum daily demand, and peak hour demand conditions. Peaking factors are determined using the water system demands for a selected period and dividing the quantity by the average daily demand. The maximum daily demand factor, for example, is determined by comparing the water demands for the day of the year with the highest daily water demand to the average daily demands. The peak hour demand factor is defined as the highest hourly demand and is typically seen during the maximum day.

Historical production records are typically used to determine the seasonal demand factors, such as maximum daily demand to average daily demand ratio or minimum daily demand to average daily demand ratio. Mesa Water provided supervisory control and data acquisition (SCADA) data for FY 2021 through 2024. As shown in Table 1.5, analysis of the SCADA data shows that the average daily demand was 13.25 million gallons per day (mgd). The maximum daily demand occurred on August 6, 2022 (FY 2023), which corresponds to a maximum daily demand to average daily demand peaking factor of 1.30. The minimum daily demand occurred on December 26, 2022 (FY 2023) with a total demand of 8.97 mgd and a corresponding peaking factor (or minimum daily demand to average daily demand ratio) of 0.68. For planning purposes and analysis presented in this technical memorandum, a maximum daily demand to average daily demand peaking factor of 1.5 and a minimum daily demand to average daily demand peaking factor of 0.65 were used. These are the same values used in the previous Master Plan (Carollo Engineers, 2014).

Table 1.5 Peaking Factor Summary

FY	Average Day Demand(1)	Maximum Day Demand			Minimum Day Demand		
	mgd	Date	mgd	Maximum Daily Demand to Average Daily Demand Peaking Factors(1)	Date	mgd	Minimum Daily Demand to Average Daily Demand Peaking Factors(1)
2021	14.57	8/15/2020	18.31	1.26	1/30/2021	9.46	0.65
2022	13.25	7/24/2021	18.29	1.38	1/2/2022	9.10	0.53
2023	13.25	8/6/2022	17.27	1.30	12/26/2022	8.97	0.68
2024	12.85	8/17/2023	18.33	1.43	12/26/2023	9.33	0.73

Notes:
(1) Based on SCADA data provided by Mesa Water.

1.2.4 Diurnal Flow

The variation of water use during the day can be grouped into a pattern of hourly use called a diurnal curve. A diurnal curve is a pattern of hourly water use, which can be used to show variations in water use at an hourly resolution. In residential areas, there are often two peak use periods, in the morning between 6 a.m. and 8 a.m. and again in the late afternoon between 5 p.m. and 8 p.m. These peak demand periods reflect the increased usage in toilets, bathrooms, and kitchens before customers typically leave their homes in the morning and when they return from work in late afternoon/evening. Recycled water systems or areas that have automatic sprinkler systems for irrigation typically experience peak demand periods late at night through the early morning hours.

Hourly data from SCADA systems and other field recorders are typically used to create a 24-hour water usage curve or diurnal pattern. A diurnal pattern consists of 24 1-hour peaking factors known as hourly peaking factors. These hourly peaking factors add to a total of 24 and average to 1. The highest hourly peaking factor in the 24-hour diurnal pattern is referred to as the peak hour demand. The peak hour demand is notable because it is typically the hour where the maximum velocity and minimum pressures occur.

Two diurnal curves were developed for weekday and weekend summer conditions using a mass balance calculation using flow data obtained from Mesa Water's SCADA during the week of August 1, 2024 through August 8, 2024. The weekday summer demand is based on data from Tuesday, August 6, 2024, with a daily average demand of 20.1 mgd and is presented in Figure 1.4. The weekend summer demand is based on data from Sunday, August 4, 2024, with an average of 18.7 mgd of daily demand and is presented on Figure 1.5. Peak hourly demand on Tuesday, August 6, 2024, was at 18,275 gallons per minute (gpm), representing a peak hour demand to maximum daily demand peaking factor of 1.39, while the peak hourly demand on Sunday, August 4, 2024, was at 14,769 gpm, representing a peak hour demand to maximum daily demand peaking factor of 1.12. The hourly diurnal peaking factors are included in Table 1.6. Appendix 1A includes calculation details of diurnal curves developed.

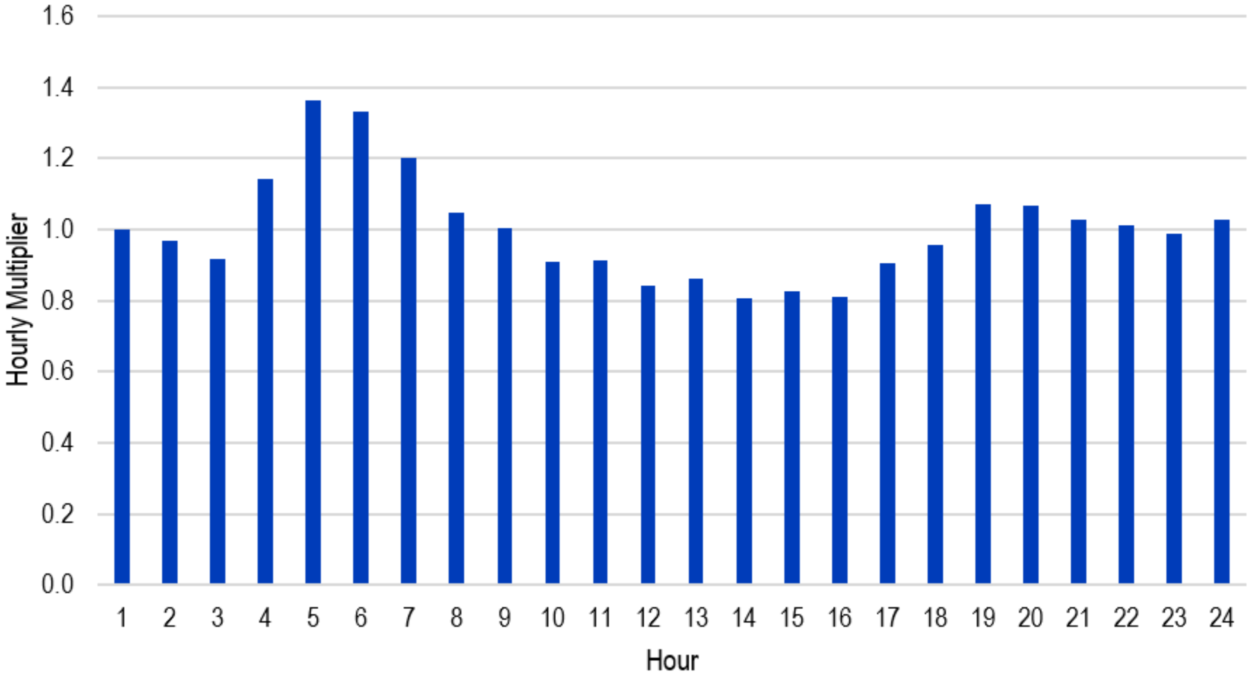


Figure 1.4 Diurnal Pattern for Weekday Maximum Daily Demand, August 6, 2024

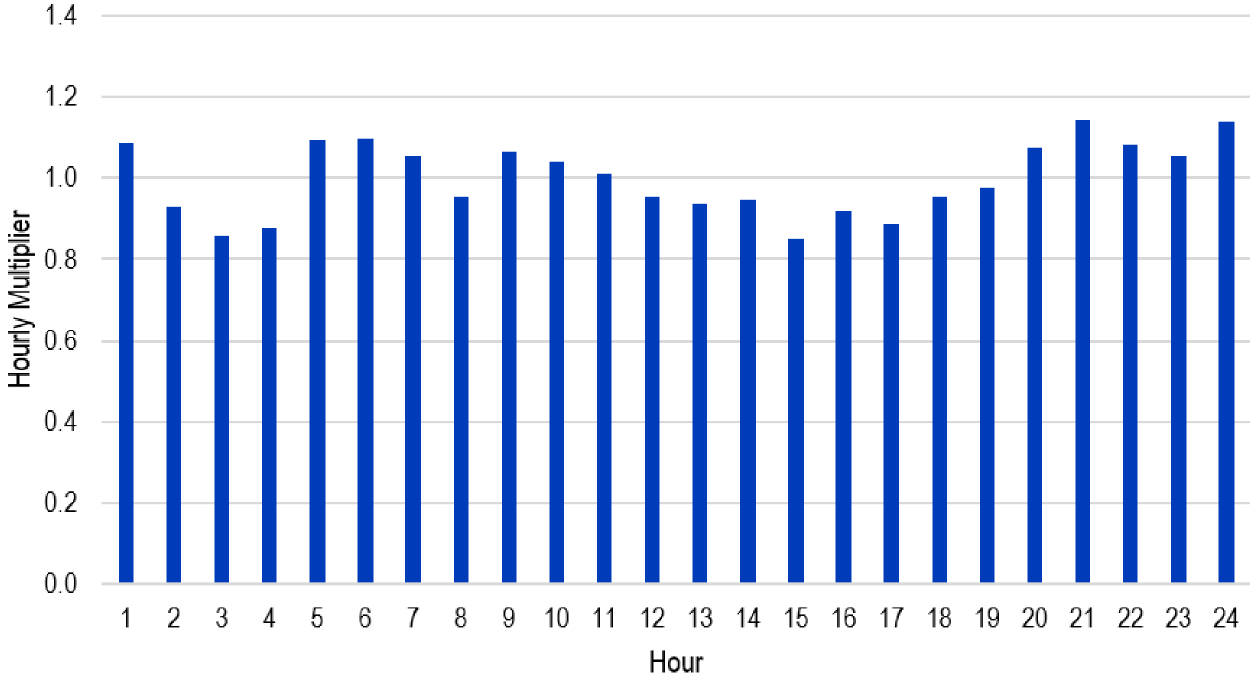


Figure 1.5 Diurnal Pattern for Weekend Maximum Daily Demand, August 4, 2024

Table 1.6 Hourly Diurnal Peaking Factor

Time	Maximum Daily Demand (Weekday) Tuesday, 08/06/2024	Maximum Daily Demand (Weekend) Sunday, 08/04/2024
0:00	1.00	1.09
1:00	0.97	0.93
2:00	0.92	0.86
3:00	1.14	0.88
4:00	1.36	1.09
5:00	1.33	1.10
6:00	1.20	1.05
7:00	1.05	0.95
8:00	1.00	1.06
9:00	0.91	1.04
10:00	0.91	1.01
11:00	0.84	0.96
12:00	0.86	0.94
13:00	0.81	0.95
14:00	0.83	0.85
15:00	0.81	0.92
16:00	0.90	0.89
17:00	0.96	0.96
18:00	1.07	0.98
19:00	1.07	1.08
20:00	1.03	1.14
21:00	1.01	1.08
22:00	0.99	1.06
23:00	1.03	1.14

1.3 Future Potable Water Demand Forecast

Demand forecasting is the process of predicting the level of demand that might occur at some point in the future, or over a specified period. Demand projections were developed using a combination of per-capita water use and land information.

1.3.1 Forecasting Methodology

A population-based method was used to forecast water demand through 2035. Socioeconomic projections of population were provided by Southern California Association of Governments, a joint powers authority that encompasses six counties (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura,). The data was originally prepared for the 2024-2050 Regional Transportation Plan and Sustainable Communities Strategy, also known as Connect SoCal 2024. The Regional Housing Needs Assessment is included in the population projections, a process mandated by the State of California's housing laws to determine existing and future housing needs. The population within Mesa Water's service area is expected to increase from 108,360 in 2019 to 119,811 in 2035 according to an analysis of Transportation Analysis Zone level data provided by Southern California Association of Governments. This projection equates to an annual growth rate of approximately 0.6 percent.

1.3.2 Impact of Recycled Water Demands From Green Acres Project

Mesa Water benefits from the Orange County Water District's Green Acres Project for direct and indirect use of recycled water as Mesa Water does not own or operate wastewater treatment facilities. Green Acres Project provides up to 8,400 AFY of recycled water for direct non-potable reuses, such as landscape irrigation and industrial uses. Green Acres Project recycled water is distributed by Orange County Water District for purchase by Mesa Water and provided to 43 recycled water customers within the service area. As discussed in Section 1.2.2, Mesa Water distributed approximately 1,020 AFY of recycled water in the FY 2022 with a maximum of 1,084 AFY between the FYs of 2019 through 2024 (occurring in FY 2021). Mesa Water is considering converting the 43 recycled water customers currently serviced by Green Acres Project to potable water service due to concerns of the availability of Green Acres Project water supply and water quality. This conversion is considered in the potable water demand projections discussed below and is assumed to take place by year 2035.

1.3.3 Impact of Water Conservation on Future Demands

Typically, existing demands are decreased incrementally over the planning periods in anticipation of meeting water-use conservation targets defined in agency-specific Urban Water Management Plans. California’s *Making Conservation a California Way of Life* framework including California Senate Bill 606 and California Assembly Bill 1668 (2018), California Senate Bill 1157 (2022), and California Senate Bill 555 (2015), applies to all urban retail water suppliers serving more than 3,000 service connections or delivering over 3,000 acre-feet of water annually. Beginning January 1, 2025, and each year thereafter, every supplier must calculate its Urban Water Use Objective. Starting January 1, 2027, suppliers must also demonstrate annual compliance. The regulations establish efficiency standards for the following four components of the Urban Water Use Objective:

- Indoor residential use.
- Outdoor residential irrigation based on irrigable area and climate.
- Commercial, Industrial, and Institutional dedicated irrigation based on irrigable area and climate.
- Distribution-system water loss.

These standards tighten over time, requiring suppliers, beginning in 2027, to ensure their total water consumption remains within the limits of their calculated Urban Water Use Objective. Suppliers are granted a higher outdoor irrigation budget for landscaped areas irrigated with recycled water, and an incentive bonus for potable reuse investments, which recognize and reward the use of alternative, sustainable water supplies. Due to significant investment in potable reuse, recycled water, and water efficiency programs, Mesa Water is projected to remain in compliance with the framework through 2040.

A draft landscape efficiency factor regulation is in place for regular residential landscape of 0.80 through June 2030, 0.63 from 2030 to 2035, and 0.55 for 2035 onward. Similarly, draft landscape efficiency factor regulations have been developed for commercial, industrial, and institutional landscapes equating to 0.80 until 2030, 0.63 in 2030, and 0.45 in 2035. A water loss standard is based on either the number of service connections or pipeline length. Qualified service areas are also eligible for a potable reuse credit not exceeding 15 percent of the supplier's Urban Water Use Objective.

As shown in Table 1.7, Mesa Water's actual 2025 water use is below its calculated Urban Water Use Objective. Although the 2025 results include reported values for Commercial, Industrial, and Institutional dedicated irrigation meters and real water loss, under the current regulations, suppliers are not required to comply with those standards until 2027.

The future projections through year 2035 are listed in Table 1.8. Even without new conservation measures, Mesa Water remains below its Urban Water Use Objective, demonstrating that the Mesa Water's investments in potable reuse, recycled water, and water efficiency programs will continue to sustain long-term compliance with the state's framework.

Taken together, the 2025 and 2035 results show that Mesa Water is positioned to remain compliant with the Urban Water Use Objective through 2040.

Table 1.7 2025 Actual Water Use Compared Against Urban Water Use Objectives

Water Use Segment	Standard	Objective (AF)	Projections (AF)	Over/Under (AF)
Indoor Residential	47 gpcd	5,791	6,492	701
Outdoor Residential	Landscape Efficiency Factor: 0.80	2,849	3,194	345
Commercial, Industrial, and Institutional Dedicated Irrigation Meter	Landscape Efficiency Factor: 0.80	1,175	1,175	0
Real Water Loss	Reported Loss	284	284	0
Potable Reuse Bonus Incentive	15% of max 15%	1,515	-	-1,515
	TOTAL	**11,614**	**11,145**	**-469**

Notes:
AF - acre-feet; gpcd - gallons per capita per day

Table 1.8 2035 Water Use Projections Compared Against Urban Water Use Objectives

Water Use Segment	Standard	Objective (AF)	Projections (AF)	Over/Under (AF)
Indoor Residential	42 gpcd	5,175	5,696	521
Outdoor Residential	Landscape Efficiency Factor: 0.63	2,283	2,910	628
Commercial, Industrial, and Institutional Dedicated Irrigation Meter	Landscape Efficiency Factor: 0.63	1,408	1,243	-165
Real Water Loss	16.67 gallons per connection per day	479	312	-167
Potable Reuse Bonus Incentive	15% of max 15%	1,402	-	-1,402
	TOTAL	**10,746**	**10,161**	**-586**

1.3.4 Projected Demands

As discussed in Section 1.2.1, residential demand accounted for 67 percent of potable water billing in the FY 2022 with the remaining 33 percent being non-residential demand. The residential indoor and outdoor per capita water demand during this year is 85.6 gallons per capita day. Assuming no increases due to employment or conservation, the projected demand is based on population growth only and Green Acres Project conversion. It is recognized there are some known future developments, but these are not used in the demand projections; these are used only for distributing the future demands for system analysis. The potable water demand projections are summarized through the year 2035 in Table 1.9.

Table 1.9 Potable Water Demand Projections

	2022	2025	2030	2035
Service Area Population(1)(2)	109,189	110,432	114,184	119,811
Residential Demand (AFY)(3)	10,862	10,988	11,361	11,921
Non-Residential Demand (AFY)(4)	5,467	5,467	5,467	5,467
Green Acres Project Conversion (AFY)	0	0	0	1,084
Total Demand (AFY)	**16,329**	**16,455**	**16,828**	**18,742**
Average Day Demand (mgd)	**14.6**	**14.7**	**15.0**	**16.5**
Maximum Day Demand (mgd)(5)	**21.9**	**22.0**	**22.5**	**24.7**

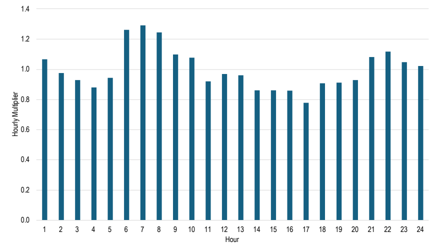
Notes:
(1) Reference: Transportation Analysis Zone-level data provided by Southern California Association of Governments as used in 2024 Connect SoCal.
(2) Population projections for the years 2022 and 2030 were developed linearly.
(3) Residential demand includes single family and multi-family billing classifications presented in Table 1.1.
(4) Non-residential demand includes commercial, government, industrial, and other billing classifications presented in Table 1.1.
(5) Peaking factor of 1.5.

APPENDIX 1A DIURNAL CURVES

8/1/2024										Supply In (gpm)												
		Reservoir 1				Reservoir 2													Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
23:45	23																					
0:00	0	18.35	4,783,181	-1,330	-89	5.06	2,533,864	-20,762	-1,384	2,301	1,795	0	0	1,803	3,967	64	2,690	0	-1,473	12,620	0	11,147
0:15	0	18.36	4,784,511	5,302	353	5.10	2,554,626	0	0	2,301	1,814	0	0	1,810	3,997	65	2,827	0	353	12,813	0	13,167
0:30	0	18.34	4,779,209	-5,705	-380	5.10	2,554,626	0	0	2,299	1,800	0	0	1,800	3,973	65	2,743	0	-380	12,681	0	12,301
0:45	0	18.36	4,784,914	-920	-61	5.10	2,554,626	0	0	2,299	1,781	0	0	1,787	3,963	66	2,613	0	-61	12,509	0	12,448
1:00	1	18.36	4,785,834	7,398	493	5.10	2,554,626	0	0	2,300	1,794	0	0	1,800	3,979	66	2,689	0	493	12,628	0	13,121
1:15	1	18.33	4,778,436	-3,270	-218	5.10	2,554,626	-2,387	-159	2,300	1,810	0	0	1,805	3,984	67	2,791	0	-377	12,757	0	12,380
1:30	1	18.34	4,781,706	-1,108	-74	5.10	2,557,013	-41,246	-2,750	2,300	1,781	0	0	1,787	3,964	68	2,604	0	-2,824	12,504	0	9,680
1:45	1	18.35	4,782,814	-582	-39	5.19	2,598,259	-42,994	-2,866	2,301	1,789	0.00	0	1,799	3,972	68	2,652	0	-2,905	12,582	0	9,677
2:00	2	18.35	4,783,396	563	38	5.27	2,641,254	-13,554	-904	2,298	1,787	0	0	1,801	3,979	69	2,643	0	-866	12,577	0	11,711
2:15	2	18.35	4,782,833	-117	-8	5.30	2,654,808	-2,407	-160	2,298	1,801	0	0	1,802	3,972	69	2,732	0	-168	12,674	0	12,506
2:30	2	18.35	4,782,951	-2,561	-171	5.30	2,657,215	-54,179	-3,612	2,300	1,787	0	0	1,792	3,949	70	2,628	0	-3,783	12,525	0	8,743
2:45	2	18.36	4,785,512	748	50	5.41	2,711,393	-43,354	-2,890	2,299	1,791	0	0	1,796	3,973	71	2,658	0	-2,840	12,588	0	9,748
3:00	3	18.36	4,784,763	-488	-33	5.50	2,754,747	-242	-16	2,303	1,793	0	0	1,792	3,964	71	2,667	0	-49	12,591	0	12,542
3:15	3	18.36	4,785,252	-6,643	-443	5.50	2,754,989	-29,372	-1,958	2,300	1,796	0	0.0	1,829	3,973	72	2,702	0	-2,401	12,672	0	10,271
3:30	3	18.38	4,791,895	882	59	5.56	2,784,361	-33,635	-2,242	2,302	1,785	0	0	1,798	3,957	72	2,623	0	-2,183	12,538	0	10,355
3:45	3	18.38	4,791,013	-4,467	-298	5.63	2,817,996	-73,907	-4,927	2,299	1,781	0	0	1,797	3,954	73	2,608	0	-5,225	12,513	0	7,288
4:00	4	18.40	4,795,479	2,308	154	5.77	2,891,903	-13,359	-891	2,299	1,782	0	0	1,798	3,952	74	2,616	0	-737	12,521	0	11,785
4:15	4	18.39	4,793,172	2,144	143	5.80	2,905,261	-2,404	-160	2,302	1,804	0	0	1,810	3,969	74	2,771	0	-17	12,731	0	12,714
4:30	4	18.38	4,791,028	-1,906	-127	5.80	2,907,666	-41,257	-2,750	2,299	1,782	0	0	1,791	3,950	75	2,623	0	-2,878	12,521	0	9,643
4:45	4	18.39	4,792,933	-12,888	-859	5.89	2,948,922	-35,797	-2,386	2,299	1,784	0	0	1,797	3,952	75	2,642	0	-3,246	12,551	0	9,305
5:00	5	18.44	4,805,821	15,579	1,039	5.96	2,984,720	-20,723	-1,382	2,300	1,791	0	0	1,802	3,971	76	2,686	0	-343	12,626	0	12,283
5:15	5	18.38	4,790,242	68,164	4,544	6.00	3,005,443	0	0	2,302	1,813	0	0	1,820	3,990	77	2,969	0	4,544	12,971	0	17,515
5:30	5	18.12	4,722,078	34,195	2,280	6.00	3,005,443	0	0	2,300	1,789	0	0	1,798	3,985	77	2,844	0	2,280	12,794	0	15,074
5:45	5	17.98	4,687,883	5,469	365	6.00	3,005,443	0	0	2,298	1,788	0	0	1,799	3,985	78	2,824	0	365	12,772	0	13,136
6:00	6	17.96	4,682,414	28,706	1,914	6.00	3,005,443	0	0	2,300	1,784	0	0	1,796	3,982	79	2,799	0	1,914	12,739	0	14,653
6:15	6	17.85	4,653,708	56,196	3,746	6.00	3,005,443	0	0	2,301	1,799	0	0	1,805	3,997	79	2,925	0	3,746	12,906	0	16,652
6:30	6	17.64	4,597,512	18,812	1,254	6.00	3,005,443	0	0	2,300	1,782	0	0	1,794	3,985	80	2,825	0	1,254	12,765	0	14,020
6:45	6	17.57	4,578,700	20,300	1,353	6.00	3,005,443	0	0	2,302	1,778	0	0	1,796	3,976	80	2,797	0	1,353	12,729	0	14,082
7:00	7	17.49	4,558,399	16,423	1,095	6.00	3,005,443	0	0	2,301	1,785	0	0	1,802	3,989	81	2,826	0	1,095	12,784	0	13,879
7:15	7	17.42	4,541,977	39,718	2,648	6.00	3,005,443	0	0	2,299	1,787	0	0	1,823	3,988	82	2,843	0	2,648	12,822	0	15,470
7:30	7	17.27	4,502,259	27,808	1,854	6.00	3,005,443	0	0	2,298	1,783	0	0	1,802	3,983	82	2,802	0	1,854	12,751	0	14,604
7:45	7	17.17	4,474,451	10,510	701	6.00	3,005,443	0	0	2,301	1,778	0	0	1,800	3,981	83	2,636	0	701	12,578	0	13,279
8:00	8	17.13	4,463,941	11,720	781	6.00	3,005,443	0	0	2,300	1,776	0	0	1,799	3,982	83	2,600	0	781	12,540	0	13,321
8:15	8	17.08	4,452,220	3,303	220	6.00	3,005,443	0	0	2,299	1,780	0	0	1,800	3,967	84	2,611	0	220	12,541	0	12,761
8:30	8	17.07	4,448,917	-12,216	-814	6.00	3,005,443	0	0	2,300	1,775	0	0	1,797	3,969	85	2,559	0	-814	12,484	0	11,670
8:45	8	17.11	4,461,134	4,195	280	6.00	3,005,443	0	0	2,301	1,778	0	0	1,796	3,964	85	2,546	0	280	12,470	0	12,750
9:00	9	17.10	4,456,939	-8,401	-560	6.00	3,005,443	0	0	2,299	1,781	0	0	1,794	3,957	86	2,516	1	-560	12,433	0	11,873
9:15	9	17.13	4,465,340	3,884	259	6.00	3,005,443	0	0	2,301	1,792	0	0	1,800	3,951	86	2,518	2	259	12,449	0	12,708
9:30	9	17.12	4,461,456	5,655	377	6.00	3,005,443	0	0	2,302	1,792	0	0	1,797	3,967	87	2,507	2	377	12,454	0	12,831
9:45	9	17.09	4,455,801	-4,252	-283	6.00	3,005,443	0	0	2,300	1,792	0	0	1,798	3,957	88	2,518	3	-283	12,456	0	12,172
10:00	10	17.11	4,460,053	-5,791	-386	6.00	3,005,443	-12,902	-860	2,298	1,792	0	0	1,797	3,969	88	2,519	4	-1,246	12,468	0	11,222
10:15	10	17.13	4,465,844	-5,381	-359	6.03	3,018,344	-36,945	-2,463	2,301	1,791	0	0	1,798	3,966	89	2,506	5	-2,822	12,456	0	9,634
10:30	10	17.15	4,471,225	1,538	103	6.10	3,055,289	-13,145	-876	2,300	1,791	0	0	1,798	3,959	89	2,515	6	-774	12,457	0	11,683
10:45	10	17.15	4,469,687	-3,146	-210	6.13	3,068,434	-36,946	-2,463	2,302	1,792	0	0	1,800	3,960	90	2,512	6	-2,673	12,463	0	9,790
11:00	11	17.16	4,472,833	2,533	169	6.20	3,105,379	-245	-16	2,300	1,792	0	0	1,794	3,952	91	2,515	7	153	12,451	0	12,604
11:15	11	17.15	4,470,301	1,119	75	6.20	3,105,624	-3,719	-248	2,303	1,790	0	0	1,790	3,950	91	2,510	6	-173	12,440	0	12,267
11:30	11	17.15	4,469,182	-4,039	-269	6.21	3,109,343	-42,455	-2,830	2,300	1,790	0	0	1,804	3,975	92	2,505	3	-3,100	12,468	0	9,368
11:45	11	17.16	4,473,221	483	32	6.29	3,151,798	-33,266	-2,218	2,298	1,792	0	0	1,804	3,961	92	2,515	3	-2,186	12,466	0	10,281
12:00	12	17.16	4,472,738	-5,849	-390	6.36	3,185,064	-20,742	-1,383	2,298	1,794	0	0	1,800	3,972	93	2,528	0	-1,773	12,486	0	10,713
12:15	12	17.18	4,478,587	5,289	353	6.40	3,205,805	0	0	2,300	1,790	0	0	1,799	3,961	94	2,506	0	353	12,451	0	12,803
12:30	12	17.16	4,473,298	-21,347	-1,423	6.40	3,205,805	-12,897	-860	2,302	1,793	0	0	1,802	3,969	94	2,527	0	-2,283	12,489	0	10,206
12:45	12	17.24	4,494,644	8,704	580	6.43	3,218,702	-39,345	-2,623	2,298	1,792	0	0	1,798	3,958	95	2,527	0	-2,043	12,469	0	10,426
13:00	13	17.21	4,485,940	435	29	6.50	3,258,048	-41,497	-2,766	2,298	1,788	0	0	1,796	3,967	95	2,498	0	-2,737	12,443	0	9,706
13:15	13	17.21	4,485,505	-5,528	-369	6.59	3,299,545	-8,838	-589	2,301	1,790	0	0	1,798	3,962	96	2,511	0	-958	12,458	0	11,500
13:30	13	17.23	4,491,033	9,873	658	6.60	3,308,383	-41,252	-2,750	2,300	1,789	0	0	1,799	3,961	97	2,503	0	-2,092	12,449	0	10,358
13:45	13	17.19	4,481,160	-32,328	-2,155	6.69	3,349,635	-33,047	-2,203	2,299	1,789	0	0	1,799	3,943	97	2,499	0	-4,358	12,425	0	8,067
14:00	14	17.32	4,513,487	1,850	123	6.75	3,382,682	-36,381	-2,425	2,300	1,787	0	0	1,799	3,963	98	2,508	0	-2,302	12,455	0	10,153
14:15	14	17.31	4,511,638	12,555	837	6.83	3,419,063	-36,951	-2,463	2,300	1,790	0	0	1,798	3,953	98	2,510	0	-1,626	12,449	0	10,822
14:30	14	17.26	4,499,083	-9,368	-625	6.90	3,456,014	-13,139	-876	2,297	1,788	0	0	1,799	3,953	99	2,500	0	-1,500	12,436	0	10,935
14:45	14	17.30	4,508,451	-5,070	-338	6.93	3,469,152	-66,296	-4,420	2,300	1,788	0	0	1,799	3,962	100	2,497	0	-4,758	12,447	0	7,689
15:00	15	17.32	4,513,521	-2,100	-140	7.06	3,535,448	-33,884	-2,259	2,299	1,786	0	0	1,797	3,949	100	2,484	0	-2,399	12,415	0	10,016
15:15	15	17.32	4,515,621	4,749	317	7.13	3,569,332	-64,805	-4,320	2,300	1,788	0	0	1,794	3,957	101	2,500	0	-4,004	12,440	0	8,437
15:30	15	17.31	4,510,873	-6,974	-465	7.26	3,634,137	-22,485	-1,499	2,299	1,788	0	0	1,787	3,962	101	2,500	0	-1,964	12,438	0	10,474
15:45	15	17.33	4,517,847	4,578	305	7.30	3,656,622	-31,735	-2,116	2,300	1,790	0	0	1,782	3,945	102	2,509	0	-1,810	12,429	0	10,618
16:00	16	17.31	4,513,268	-5,090	-339	7.36	3,688,357	-61,999	-4,133	2,298	1,791	0	0	1,814	3,979	103	2,511	0	-4,473	12,496	0	8,024
16:15	16	17.33	4,518,358	-1,014	-68	7.49	3,750,356	-35,786	-2,386	2,298	1,786	0	0	1,802	3,959	103	2,497	0	-2,453	12,446	0	9,993
16:30	16	17.34	4,519,372	-1,186	-79	7.56	3,786,143	-33,639	-2,243	2,301	1,790	0	0	1,800	3,953	104	2,515	0	-2,322	12,464	0	10,142
16:45	16	17.34	4,520,559	-1,462	-97	7.63	3,819,782	-70,559	-4,704	2,298	1,786	0	0	1,797	3,961	104	2,489	0	-4,801	12,435	0	7,634
17:00	17	17.35	4,522,021	-3,099	-207	7.77	3,890,341	-16,734	-1,116	2,298	1,789	0	0	1,803	3,970	105	2,524	0	-1,322	12,490	0	11,168
17:15	17	17.36	4,525,120	414	28	7.80	3,907,075	-31,730	-2,115	2,300	1,788	0	0	1,799	3,975	106	2,510	0	-2,088	12,478	0	10,391
17:30	17	17.36	4,524,706	728	49	7.86	3,938,805	-62,003	-4,134	2,299	1,789	0	0	1,798	3,949	106	2,512	0	-4,085	12,454	0	8,369
17:45	17	17.36	4,523,978	-3,543	-236	7.99	4,000,808	-6,449	-430	2,301	1,788	0	0	1,799	3,953	107	2,512	0	-666	12,459	0	11,793
18:00	18	17.37	4,527,521	-10,217	-681	8.00	4,007,257	-17,318	-1,155	2,301	1,788	0	0	1,800	3,949	107	2,511	0	-1,836	12,456	0	10,620
18:15	18	17.41	4,537,738	-7,956	-530	8.03	4,024,575	-35,164	-2,344	2,301	1,794	0	0	1,802	3,962	108	2,545	0	-2,875	12,512	0	9,637
18:30	18	17.44	4,545,694	1,789	119	8.10	4,059,738	-41,248	-2,750	2,301	1,790	0	0	1,798	3,953	109	2,515	0	-2,631	12,467	0	9,836
18:45	18	17.43	4,543,905	-2,694	-180	8.19	4,100,987	-6,452	-430	2,298	1,790	0	0	1,800	3,969	109	2,524	0	-610	12,491	0	11,881
19:00	19	17.44	4,546,599	-4,804	-320	8.20	4,107,438	-14,571	-971	2,298	1,792	0	0	1,798	3,967	110	2,531	0	-1,292	12,496	0	11,205
19:15	19	17.46	4,551,403	-7,697	-513	8.23	4,122,009	-30,841	-2,056	2,301	1,793	0	0	1,800	3,980	110	2,551	0	-2,569	12,535	0	9,966
19:30	19	17.49	4,559,101	1,898	127	8.29	4,152,851	-17,560	-1,171	2,300	1,791	0	0	1,797	3,962	111	2,531	0	-1,044	12,493	0	11,448
19:45	19	17.48	4,557,203	702	47	8.33	4,170,410	-36,962	-2,464	2,298	1,792	0	0	1,802	3,974	112	2,547	0	-2,417	12,526	0	10,108
20:00	20	17.48	4,556,501	4,535	302	8.40	4,207,372	-247	-16	2,299	1,794	0	0	1,799	3,968	112	2,553	0	286	12,526	0	12,811
20:15	20	17.46	4,551,966	-771	-51	8.40	4,207,619	0	0	2,299	1,811	0	0	1,810	3,989	113	2,692	0	-51	12,714	0	12,663
20:30	20	17.47	4,552,737	-3,582	-239	8.40	4,207,619	0	0	2,299	1,797	0	0	1,793	3,966	113	2,596	0	-239	12,565	0	12,326
20:45	20	17.48	4,556,319	460	31	8.40	4,207,619	-7,802	-520	2,301	1,782	0	0	1,791	3,947	114	2,506	0	-489	12,442	0	11,953
21:00	21	17.48	4,555,858	4,952	330	8.42	4,215,421	-25,176	-1,678	2,300	1,793	0	0	1,814	3,977	115	2,557	0	-1,348	12,556	0	11,208
21:15	21	17.46	4,550,907	5,239	349	8.47	4,240,597	1,590	106	2,302	1,815	0	0	1,816	3,989	115	2,743	0	455	12,780	0	13,236
21:30	21	17.44	4,545,667	35,961	2,397	8.46	4,239,007	-12,123	-808	965	1,809	0	0	1,804	3,998	116	2,756	0	1,589	11,449	0	13,038
21:45	21	17.30	4,509,706	37,917	2,528	8.49	4,251,130	13,704	914	0	1,795	0	0	1,800	3,994	116	2,728	0	3,441	10,433	0	13,874
22:00	22	17.16	4,471,790	20,687	1,379	8.46	4,237,427	-3,267	-218	0	1,797	0	0	1,800	3,997	117	2,740	0	1,161	10,453	0	11,614
22:15	22	17.08	4,451,103	30,358	2,024	8.47	4,240,694	-959	-64	0	1,796	0	0	1,795	3,984	118	2,741	0	1,960	10,435	0	12,395
22:30	22	16.96	4,420,744	28,367	1,891	8.47	4,241,653	8,941	596	0	1,794	0	0	1,799	3,988	118	2,723	0	2,487	10,423	0	12,910
22:45	22	16.85	4,392,377	14,299	953	8.45	4,232,712	-2,632	-175	0	1,795	0	0	1,799	4,001	119	2,717	0	778	10,431	0	11,209
23:00	23	16.80	4,378,078	40,474	2,698	8.46	4,235,344	-1,589	-106	0	1,798	0	0	1,802	3,986	119	2,737	0	2,592	10,443	0	13,036
23:15	23	16.64	4,337,604	13,111	874	8.46	4,236,933	-1,045	-70	0	1,803	0	0	1,804	3,997	120	2,775	0	804	10,500	0	11,304
23:30	23	16.59	4,324,493	9,758	651	8.46	4,237,979	3,830	255	0	1,796	0	0	1,794	3,996	121	2,719	0	906	10,426	0	11,332
23:45	23	16.55	4,314,735	15,005	1,000	8.45	4,234,149	-842	-56	0	1,793	0	0	1,800	3,996	121	2,712	0	944	10,422	0	11,366
0:00	0	16.50	4,299,730	36,851	2,457	8.45	4,234,991	2,612	174	0	1,799	0	0	1,799	3,992	122	2,744	0	2,631	10,455	0	13,086

THURSDAY 8/1/2024

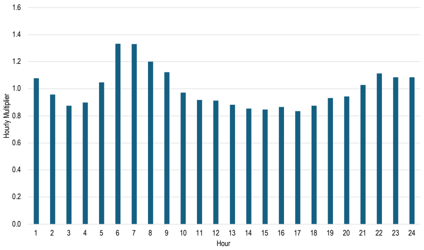
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	12,266	1.07
1	1:00	11,215	0.98
2	2:00	10,677	0.93
3	3:00	10,114	0.88
4	4:00	10,862	0.94
5	5:00	14,502	1.26
6	6:00	14,852	1.29
7	7:00	14,308	1.24
8	8:00	12,625	1.10
9	9:00	12,396	1.08
10	10:00	10,582	0.92
11	11:00	11,130	0.97
12	12:00	11,037	0.96
13	13:00	9,908	0.86
14	14:00	9,900	0.86
15	15:00	9,886	0.86
16	16:00	8,948	0.78
17	17:00	10,430	0.91
18	18:00	10,493	0.91
19	19:00	10,682	0.93
20	20:00	12,438	1.08
21	21:00	12,839	1.12
22	22:00	12,032	1.05
23	23:00	11,760	1.02
	Avg. (gpm)	11,495	1.00
	Avg. (mgd)	16.55	
	Max. (gpm)	14,852	



8/2/2024		Reservoir 1				Reservoir 2				Supply In (gpm)									Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
0:00	0	16.35	4,262,878	72,461	4,831	8.45	4,232,378	-2,997	-200	0	1,805	0	0	1,800	4,000	122	2,790	0	4,631	10,517	0	15,148
0:15	0	16.08	4,190,417	41,551	2,770	8.46	4,235,375	2,206	147	0	1,801	0	0	1,798	3,980	123	2,766	0	2,917	10,468	0	13,385
0:30	0	15.92	4,148,866	18,538	1,236	8.45	4,233,169	-2,646	-176	0	1,791	0	0	1,799	3,991	124	2,713	0	1,059	10,418	0	11,478
0:45	0	15.85	4,130,328	14,663	978	8.46	4,235,815	3,192	213	0	1,793	0	0	1,801	4,000	124	2,706	0	1,190	10,424	0	11,614
1:00	1	15.79	4,115,665	54,519	3,635	8.45	4,232,623	-4,933	-329	0	1,799	0	0	1,798	3,987	125	2,758	0	3,306	10,468	0	13,774
1:15	1	15.58	4,061,146	2,273	152	8.46	4,237,556	4,563	304	0	1,794	0	0	1,800	4,000	126	2,724	0	456	10,444	0	10,899
1:30	1	15.57	4,058,873	4,283	286	8.45	4,232,993	-4,604	-307	0	1,788	0	0	1,796	3,997	126	2,687	0	-21	10,394	0	10,373
1:45	1	15.56	4,054,591	3,120	208	8.46	4,237,597	5,063	338	0	1,777	0.00	0	1,791	3,986	127	2,616	0	546	10,296	0	10,842
2:00	2	15.54	4,051,471	11,982	799	8.45	4,232,534	-13,282	-885	0	1,800	0	0	1,811	3,994	127	2,767	0	-87	10,499	0	10,412
2:15	2	15.50	4,039,488	10,704	714	8.48	4,245,815	13,346	890	0	1,789	0	0	1,816	3,984	128	2,689	0	1,603	10,406	0	12,009
2:30	2	15.46	4,028,784	-5,570	-371	8.45	4,232,469	-6,902	-460	0	1,779	0	0	1,803	3,994	129	2,627	0	-832	10,331	0	9,500
2:45	2	15.48	4,034,355	8,887	592	8.46	4,239,371	-12,591	-839	0	1,772	0	0	1,796	3,959	129	2,539	0	-247	10,195	0	9,948
3:00	3	15.44	4,025,468	-559	-37	8.49	4,251,962	1,283	86	0	1,806	0	0	1,801	4,000	130	2,762	0	48	10,499	0	10,547
3:15	3	15.45	4,026,027	995	66	8.49	4,250,679	-7,031	-469	0	1,791	0	0.0	1,799	3,989	130	2,655	0	-402	10,364	0	9,961
3:30	3	15.44	4,025,031	2,318	155	8.50	4,257,710	0	0	0	1,776	0	0	1,797	3,979	131	2,560	0	155	10,242	0	10,397
3:45	3	15.43	4,022,713	28,510	1,901	8.50	4,257,710	0	0	0	1,782	0	0	1,804	3,973	132	2,564	0	1,901	10,254	0	12,155
4:00	4	15.32	3,994,203	22,310	1,487	8.50	4,257,710	0	0	0	1,808	0	0	1,802	3,985	132	2,802	0	1,487	10,529	0	12,016
4:15	4	15.24	3,971,894	36,760	2,451	8.50	4,257,710	0	0	0	1,795	0	0	1,799	3,991	133	2,725	0	2,451	10,443	0	12,894
4:30	4	15.10	3,935,134	-2,096	-140	8.50	4,257,710	0	0	0	1,793	0	0	1,799	3,997	133	2,707	0	-140	10,429	0	10,290
4:45	4	15.10	3,937,230	53,186	3,546	8.50	4,257,710	13,267	884	0	1,795	0	0	1,802	3,990	134	2,725	0	4,430	10,446	0	14,876
5:00	5	14.90	3,884,044	108,494	7,233	8.47	4,244,443	-13,267	-884	0	1,816	0	0	1,808	3,999	135	2,940	0	6,348	10,696	0	17,045
5:15	5	14.48	3,775,551	86,911	5,794	8.50	4,257,710	0	0	0	1,793	0	0	1,796	3,997	135	2,815	0	5,794	10,536	0	16,330
5:30	5	14.15	3,688,639	65,282	4,352	8.50	4,257,710	0	0	0	1,790	0	0	1,800	3,982	136	2,795	0	4,352	10,502	0	14,854
5:45	5	13.90	3,623,358	76,569	5,105	8.50	4,257,710	0	0	0	1,783	0	0	1,799	4,005	136	2,753	0	5,105	10,477	0	15,582
6:00	6	13.61	3,546,788	100,663	6,711	8.50	4,257,710	0	0	0	1,804	0	0	1,803	4,006	137	2,890	0	6,711	10,639	0	17,350
6:15	6	13.22	3,446,126	85,296	5,686	8.50	4,257,710	0	0	0	1,793	0	0	1,797	4,000	138	2,823	0	5,686	10,551	0	16,237
6:30	6	12.89	3,360,830	65,698	4,380	8.50	4,257,710	0	0	0	1,789	0	0	1,797	3,986	138	2,796	0	4,380	10,507	0	14,887
6:45	6	12.64	3,295,131	70,244	4,683	8.50	4,257,710	0	0	0	1,783	0	0	1,799	3,994	139	2,754	0	4,683	10,469	0	15,152
7:00	7	12.37	3,224,887	79,182	5,279	8.50	4,257,710	0	0	0	1,790	0	0	1,800	3,992	139	2,793	0	5,279	10,515	0	15,794
7:15	7	12.07	3,145,705	50,965	3,398	8.50	4,257,710	0	0	0	1,785	0	0	1,801	3,992	140	2,761	0	3,398	10,479	0	13,877
7:30	7	11.87	3,094,740	54,080	3,605	8.50	4,257,710	0	0	0	1,789	0	0	1,800	3,996	141	2,783	0	3,605	10,508	0	14,114
7:45	7	11.67	3,040,660	47,861	3,191	8.50	4,257,710	0	0	0	1,782	0	0	1,797	3,990	141	2,733	0	3,191	10,443	0	13,634
8:00	8	11.48	2,992,799	55,995	3,733	8.50	4,257,710	0	0	0	1,785	0	0	1,804	4,000	142	2,755	0	3,733	10,486	0	14,219
8:15	8	11.27	2,936,805	48,404	3,227	8.50	4,257,710	0	0	0	1,785	0	0	1,812	3,990	142	2,747	0	3,227	10,477	0	13,704
8:30	8	11.08	2,888,401	38,926	2,595	8.50	4,257,710	0	0	0	1,781	0	0	1,800	3,989	143	2,714	0	2,595	10,427	0	13,022
8:45	8	10.93	2,849,475	35,141	2,343	8.50	4,257,710	0	0	0	1,778	0	0	1,800	3,985	144	2,701	0	2,343	10,407	0	12,750
9:00	9	10.80	2,814,333	24,531	1,635	8.50	4,257,710	0	0	0	1,783	0	0	1,799	3,986	144	2,727	0	1,635	10,438	0	12,074
9:15	9	10.70	2,789,803	28,788	1,919	8.50	4,257,710	0	0	0	1,784	0	0	1,799	3,989	145	2,704	1	1,919	10,422	0	12,341
9:30	9	10.59	2,761,015	11,565	771	8.50	4,257,710	0	0	0	1,782	0	0	1,801	3,986	145	2,693	6	771	10,412	0	11,183
9:45	9	10.55	2,749,450	7,827	522	8.50	4,257,710	0	0	0	1,782	0	0	1,799	3,978	146	2,697	4	522	10,406	0	10,928
10:00	10	10.52	2,741,623	11,683	779	8.50	4,257,710	0	0	0	1,781	0	0	1,798	3,992	147	2,678	5	779	10,400	0	11,179
10:15	10	10.47	2,729,939	6,280	419	8.50	4,257,710	0	0	0	1,786	0	0	1,801	3,987	147	2,710	5	419	10,437	0	10,855
10:30	10	10.45	2,723,659	10,550	703	8.50	4,257,710	0	0	0	1,785	0	0	1,799	3,991	148	2,689	7	703	10,419	0	11,123
10:45	10	10.41	2,713,110	4,933	329	8.50	4,257,710	0	0	0	1,785	0	0	1,801	3,993	148	2,684	13	329	10,424	0	10,753
11:00	11	10.39	2,708,176	27,855	1,857	8.50	4,257,710	0	0	0	1,783	0	0	1,799	4,004	149	2,674	9	1,857	10,418	0	12,275
11:15	11	10.28	2,680,322	2,194	146	8.50	4,257,710	0	0	0	1,790	0	0	1,801	3,992	150	2,714	7	146	10,454	0	10,600
11:30	11	10.27	2,678,127	4,936	329	8.50	4,257,710	0	0	0	1,781	0	0	1,799	3,984	150	2,659	7	329	10,381	0	10,710
11:45	11	10.26	2,673,191	-4,135	-276	8.50	4,257,710	0	0	0	1,783	0	0	1,800	3,991	151	2,672	7	-276	10,403	0	10,128
12:00	12	10.27	2,677,326	3,468	231	8.50	4,257,710	0	0	0	1,781	0	0	1,799	3,989	151	2,647	5	231	10,373	0	10,604
12:15	12	10.26	2,673,858	-1,181	-79	8.50	4,257,710	0	0	0	1,788	0	0	1,799	3,983	152	2,687	3	-79	10,412	0	10,333
12:30	12	10.26	2,675,039	4,174	278	8.50	4,257,710	0	0	0	1,776	0	0	1,795	3,976	153	2,607	4	278	10,311	0	10,589
12:45	12	10.25	2,670,865	4,387	292	8.50	4,257,710	0	0	0	1,794	0	0	1,801	3,986	153	2,697	7	292	10,438	0	10,730
13:00	13	10.23	2,666,478	-2,565	-171	8.50	4,257,710	0	0	0	1,783	0	0	1,799	3,980	154	2,622	7	-171	10,345	0	10,174
13:15	13	10.24	2,669,043	-3,693	-246	8.50	4,257,710	0	0	0	1,782	0	0	1,797	3,987	154	2,629	5	-246	10,355	0	10,109
13:30	13	10.25	2,672,737	10,513	701	8.50	4,257,710	0	0	0	1,779	0	0	1,793	3,980	155	2,597	5	701	10,308	0	11,009
13:45	13	10.21	2,662,224	-9,143	-610	8.50	4,257,710	0	0	0	1,776	0	0	1,792	3,971	156	2,522	4	-610	10,221	0	9,611
14:00	14	10.25	2,671,367	1,169	78	8.50	4,257,710	0	0	0	1,791	0	0	1,810	3,974	156	2,586	4	78	10,321	0	10,399
14:15	14	10.24	2,670,198	3,085	206	8.50	4,257,710	0	0	0	1,785	0	0	1,814	3,964	157	2,536	3	206	10,258	0	10,464
14:30	14	10.23	2,667,113	-193	-13	8.50	4,257,710	0	0	0	1,784	0	0	1,802	3,967	157	2,542	4	-13	10,257	0	10,244
14:45	14	10.23	2,667,306	-12,374	-825	8.50	4,257,710	0	0	0	1,791	0	0	1,802	3,973	158	2,575	4	-825	10,302	0	9,477
15:00	15	10.28	2,679,680	11,805	787	8.50	4,257,710	0	0	0	1,797	0	0	1,802	3,984	159	2,615	4	787	10,361	0	11,148
15:15	15	10.24	2,667,875	-3,401	-227	8.50	4,257,710	0	0	0	1,783	0	0	1,793	3,975	159	2,520	4	-227	10,234	0	10,008
15:30	15	10.25	2,671,276	291	19	8.50	4,257,710	0	0	0	1,799	0	0	1,802	3,976	160	2,578	4	19	10,320	0	10,339
15:45	15	10.25	2,670,985	-4,655	-310	8.50	4,257,710	0	0	0	1,792	0	0	1,799	3,978	160	2,543	4	-310	10,276	0	9,966
16:00	16	10.26	2,675,640	9,118	608	8.50	4,257,710	-19,641	-1,309	0	1,798	0	0	1,803	3,968	161	2,565	4	-701	10,299	0	9,597
16:15	16	10.23	2,666,522	-9,352	-623	8.54	4,277,351	-5,673	-378	0	1,804	0	0	1,803	3,980	162	2,616	3	-1,002	10,369	0	9,367
16:30	16	10.27	2,675,874	-2,548	-170	8.55	4,283,024	-437	-29	0	1,799	0	0	1,798	3,976	162	2,587	4	-199	10,326	0	10,127
16:45	16	10.28	2,678,423	7,801	520	8.55	4,283,460	1,339	89	0	1,797	0	0	1,799	3,970	163	2,577	3	609	10,310	0	10,920
17:00	17	10.25	2,670,622	2,147	143	8.55	4,282,121	2,159	144	0	1,812	(null)	0	1,803	3,995	163	2,679	4	287	10,457	0	10,744
17:15	17	10.24	2,668,475	-3,155	-210	8.54	4,279,962	-1,941	-129	0	1,813	(null)	0	1,800	3,998	164	2,690	4	-340	10,468	0	10,129
17:30	17	10.25	2,671,630	-53	-4	8.55	4,281,903	-2,632	-175	0	1,801	(null)	0	1,798	3,986	165	2,626	4	-179	10,379	0	10,200
17:45	17	10.25	2,671,683	2,763	184	8.55	4,284,535	2,160	144	0	1,812	(null)	0	1,802	3,988	165	2,693	2	328	10,462	0	10,790
18:00	18	10.24	2,668,920	19,335	1,289	8.55	4,282,374	2,091	139	0	1,809	(null)	0	1,800	3,990	166	2,676	5	1,428	10,446	0	11,874
18:15	18	10.16	2,649,586	10,828	722	8.55	4,280,283	-3,120	-208	0	1,807	0	0	1,800	3,982	166	2,672	2	514	10,429	0	10,943
18:30	18	10.12	2,638,758	-6,796	-453	8.55	4,283,403	623	42	0	1,804	0	0	1,800	3,990	167	2,647	3	-412	10,411	0	10,000
18:45	18	10.15	2,645,554	19,514	1,301	8.55	4,282,780	356	24	0	1,807	0	0	1,801	3,988	168	2,669	5	1,325	10,438	0	11,763
19:00	19	10.07	2,626,040	6,922	461	8.55	4,282,425	-822	-55	0	1,811	0	0	1,803	3,986	168	2,698	2	407	10,469	0	10,875
19:15	19	10.05	2,619,118	12,101	807	8.55	4,283,246	595	40	0	1,805	0	0	1,799	3,985	169	2,661	0	846	10,419	0	11,265
19:30	19	10.00	2,607,017	14,325	955	8.55	4,282,652	-142	-9	0	1,811	0	0	1,800	3,993	169	2,732	0	946	10,505	0	11,451
19:45	19	9.95	2,592,691	17,550	1,170	8.55	4,282,794	-829	-55	0	1,808	0	0	1,800	3,981	170	2,708	0	1,115	10,467	0	11,582
20:00	20	9.88	2,575,141	49,452	3,297	8.55	4,283,623	1,911	127	0	1,810	0	0	1,802	3,998	171	2,721	0	3,424	10,502	0	13,926
20:15	20	9.69	2,525,689	17,420	1,161	8.55	4,281,712	-834	-56	0	1,812	0	0	1,808	3,983	171	2,734	0	1,106	10,509	0	11,615
20:30	20	9.62	2,508,269	21,316	1,421	8.55	4,282,546	233	16	0	1,808	0	0	1,800	3,991	172	2,699	0	1,437	10,469	0	11,906
20:45	20	9.54	2,486,952	22,582	1,505	8.55	4,282,313	-2,263	-151	0	1,809	0	0	1,799	3,991	173	2,707	0	1,355	10,478	0	11,833
21:00	21	9.45	2,464,371	67,981	4,532	8.55	4,284,576	2,772	185	0	1,814	0	0	1,799	3,996	173	2,740	0	4,717	10,523	0	15,240
21:15	21	9.19	2,396,389	26,596	1,773	8.55	4,281,804	-918	-61	0	1,808	0	0	1,798	3,998	174	2,718	0	1,712	10,496	0	12,208
21:30	21	9.09	2,369,794	24,317	1,621	8.55	4,282,722	6	0	0	1,812	0	0	1,801	4,002	174	2,724	0	1,622	10,512	0	12,134
21:45	21	9.00	2,345,476	48,227	3,215	8.55	4,282,716	-203	-14	0	1,809	0	0	1,798	4,000	175	2,712	0	3,202	10,494	0	13,696
22:00	22	8.81	2,297,249	43,271	2,885	8.55	4,282,918	768	51	0	1,811	0	0	1,799	4,004	176	2,755	0	2,936	10,544	0	13,480
22:15	22	8.65	2,253,978	41,491	2,766	8.55	4,282,150	-789	-53	0	1,806	0	0	1,799	3,999	176	2,729	0	2,713	10,509	0	13,222
22:30	22	8.49	2,212,487	40,866	2,724	8.55	4,282,939	-186	-12	0	1,802	0	0	1,800	3,990	177	2,701	0	2,712	10,470	0	13,182
22:45	22	8.33	2,171,621	21,357	1,424	8.55	4,283,126	1,990	133	0	1,803	0	0	1,800	3,997	177	2,714	0	1,556	10,491	0	12,048
23:00	23	8.25	2,150,265	40,140	2,676	8.55	4,281,136	-562	-37	0	1,804	0	0	1,798	3,995	178	2,722	0	2,639	10,496	0	13,135
23:15	23	8.10	2,110,125	37,384	2,492	8.55	4,281,698	-94	-6	0	1,805	0	0	1,803	3,999	179	2,726	0	2,486	10,512	0	12,998
23:30	23	7.95	2,072,741	39,691	2,646	8.55	4,281,792	18	1	0	1,804	0	0	1,799	3,995	179	2,714	0	2,647	10,491	0	13,139
23:45	23	7.80	2,033,050	33,332	2,222	8.55	4,281,774	-137	-9	0	1,807	0	0	1,801	3,980	180	2,733	0	2,213	10,502	0	12,715
0:00	0	7.67	1,999,718	87,884	5,859	8.55	4,281,910	582	39	0	1,813	0	0	1,801	3,989	180	2,772	0	5,898	10,555	0	16,452

FRIDAY 8/2/2024

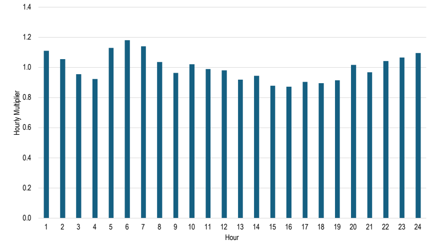
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	12,906	1.08
1	1:00	11,472	0.96
2	2:00	10,467	0.87
3	3:00	10,765	0.90
4	4:00	12,519	1.05
5	5:00	15,953	1.33
6	6:00	15,907	1.33
7	7:00	14,355	1.20
8	8:00	13,424	1.12
9	9:00	11,632	0.97
10	10:00	10,978	0.92
11	11:00	10,928	0.91
12	12:00	10,564	0.88
13	13:00	10,226	0.85
14	14:00	10,146	0.85
15	15:00	10,365	0.87
16	16:00	10,003	0.84
17	17:00	10,466	0.87
18	18:00	11,145	0.93
19	19:00	11,293	0.94
20	20:00	12,320	1.03
21	21:00	13,319	1.11
22	22:00	12,983	1.09
23	23:00	12,997	1.09
	Avg. (gpm)	11,964	1.00
	Avg. (mgd)	17.23	
	Max. (gpm)	15,953	



8/3/2024										Supply In (gpm)												
		Reservoir 1				Reservoir 2													Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
0:00	0	7.33	1,911,834	27,851	1,857	8.55	4,281,329	-937	-62	0	1,806	0	0	1,799	3,989	181	2,729	0	1,794	10,505	0	12,299
0:15	0	7.23	1,883,983	41,117	2,741	8.55	4,282,266	-2,266	-151	0	1,805	0	0	1,799	3,989	182	2,714	0	2,590	10,489	0	13,079
0:30	0	7.07	1,842,866	41,132	2,742	8.55	4,284,532	2,437	162	0	1,802	0	0	1,800	4,008	182	2,697	0	2,905	10,489	0	13,394
0:45	0	6.91	1,801,734	20,083	1,339	8.55	4,282,094	-1,820	-121	0	1,807	0	0	1,802	3,994	183	2,736	0	1,218	10,523	0	11,740
1:00	1	6.84	1,781,651	19,284	1,286	8.55	4,283,914	3,512	234	0	1,798	0	0	1,799	3,997	183	2,680	0	1,520	10,456	0	11,976
1:15	1	6.76	1,762,366	18,027	1,202	8.55	4,280,403	-3,069	-205	0	1,801	0	0	1,802	4,008	184	2,697	0	997	10,492	0	11,489
1:30	1	6.69	1,744,339	17,821	1,188	8.55	4,283,471	749	50	0	1,796	0	0	1,797	3,986	185	2,664	0	1,238	10,428	0	11,666
1:45	1	6.62	1,726,518	35,038	2,336	8.55	4,282,722	125	8	0	1,806	0.00	0	1,801	3,982	185	2,723	0	2,344	10,497	0	12,841
2:00	2	6.49	1,691,480	21,124	1,408	8.55	4,282,597	-1,013	-68	0	1,797	0	0	1,802	3,994	186	2,655	0	1,341	10,435	0	11,775
2:15	2	6.41	1,670,355	-1,774	-118	8.55	4,283,610	-638	-43	0	1,796	0	0	1,800	3,989	186	2,662	0	-161	10,434	0	10,274
2:30	2	6.41	1,672,129	3,909	261	8.55	4,284,248	2,780	185	0	1,785	0	0	1,797	3,975	187	2,586	0	446	10,331	0	10,777
2:45	2	6.40	1,668,220	1,726	115	8.55	4,281,469	765	51	0	1,803	0	0	1,801	3,993	188	2,700	0	166	10,484	0	10,650
3:00	3	6.39	1,666,494	-10,004	-667	8.55	4,280,704	-27,014	-1,801	0	1,778	0	0	1,791	3,978	188	2,540	0	-2,468	10,275	0	7,807
3:15	3	6.43	1,676,498	-5,964	-398	8.60	4,307,718	-84	-6	0	1,792	0	0.0	1,800	3,993	189	2,544	0	-403	10,318	0	9,915
3:30	3	6.45	1,682,462	15,152	1,010	8.60	4,307,801	0	0	0	1,794	0	0	1,802	3,968	189	2,557	0	1,010	10,311	0	11,321
3:45	3	6.40	1,667,310	36,935	2,462	8.60	4,307,801	0	0	0	1,810	0	0	1,808	3,991	190	2,727	0	2,462	10,526	0	12,989
4:00	4	6.25	1,630,375	-552	-37	8.60	4,307,801	-12,887	-859	0	1,796	0	0	1,799	3,987	191	2,636	0	-896	10,409	0	9,514
4:15	4	6.26	1,630,927	1,376	92	8.63	4,320,688	-7,620	-508	0	1,795	0	0	1,797	3,991	191	2,629	0	-416	10,403	0	9,986
4:30	4	6.25	1,629,551	40,377	2,692	8.64	4,328,308	20,507	1,367	0	1,803	0	0	1,803	4,001	192	2,686	0	4,059	10,486	0	14,545
4:45	4	6.10	1,589,174	57,465	3,831	8.60	4,307,801	41,786	2,786	0	1,814	0	0	1,806	3,997	192	2,898	0	6,617	10,709	0	17,325
5:00	5	5.88	1,531,709	-21,680	-1,445	8.52	4,266,015	47,835	3,189	0	1,791	0	0	1,796	3,993	193	2,758	0	1,744	10,530	0	12,274
5:15	5	5.96	1,553,389	4,078	272	8.42	4,218,180	43,327	2,888	0	1,785	0	0	1,796	3,996	194	2,717	0	3,160	10,487	0	13,647
5:30	5	5.94	1,549,311	-16,177	-1,078	8.33	4,174,853	59,966	3,998	0	1,785	0	0	1,799	3,998	194	2,712	0	2,919	10,487	0	13,407
5:45	5	6.01	1,565,488	14,016	934	8.21	4,114,888	43,192	2,879	0	1,795	0	0	1,802	3,995	195	2,774	0	3,814	10,560	0	14,374
6:00	6	5.95	1,551,472	-4,266	-284	8.13	4,071,696	62,779	4,185	0	1,784	0	0	1,800	3,988	195	2,718	0	3,901	10,486	0	14,387
6:15	6	5.97	1,555,738	-8,218	-548	8.00	4,008,917	30,997	2,066	0	1,783	0	0	1,798	3,999	196	2,713	0	1,519	10,489	0	12,007
6:30	6	6.00	1,563,956	-9,956	-664	7.94	3,977,920	33,639	2,243	0	1,782	0	0	1,799	3,987	197	2,705	0	1,579	10,470	0	12,049
6:45	6	6.04	1,573,912	7,184	479	7.87	3,944,280	36,958	2,464	0	1,786	0	0	1,799	3,986	197	2,724	0	2,943	10,493	0	13,436
7:00	7	6.01	1,566,728	-19,395	-1,293	7.80	3,907,322	15,000	1,000	0	1,783	0	0	1,799	3,993	198	2,699	0	-293	10,472	0	10,179
7:15	7	6.09	1,586,123	8,418	561	7.77	3,892,322	28,283	1,886	0	1,783	0	0	1,800	3,996	198	2,696	0	2,447	10,472	0	12,919
7:30	7	6.05	1,577,705	-4,215	-281	7.71	3,864,040	19,938	1,329	0	1,781	0	0	1,799	3,984	199	2,684	0	1,048	10,447	0	11,495
7:45	7	6.07	1,581,920	-5,656	-377	7.67	3,844,101	36,961	2,464	0	1,787	0	0	1,802	3,988	200	2,697	0	2,087	10,474	0	12,561
8:00	8	6.09	1,587,576	3,087	206	7.60	3,807,141	247	16	0	1,786	0	0	1,803	3,998	200	2,688	0	222	10,476	0	10,698
8:15	8	6.08	1,584,489	-4,651	-310	7.60	3,806,894	0	0	0	1,788	0	0	1,801	3,988	201	2,686	0	-310	10,465	0	10,155
8:30	8	6.10	1,589,140	-14,660	-977	7.60	3,806,894	12,880	859	0	1,790	0	0	1,799	3,983	201	2,683	0	-119	10,457	0	10,338
8:45	8	6.15	1,603,801	-4,693	-313	7.57	3,794,013	36,963	2,464	0	1,788	0	0	1,802	3,990	202	2,682	0	2,151	10,465	0	12,616
9:00	9	6.17	1,608,494	-362	-24	7.50	3,757,051	13,127	875	0	1,787	0	0	1,799	3,992	203	2,683	3	851	10,467	0	11,318
9:15	9	6.17	1,608,855	7,906	527	7.47	3,743,924	36,964	2,464	0	1,789	0	0	1,798	3,984	203	2,683	5	2,991	10,463	0	13,455
9:30	9	6.14	1,600,950	-9,975	-665	7.40	3,706,960	247	16	0	1,788	0	0	1,799	3,992	204	2,673	4	-649	10,459	0	9,811
9:45	9	6.18	1,610,925	-8,721	-581	7.40	3,706,713	29,327	1,955	0	1,789	0	0	1,801	3,996	204	2,687	4	1,374	10,482	0	11,856
10:00	10	6.21	1,619,646	-1,020	-68	7.34	3,677,385	20,763	1,384	0	1,787	0	0	1,800	3,989	205	2,682	4	1,316	10,469	0	11,785
10:15	10	6.22	1,620,666	-3,186	-212	7.30	3,656,622	0	0	0	1,790	0	0	1,800	3,990	206	2,680	4	-212	10,471	0	10,259
10:30	10	6.23	1,623,852	-3,751	-250	7.30	3,656,622	12,906	860	0	1,789	0	0	1,800	3,981	206	2,677	5	610	10,458	0	11,069
10:45	10	6.24	1,627,603	10,269	685	7.27	3,643,716	11,841	789	0	1,789	0	0	1,799	3,995	207	2,671	10	1,474	10,471	0	11,945
11:00	11	6.20	1,617,334	-11,116	-741	7.25	3,631,875	9,989	666	0	1,790	0	0	1,800	3,997	207	2,676	7	-75	10,477	0	10,402
11:15	11	6.25	1,628,450	5,085	339	7.23	3,621,886	15,355	1,024	0	1,787	0	0	1,799	3,987	208	2,647	7	1,363	10,434	0	11,797
11:30	11	6.23	1,623,365	-5,195	-346	7.20	3,606,531	0	0	0	1,788	0	0	1,801	3,996	209	2,661	7	-346	10,461	0	10,115
11:45	11	6.25	1,628,561	136	9	7.20	3,606,531	26,931	1,795	0	1,786	0	0	1,800	3,994	209	2,663	11	1,804	10,463	0	12,267
12:00	12	6.25	1,628,425	-2,959	-197	7.15	3,579,600	-20,496	-1,366	0	1,786	0	0	1,802	3,988	210	2,651	11	-1,564	10,449	0	8,885
12:15	12	6.26	1,631,383	390	26	7.19	3,600,096	22,940	1,529	0	1,789	0	0	1,799	3,992	210	2,666	8	1,555	10,465	0	12,020
12:30	12	6.26	1,630,994	-1,800	-120	7.14	3,577,156	7,796	520	0	1,788	0	0	1,800	3,986	211	2,656	12	400	10,453	0	10,853
12:45	12	6.26	1,632,794	1,173	78	7.13	3,569,360	-7,555	-504	0	1,787	0	0	1,801	3,979	212	2,659	5	-425	10,443	0	10,018
13:00	13	6.26	1,631,621	3,490	233	7.14	3,576,915	20,475	1,365	0	1,784	0	0	1,801	3,988	212	2,650	2	1,598	10,437	0	12,035
13:15	13	6.25	1,628,131	-1,581	-105	7.10	3,556,440	0	0	0	1,785	0	0	1,800	3,988	213	2,652	3	-105	10,442	0	10,337
13:30	13	6.25	1,629,712	-1,247	-83	7.10	3,556,440	0	0	0	1,773	0	0	1,791	3,973	213	2,555	4	-83	10,309	0	10,226
13:45	13	6.26	1,630,959	-1,370	-91	7.10	3,556,440	0	0	0	1,791	0	0	1,806	3,996	214	2,651	4	-91	10,462	0	10,371
14:00	14	6.26	1,632,329	-3,013	-201	7.10	3,556,440	0	0	0	1,781	0	0	1,804	3,988	215	2,572	5	-201	10,364	0	10,163
14:15	14	6.27	1,635,342	-7,996	-533	7.10	3,556,440	0	0	0	1,777	0	0	1,798	3,970	215	2,511	4	-533	10,275	0	9,742
14:30	14	6.30	1,643,338	-19,676	-1,312	7.10	3,556,440	0	0	0	1,789	0	0	1,802	3,981	216	2,565	3	-1,312	10,356	0	9,044
14:45	14	6.38	1,663,013	10,808	721	7.10	3,556,440	0	0	0	1,786	0	0	1,801	3,989	216	2,556	4	721	10,351	0	11,072
15:00	15	6.34	1,652,205	-14	-1	7.10	3,556,440	0	0	0	1,784	0	0	1,801	3,980	217	2,539	4	-1	10,324	0	10,323
15:15	15	6.34	1,652,219	-18,816	-1,254	7.10	3,556,440	0	0	0	1,779	0	0	1,797	3,960	218	2,511	3	-1,254	10,267	0	9,013
15:30	15	6.41	1,671,035	-5,541	-369	7.10	3,556,440	0	0	0	1,786	0	0	1,801	3,973	218	2,532	3	-369	10,313	0	9,943
15:45	15	6.43	1,676,576	1,035	69	7.10	3,556,440	0	0	0	1,788	0	0	1,800	3,976	219	2,556	4	69	10,343	0	10,412
16:00	16	6.43	1,675,541	-5,123	-342	7.10	3,556,440	0	0	0	1,789	0	0	1,802	3,989	220	2,556	3	-342	10,359	0	10,017
16:15	16	6.45	1,680,664	-10,316	-688	7.10	3,556,440	0	0	0	1,792	0	0	1,802	3,989	220	2,578	4	-688	10,384	0	9,697
16:30	16	6.49	1,690,980	2,866	191	7.10	3,556,440	0	0	0	1,809	0	0	1,801	3,998	221	2,695	3	191	10,526	0	10,717
16:45	16	6.48	1,688,114	3,990	266	7.10	3,556,440	0	0	0	1,801	0	0	1,801	3,981	221	2,629	5	266	10,439	0	10,705
17:00	17	6.46	1,684,123	-7,050	-470	7.10	3,556,440	0	0	0	1,792	0	0	1,795	3,977	222	2,575	4	-470	10,364	0	9,894
17:15	17	6.49	1,691,174	-3,112	-207	7.10	3,556,440	0	0	0	1,795	0	0	1,801	3,988	223	2,602	3	-207	10,411	0	10,203
17:30	17	6.50	1,694,285	-6,718	-448	7.10	3,556,440	0	0	0	1,793	0	0	1,800	3,977	223	2,587	4	-448	10,385	0	9,937
17:45	17	6.53	1,701,003	3,059	204	7.10	3,556,440	0	0	0	1,809	0	0	1,801	3,992	224	2,699	2	204	10,527	0	10,731
18:00	18	6.51	1,697,944	-12,342	-823	7.10	3,556,440	0	0	0	1,795	0	0	1,796	3,990	224	2,621	0	-823	10,428	0	9,605
18:15	18	6.56	1,710,286	15,874	1,058	7.10	3,556,440	0	0	0	1,807	0	0	1,804	3,988	225	2,703	0	1,058	10,528	0	11,586
18:30	18	6.50	1,694,412	-6,590	-439	7.10	3,556,440	0	0	0	1,812	0	0	1,799	3,993	226	2,734	0	-439	10,563	0	10,124
18:45	18	6.53	1,701,002	-3,945	-263	7.10	3,556,440	0	0	0	1,808	0	0	1,797	3,995	226	2,704	0	-263	10,530	0	10,267
19:00	19	6.54	1,704,947	3,946	263	7.10	3,556,440	0	0	0	1,797	0	0	1,797	3,986	227	2,634	0	263	10,441	0	10,704
19:15	19	6.53	1,701,001	-19,224	-1,282	7.10	3,556,440	2,400	160	0	1,792	0	0	1,798	3,994	227	2,606	0	-1,122	10,417	0	9,296
19:30	19	6.60	1,720,224	-18,363	-1,224	7.10	3,554,040	41,254	2,750	0	1,801	0	0	1,802	3,993	228	2,658	0	1,526	10,482	0	12,008
19:45	19	6.67	1,738,588	19,485	1,299	7.01	3,512,786	35,792	2,386	0	1,809	0	0	1,803	4,003	229	2,715	0	3,685	10,559	0	14,244
20:00	20	6.60	1,719,103	-760	-51	6.94	3,476,994	20,735	1,382	0	1,809	0	0	1,803	4,000	229	2,704	0	1,332	10,546	0	11,878
20:15	20	6.60	1,719,863	-26,126	-1,742	6.90	3,456,259	0	0	0	1,808	0	0	1,800	3,991	230	2,698	0	-1,742	10,526	0	8,784
20:30	20	6.70	1,745,989	-14,109	-941	6.90	3,456,259	12,900	860	0	1,802	0	0	1,798	3,987	230	2,647	0	-81	10,466	0	10,385
20:45	20	6.75	1,760,098	180	12	6.87	3,443,359	36,946	2,463	0	1,810	0	0	1,803	3,977	231	2,715	0	2,475	10,536	0	13,011
21:00	21	6.75	1,759,919	657	44	6.80	3,406,413	14,216	948	0	1,809	0	0	1,799	3,988	232	2,700	0	992	10,527	0	11,519
21:15	21	6.75	1,759,261	1,739	116	6.77	3,392,196	26,453	1,764	0	1,807	0	0	1,799	3,989	232	2,698	0	1,879	10,525	0	12,405
21:30	21	6.74	1,757,522	-1,614	-108	6.72	3,365,743	9,666	644	0	1,806	0	0	1,800	3,999	233	2,684	0	537	10,522	0	11,059
21:45	21	6.75	1,759,136	-176	-12	6.70	3,356,077	29,349	1,957	0	1,810	0	0	1,801	3,997	233	2,712	0	1,945	10,553	0	12,498
22:00	22	6.75	1,759,312	-2,728	-182	6.64	3,326,728	20,741	1,383	0	1,809	0	0	1,799	3,992	234	2,701	0	1,201	10,534	0	11,735
22:15	22	6.76	1,762,040	-10,716	-714	6.60	3,305,987	29,348	1,957	0	1,809	0	0	1,799	3,991	235	2,526	0	1,242	10,359	0	11,602
22:30	22	6.80	1,772,756	13,775	918	6.54	3,276,639	33,638	2,243	0	1,810	0	0	1,800	4,001	235	2,427	0	3,161	10,273	0	13,434
22:45	22	6.75	1,758,981	-18,703	-1,247	6.47	3,243,001	39,346	2,623	0	1,816	0	0	1,800	3,997	236	2,457	0	1,376	10,306	0	11,682
23:00	23	6.82	1,777,684	-2,552	-170	6.40	3,203,655	41,496	2,766	1	1,814	0	0	1,801	3,994	236	2,444	0	2,596	10,290	0	12,887
23:15	23	6.83	1,780,236	-10,751	-717	6.31	3,162,158	41,221	2,748	7	1,811	0	0	1,801	3,994	237	2,440	0	2,031	10,291	0	12,322
23:30	23	6.87	1,790,987	8,286	552	6.23	3,120,938	28,206	1,880	14	1,812	0	0	1,800	4,012	238	2,442	0	2,433	10,317	0	12,750
23:45	23	6.84	1,782,701	-15,210	-1,014	6.17	3,092,731	39,347	2,623	20	1,811	0	0	1,799	3,994	238	2,461	0	1,609	10,322	0	11,931
0:00	0	6.90	1,797,911	-7,346	-490	6.10	3,053,385	41,497	2,766	26	1,808	0	0	1,800	4,004	239	2,440	0	2,277	10,317	0	12,594

SATURDAY 8/3/2024

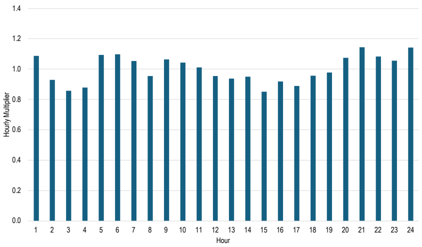
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	12,628	1.11
1	1:00	11,993	1.05
2	2:00	10,869	0.96
3	3:00	10,508	0.92
4	4:00	12,843	1.13
5	5:00	13,426	1.18
6	6:00	12,970	1.14
7	7:00	11,789	1.04
8	8:00	10,952	0.96
9	9:00	11,610	1.02
10	10:00	11,264	0.99
11	11:00	11,145	0.98
12	12:00	10,444	0.92
13	13:00	10,742	0.94
14	14:00	10,005	0.88
15	15:00	9,923	0.87
16	16:00	10,284	0.90
17	17:00	10,191	0.90
18	18:00	10,395	0.91
19	19:00	11,563	1.02
20	20:00	11,015	0.97
21	21:00	11,870	1.04
22	22:00	12,113	1.06
23	23:00	12,472	1.10
	Avg. (gpm)	11,376	1.00
	Avg. (mgd)	16.38	
	Max. (gpm)	13,426	



8/4/2024										Supply In (gpm)									Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
		Reservoir 1				Reservoir 2																
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
0:00	0	6.93	1,805,258	5,597	373	6.01	3,011,888	6,445	430	32	1,805	0	0	1,801	3,989	239	2,442	0	803	10,308	0	11,111
0:15	0	6.90	1,799,661	1,112	74	6.00	3,005,443	12,890	859	38	1,800	0	0	1,799	4,002	240	2,419	0	933	10,299	0	11,233
0:30	0	6.90	1,798,549	-452	-30	5.97	2,992,553	39,348	2,623	45	1,808	0	0	1,802	3,988	241	2,448	0	2,593	10,332	0	12,925
0:45	0	6.90	1,799,001	-7,342	-489	5.90	2,953,205	41,496	2,766	51	1,803	0	0	1,798	3,991	241	2,432	0	2,277	10,316	0	12,593
1:00	1	6.93	1,806,343	2,255	150	5.81	2,911,709	6,448	430	57	1,789	0	0	1,796	3,992	242	2,385	0	580	10,262	0	10,842
1:15	1	6.92	1,804,088	-13,223	-882	5.80	2,905,261	0	0	63	1,781	0	0	1,794	3,975	242	2,355	0	-882	10,212	0	9,330
1:30	1	6.97	1,817,311	3,178	212	5.80	2,905,261	0	0	70	1,804	0	0	1,809	3,990	243	2,450	0	212	10,367	0	10,579
1:45	1	6.96	1,814,132	-2,274	-152	5.80	2,905,261	0	0	76	1,796	0.00	0	1,803	3,982	244	2,409	0	-152	10,310	0	10,158
2:00	2	6.97	1,816,406	-9,325	-622	5.80	2,905,261	0	0	82	1,788	0	0	1,794	3,979	244	2,379	0	-622	10,267	0	9,645
2:15	2	7.00	1,825,731	-6,829	-455	5.80	2,905,261	0	0	88	1,775	0	0	1,797	3,960	245	2,281	0	-455	10,147	0	9,691
2:30	2	7.03	1,832,560	-5,819	-388	5.80	2,905,261	0	0	95	1,808	0	0	1,808	3,997	245	2,441	0	-388	10,394	0	10,006
2:45	2	7.05	1,838,380	-25,494	-1,700	5.80	2,905,261	0	0	101	1,772	0	0	1,788	3,958	246	2,255	0	-1,700	10,120	0	8,421
3:00	3	7.15	1,863,874	-19,241	-1,283	5.80	2,905,261	0	0	107	1,789	0	0	1,803	3,977	247	2,325	0	-1,283	10,248	0	8,966
3:15	3	7.22	1,883,115	-14,981	-999	5.80	2,905,261	0	0	113	1,786	0	0.0	1,802	3,976	247	2,317	0	-999	10,243	0	9,244
3:30	3	7.28	1,898,096	-22,303	-1,487	5.80	2,905,261	0	0	120	1,811	0	0	1,808	4,002	248	2,468	0	-1,487	10,456	0	8,970
3:45	3	7.37	1,920,399	16,712	1,114	5.80	2,905,261	0	0	126	1,794	0	0	1,800	3,986	248	2,390	0	1,114	10,343	0	11,457
4:00	4	7.30	1,903,687	-30,933	-2,062	5.80	2,905,261	3,084	206	132	1,782	0	0	1,795	3,982	249	2,406	0	-1,857	10,346	0	8,490
4:15	4	7.42	1,934,619	-60,235	-4,016	5.79	2,902,177	53,996	3,600	1,864	1,786	0	0	1,792	3,970	250	2,514	0	-416	12,176	0	11,760
4:30	4	7.65	1,994,855	-42,720	-2,848	5.69	2,848,181	72,183	4,812	2,302	1,815	0	0	1,815	4,001	250	2,815	0	1,964	13,000	0	14,964
4:45	4	7.82	2,037,575	-19,713	-1,314	5.54	2,775,998	21,009	1,401	2,300	1,793	0	0	1,796	3,987	251	2,682	0	86	12,809	0	12,896
5:00	5	7.89	2,057,288	-17,182	-1,145	5.50	2,754,989	0	0	2,297	1,775	0	0	1,791	3,975	251	2,568	0	-1,145	12,657	0	11,512
5:15	5	7.96	2,074,470	-18,097	-1,206	5.50	2,754,989	0	0	2,304	1,776	0	0	1,791	3,964	252	2,491	0	-1,206	12,578	0	11,372
5:30	5	8.03	2,092,566	8,513	568	5.50	2,754,989	0	0	2,299	1,801	0	0	1,813	3,997	253	2,708	0	568	12,872	0	13,440
5:45	5	8.00	2,084,053	-10,411	-694	5.50	2,754,989	0	0	2,285	1,776	0	0	1,789	3,986	253	2,544	0	-694	12,633	0	11,939
6:00	6	8.04	2,094,464	-5,515	-368	5.50	2,754,989	0	0	2,290	1,780	0	0	1,786	3,960	254	2,471	0	-368	12,542	0	12,174
6:15	6	8.06	2,099,978	-17,513	-1,168	5.50	2,754,989	0	0	2,297	1,789	0	0	1,805	3,970	254	2,515	0	-1,168	12,631	0	11,463
6:30	6	8.12	2,117,491	-24,184	-1,612	5.50	2,754,989	0	0	2,302	1,808	0	0	1,807	3,973	255	2,640	0	-1,612	12,785	0	11,173
6:45	6	8.22	2,141,675	-14,124	-942	5.50	2,754,989	0	0	2,276	1,773	0	0	1,784	3,941	256	2,456	0	-942	12,487	0	11,546
7:00	7	8.27	2,155,799	-29,018	-1,935	5.50	2,754,989	0	0	2,298	1,785	0	0	1,799	3,973	256	2,496	0	-1,935	12,608	0	10,673
7:15	7	8.38	2,184,817	-26,274	-1,752	5.50	2,754,989	0	0	2,297	1,783	0	0	1,798	3,956	257	2,483	0	-1,752	12,575	0	10,823
7:30	7	8.48	2,211,092	-30,160	-2,011	5.50	2,754,989	0	0	2,302	1,794	0	0	1,808	3,985	257	2,552	0	-2,011	12,698	0	10,687
7:45	7	8.60	2,241,252	-41,683	-2,779	5.50	2,754,989	0	0	2,289	1,782	0	0	1,805	3,962	258	2,486	0	-2,779	12,582	0	9,804
8:00	8	8.76	2,282,935	139	9	5.50	2,754,989	0	0	2,300	1,788	0	0	1,802	3,972	259	2,512	0	9	12,632	0	12,642
8:15	8	8.76	2,282,796	-25,537	-1,702	5.50	2,754,989	0	0	2,295	1,784	0	0	1,799	3,965	259	2,495	0	-1,702	12,597	0	10,895
8:30	8	8.86	2,308,334	-25,083	-1,672	5.50	2,754,989	0	0	2,300	1,795	0	0	1,803	3,968	260	2,563	1	-1,672	12,690	0	11,018
8:45	8	8.95	2,333,417	-4,765	-318	5.50	2,754,989	0	0	2,301	1,786	0	0	1,800	3,967	260	2,512	3	-318	12,630	0	12,312
9:00	9	8.97	2,338,182	-16,743	-1,116	5.50	2,754,989	0	0	2,299	1,788	0	0	1,799	3,955	261	2,514	5	-1,116	12,621	0	11,505
9:15	9	9.03	2,354,925	-3,945	-263	5.50	2,754,989	0	0	2,300	1,787	0	0	1,796	3,964	262	2,508	7	-263	12,625	0	12,362
9:30	9	9.05	2,358,869	-38,897	-2,593	5.50	2,754,989	0	0	2,301	1,790	0	0	1,799	3,987	262	2,526	4	-2,593	12,669	0	10,076
9:45	9	9.20	2,397,767	-10,835	-722	5.50	2,754,989	0	0	2,299	1,790	0	0	1,800	3,961	263	2,523	4	-722	12,640	0	11,917
10:00	10	9.24	2,408,602	-12,944	-863	5.50	2,754,989	0	0	2,300	1,787	0	0	1,798	3,977	264	2,508	4	-863	12,637	0	11,774
10:15	10	9.29	2,421,545	-37,429	-2,495	5.50	2,754,989	0	0	2,304	1,788	0	0	1,797	3,959	264	2,508	5	-2,495	12,625	0	10,130
10:30	10	9.43	2,458,974	-18,521	-1,235	5.50	2,754,989	0	0	2,299	1,789	0	0	1,799	3,961	265	2,512	6	-1,235	12,631	0	11,396
10:45	10	9.50	2,477,495	-21,722	-1,448	5.50	2,754,989	0	0	2,290	1,786	0	0	1,798	3,953	265	2,509	6	-1,448	12,607	0	11,158
11:00	11	9.59	2,499,217	-31,499	-2,100	5.50	2,754,989	0	0	2,294	1,786	0	0	1,797	3,952	266	2,496	9	-2,100	12,599	0	10,499
11:15	11	9.71	2,530,716	-35,990	-2,399	5.50	2,754,989	0	0	2,271	1,785	0	0	1,800	3,966	267	2,490	11	-2,399	12,589	0	10,189
11:30	11	9.85	2,566,706	-30,089	-2,006	5.50	2,754,989	0	0	2,282	1,792	0	0	1,801	3,960	267	2,519	3	-2,006	12,624	0	10,618
11:45	11	9.96	2,596,795	-27,762	-1,851	5.50	2,754,989	0	0	2,263	1,788	0	0	1,796	3,954	268	2,503	4	-1,851	12,576	0	10,725
12:00	12	10.07	2,624,557	-42,295	-2,820	5.50	2,754,989	0	0	2,296	1,788	0	0	1,800	3,955	268	2,501	4	-2,820	12,613	0	9,793
12:15	12	10.23	2,666,852	-21,561	-1,437	5.50	2,754,989	0	0	2,288	1,785	0	0	1,801	3,953	269	2,493	3	-1,437	12,592	0	11,155
12:30	12	10.31	2,688,413	-37,005	-2,467	5.50	2,754,989	0	0	2,278	1,803	0	0	1,171	3,973	270	2,610	3	-2,467	12,108	0	9,641
12:45	12	10.46	2,725,418	-4,241	-283	5.50	2,754,989	0	0	2,296	1,794	0	0	0	3,966	270	2,619	3	-283	10,950	0	10,667
13:00	13	10.47	2,729,659	1,075	72	5.50	2,754,989	0	0	2,303	1,786	0	0	0	3,992	271	2,558	4	72	10,914	0	10,986
13:15	13	10.47	2,728,584	-8,990	-599	5.50	2,754,989	0	0	2,303	1,785	0	0	0	3,976	271	2,557	4	-599	10,896	0	10,297
13:30	13	10.50	2,737,574	-13,767	-918	5.50	2,754,989	0	0	2,303	1,786	0	0	0	3,974	272	2,543	3	-918	10,881	0	9,963
13:45	13	10.56	2,751,342	-5,558	-371	5.50	2,754,989	0	0	2,299	1,790	0	0	0	3,969	273	2,560	4	-371	10,894	0	10,524
14:00	14	10.58	2,756,899	-27,865	-1,858	5.50	2,754,989	0	0	2,306	1,787	0	0	0	3,982	273	2,547	4	-1,858	10,898	0	9,040
14:15	14	10.68	2,784,764	-19,353	-1,290	5.50	2,754,989	0	0	2,300	1,788	0	0	0	3,977	274	2,555	4	-1,290	10,898	0	9,608
14:30	14	10.76	2,804,117	-9,980	-665	5.50	2,754,989	0	0	2,300	1,790	0	0	0	3,972	274	2,569	3	-665	10,908	0	10,243
14:45	14	10.80	2,814,097	-34,558	-2,304	5.50	2,754,989	0	0	2,302	1,786	0	0	0	3,978	275	2,537	4	-2,304	10,882	0	8,578
15:00	15	10.93	2,848,655	-5,153	-344	5.50	2,754,989	0	0	2,298	1,790	0	0	0	3,977	276	2,565	3	-344	10,909	0	10,566
15:15	15	10.95	2,853,808	-21,917	-1,461	5.50	2,754,989	0	0	2,299	1,789	0	0	0	3,986	276	2,558	4	-1,461	10,912	0	9,451
15:30	15	11.03	2,875,725	-3,843	-256	5.50	2,754,989	0	0	2,301	1,794	0	0	0	3,983	277	2,586	3	-256	10,943	0	10,687
15:45	15	11.05	2,879,568	-17,956	-1,197	5.50	2,754,989	0	0	2,298	1,786	0	0	0	3,970	277	2,545	5	-1,197	10,882	0	9,685
16:00	16	11.12	2,897,524	-30,297	-2,020	5.50	2,754,989	0	0	2,299	1,789	0	0	0	3,969	278	2,565	2	-2,020	10,901	0	8,882
16:15	16	11.23	2,927,821	-28,368	-1,891	5.50	2,754,989	0	0	2,044	1,778	0	0	1,154	3,950	279	2,478	4	-1,891	11,687	0	9,796
16:30	16	11.34	2,956,190	-39,988	-2,666	5.50	2,754,989	0	0	2,287	1,796	0	0	1,806	3,960	279	2,515	5	-2,666	12,648	0	9,983
16:45	16	11.49	2,996,177	-33,127	-2,208	5.50	2,754,989	0	0	2,287	1,791	0	0	1,803	3,968	280	2,497	2	-2,208	12,628	0	10,419
17:00	17	11.62	3,029,305	-36,647	-2,443	5.50	2,754,989	0	0	2,280	1,797	0	0	1,810	3,967	280	2,529	4	-2,443	12,668	0	10,225
17:15	17	11.76	3,065,952	-36,452	-2,430	5.50	2,754,989	0	0	2,253	1,788	0	0	1,798	3,959	281	2,483	5	-2,430	12,568	0	10,138
17:30	17	11.90	3,102,404	-33,047	-2,203	5.50	2,754,989	0	0	2,298	1,801	0	0	1,803	3,966	282	2,555	0	-2,203	12,704	0	10,501
17:45	17	12.03	3,135,451	-21,583	-1,439	5.50	2,754,989	0	0	2,289	1,794	0	0	1,796	3,946	282	2,515	0	-1,439	12,622	0	11,183
18:00	18	12.11	3,157,034	-34,901	-2,327	5.50	2,754,989	0	0	2,302	1,796	0	0	1,807	3,968	283	2,526	0	-2,327	12,682	0	10,356
18:15	18	12.25	3,191,934	-31,440	-2,096	5.50	2,754,989	0	0	2,301	1,798	0	0	1,798	3,977	283	2,547	0	-2,096	12,703	0	10,607
18:30	18	12.37	3,223,374	-25,651	-1,710	5.50	2,754,989	0	0	2,294	1,802	0	0	1,801	3,964	284	2,566	0	-1,710	12,712	0	11,002
18:45	18	12.46	3,249,025	-23,882	-1,592	5.50	2,754,989	0	0	2,299	1,793	0	0	1,802	3,956	285	2,518	0	-1,592	12,652	0	11,060
19:00	19	12.56	3,272,906	-13,719	-915	5.50	2,754,989	0	0	2,296	1,801	0	0	1,799	3,966	285	2,559	0	-915	12,706	0	11,792
19:15	19	12.61	3,286,626	-30,945	-2,063	5.50	2,754,989	0	0	2,303	1,807	0	0	1,798	3,970	286	2,580	0	-2,063	12,743	0	10,680
19:30	19	12.73	3,317,571	-4,866	-324	5.50	2,754,989	0	0	2,296	1,815	0	0	1,805	3,981	286	2,708	0	-324	12,893	0	12,568
19:45	19	12.75	3,322,437	-6,444	-430	5.50	2,754,989	0	0	2,295	1,791	0	0	1,801	3,967	287	2,561	0	-430	12,704	0	12,274
20:00	20	12.77	3,328,881	6,317	421	5.50	2,754,989	0	0	2,290	1,780	0	0	1,797	3,969	288	2,494	0	421	12,618	0	13,039
20:15	20	12.75	3,322,563	-4,623	-308	5.50	2,754,989	0	0	2,289	1,783	0	0	1,797	3,960	288	2,508	0	-308	12,626	0	12,318
20:30	20	12.76	3,327,187	-10,560	-704	5.50	2,754,989	0	0	2,301	1,816	0	0	1,803	3,993	289	2,756	0	-704	12,958	0	12,254
20:45	20	12.81	3,337,747	-1,228	-82	5.50	2,754,989	0	0	2,299	1,800	0	0	1,792	3,982	289	2,643	0	-82	12,804	0	12,723
21:00	21	12.81	3,338,975	-30,977	-2,065	5.50	2,754,989	0	0	2,290	1,784	0	0	1,804	3,970	290	2,542	0	-2,065	12,679	0	10,614
21:15	21	12.93	3,369,952	-6,256	-417	5.50	2,754,989	12,901	860	2,287	1,786	0	0	1,804	3,974	291	2,556	0	443	12,698	0	13,141
21:30	21	12.95	3,376,208	2,507	167	5.47	2,742,088	7,588	506	2,299	1,808	0	0	1,805	3,988	291	2,740	0	673	12,931	0	13,604
21:45	21	12.94	3,373,701	-14,237	-949	5.46	2,734,500	-20,489	-1,366	2,237	1,772	0	0	1,792	3,952	292	2,595	0	-2,315	12,639	0	10,324
22:00	22	13.00	3,387,938	-28,210	-1,881	5.50	2,754,989	0	0	2,300	1,783	0	0	1,797	3,957	292	2,645	0	-1,881	12,775	0	10,894
22:15	22	13.11	3,416,148	-35,180	-2,345	5.50	2,754,989	0	0	2,298	1,792	0	0	1,801	3,982	293	2,713	0	-2,345	12,879	0	10,534
22:30	22	13.24	3,451,328	218	15	5.50	2,754,989	0	0	2,301	1,800	0	0	1,796	3,978	294	2,765	0	15	12,933	0	12,947
22:45	22	13.24	3,451,110	-11,561	-771	5.50	2,754,989	0	0	2,301	1,789	0	0	1,810	3,973	294	2,696	0	-771	12,863	0	12,092
23:00	23	13.28	3,462,671	-48,692	-3,246	5.50	2,754,989	2,398	160	2,263	1,781	0	0	1,799	3,951	295	2,648	0	-3,086	12,737	0	9,651
23:15	23	13.47	3,511,363	-14,777	-985	5.50	2,752,591	41,254	2,750	2,268	1,788	0	0	1,803	3,972	295	2,656	0	1,765	12,782	0	14,547
23:30	23	13.53	3,526,141	-6,404	-427	5.41	2,711,337	6,439	429	2,300	1,816	0	0	1,808	3,992	296	2,860	0	2	13,071	0	13,074
23:45	23	13.55	3,532,545	-837	-56	5.40	2,704,898	0	0	2,299	1,807	0	0	1,797	3,988	297	2,840	0	-56	13,029	0	12,973
0:00	0	13.56	3,533,382	-6,576	-438	5.40	2,704,898	0	0	2,299	1,782	0	0	1,791	3,972	297	2,682	0	-438	12,822	0	12,384

SUNDAY 8/4/2024

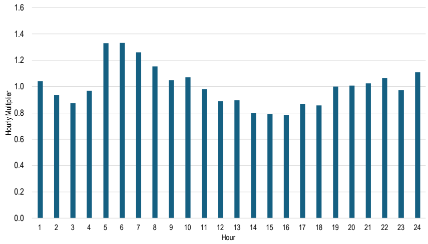
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	11,965	1.09
1	1:00	10,227	0.93
2	2:00	9,441	0.86
3	3:00	9,659	0.88
4	4:00	12,027	1.09
5	5:00	12,066	1.10
6	6:00	11,589	1.05
7	7:00	10,497	0.95
8	8:00	11,717	1.06
9	9:00	11,465	1.04
10	10:00	11,115	1.01
11	11:00	10,508	0.96
12	12:00	10,314	0.94
13	13:00	10,442	0.95
14	14:00	9,367	0.85
15	15:00	10,097	0.92
16	16:00	9,770	0.89
17	17:00	10,512	0.96
18	18:00	10,756	0.98
19	19:00	11,828	1.08
20	20:00	12,583	1.14
21	21:00	11,921	1.08
22	22:00	11,617	1.06
23	23:00	12,561	1.14
	Avg. (gpm)	11,002	1.00
	Avg. (mgd)	15.84	
	Max. (gpm)	12,583	



8/5/2024										Supply In (gpm)												
		Reservoir 1				Reservoir 2																
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2	Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
0:00	0	13.58	3,539,958	4,353	290	5.40	2,704,898	12,880	859	2,288	1,775	0	0	1,792	3,972	298	2,627	0	1,149	12,752	0	13,901
0:15	0	13.56	3,535,605	-26,569	-1,771	5.37	2,692,018	36,964	2,464	2,300	1,809	0	0	1,807	3,997	298	2,864	0	693	13,075	0	13,768
0:30	0	13.67	3,562,174	-22,018	-1,468	5.30	2,655,055	247	16	2,246	1,772	0	0	1,799	3,955	299	2,617	0	-1,451	12,689	0	11,237
0:45	0	13.75	3,584,192	-4,747	-316	5.30	2,654,808	0	0	2,303	1,785	0	0	1,803	3,972	300	2,673	0	-316	12,835	0	12,519
1:00	1	13.77	3,588,938	-29,650	-1,977	5.30	2,654,808	0	0	2,261	1,780	0	0	1,799	3,959	300	2,631	0	-1,977	12,731	0	10,755
1:15	1	13.88	3,618,589	-15,846	-1,056	5.30	2,654,808	0	0	2,298	1,799	0	0	1,806	3,983	301	2,795	0	-1,056	12,983	0	11,926
1:30	1	13.94	3,634,434	-12,412	-827	5.30	2,654,808	0	0	2,297	1,779	0	0	1,794	3,960	301	2,650	0	-827	12,781	0	11,954
1:45	1	13.99	3,646,846	-17,851	-1,190	5.30	2,654,808	0	0	2,286	1,780	0.00	0	1,797	3,969	302	2,656	0	-1,190	12,790	0	11,600
2:00	2	14.06	3,664,697	-44,119	-2,941	5.30	2,654,808	0	0	2,300	1,788	0	0	1,798	3,975	303	2,676	0	-2,941	12,841	0	9,900
2:15	2	14.23	3,708,816	-7,028	-469	5.30	2,654,808	0	0	2,298	1,795	0	0	1,800	3,972	303	2,766	0	-469	12,935	0	12,467
2:30	2	14.26	3,715,844	-9,707	-647	5.30	2,654,808	0	0	2,247	1,769	0	0	1,791	3,951	304	2,594	0	-647	12,657	0	12,009
2:45	2	14.29	3,725,551	-27,584	-1,839	5.30	2,654,808	-31,741	-2,116	2,263	1,776	0	0	1,806	3,960	304	2,631	0	-3,955	12,741	0	8,786
3:00	3	14.40	3,753,135	-61	-4	5.36	2,686,549	-61,998	-4,133	2,277	1,781	0	0	1,808	3,953	305	2,926	0	-4,137	13,050	0	8,913
3:15	3	14.40	3,753,196	1,454	97	5.49	2,748,546	-6,443	-430	2,301	1,810	0	0.0	1,815	3,976	306	3,121	0	-333	13,329	0	12,996
3:30	3	14.39	3,751,742	12,644	843	5.50	2,754,989	0	0	2,297	1,780	0	0	1,796	3,966	306	2,949	0	843	13,094	0	13,937
3:45	3	14.34	3,739,098	-19,399	-1,293	5.50	2,754,989	2,398	160	2,269	1,785	0	0	1,796	3,985	307	2,966	0	-1,133	13,107	0	11,974
4:00	4	14.42	3,758,497	-7,788	-519	5.50	2,752,591	54,152	3,610	2,255	1,787	0	0	1,798	3,965	307	2,930	0	3,091	13,043	0	16,134
4:15	4	14.45	3,766,285	-1,037	-69	5.39	2,698,439	77,620	5,175	2,299	1,816	0	0	1,815	4,000	308	3,255	0	5,105	13,493	0	18,599
4:30	4	14.45	3,767,322	-1,112	-74	5.23	2,620,819	59,753	3,984	2,299	1,795	0	0	1,796	3,987	309	3,119	0	3,909	13,305	0	17,215
4:45	4	14.46	3,768,434	-1,844	-123	5.11	2,561,066	8,838	589	2,299	1,792	0	0	1,797	3,987	309	3,095	0	466	13,279	0	13,745
5:00	5	14.46	3,770,278	3,119	208	5.10	2,552,229	54,151	3,610	2,298	1,793	0	0	1,796	3,990	310	3,095	0	3,818	13,282	0	17,100
5:15	5	14.45	3,767,159	146	10	4.99	2,498,078	77,292	5,153	2,299	1,803	0	0	1,806	3,991	311	3,210	0	5,162	13,420	0	18,583
5:30	5	14.45	3,767,014	-2,782	-185	4.83	2,420,786	64,164	4,278	2,303	1,790	0	0	1,807	3,991	311	3,118	0	4,092	13,321	0	17,413
5:45	5	14.46	3,769,795	-12,937	-862	4.70	2,356,621	4,753	317	2,301	1,788	0	0	1,799	3,999	312	3,088	0	-546	13,286	0	12,741
6:00	6	14.51	3,782,732	-10,841	-723	4.70	2,351,868	54,145	3,610	2,298	1,788	0	0	1,799	3,988	312	3,086	0	2,887	13,270	0	16,157
6:15	6	14.55	3,793,573	-3,474	-232	4.59	2,297,723	72,742	4,849	2,300	1,792	0	0	1,797	3,988	313	3,115	0	4,618	13,305	0	17,923
6:30	6	14.57	3,797,047	1,725	115	4.44	2,224,981	20,990	1,399	2,299	1,787	0	0	1,799	3,983	314	3,071	0	1,514	13,253	0	14,767
6:45	6	14.56	3,795,322	-1,183	-79	4.40	2,203,991	2,397	160	2,301	1,786	0	0	1,799	3,986	314	3,072	0	81	13,258	0	13,339
7:00	7	14.57	3,796,505	2,444	163	4.40	2,201,594	41,253	2,750	2,298	1,783	0	0	1,798	3,996	315	3,049	0	2,913	13,239	0	16,152
7:15	7	14.56	3,794,061	-267	-18	4.31	2,160,342	6,441	429	2,300	1,785	0	0	1,800	3,992	315	3,056	0	412	13,249	0	13,661
7:30	7	14.56	3,794,329	-2,640	-176	4.30	2,153,901	11,709	781	2,299	1,784	0	0	1,799	3,985	316	3,047	0	605	13,231	0	13,836
7:45	7	14.57	3,796,968	-4,325	-288	4.28	2,142,191	7,691	513	2,300	1,773	0	0	1,792	3,955	317	2,981	0	224	13,118	0	13,342
8:00	8	14.58	3,801,293	-11,482	-765	4.26	2,134,500	5,640	376	2,273	1,774	0	0	1,789	3,962	317	2,899	0	-389	13,014	0	12,624
8:15	8	14.63	3,812,775	9,657	644	4.25	2,128,860	3,050	203	2,303	1,804	0	0	1,802	3,988	318	3,036	2	847	13,252	0	14,099
8:30	8	14.59	3,803,118	-6,465	-431	4.24	2,125,810	-2,029	-135	2,295	1,799	0	0	1,814	3,984	318	3,015	5	-566	13,229	0	12,663
8:45	8	14.62	3,809,583	-30,657	-2,044	4.25	2,127,840	16,913	1,128	2,297	1,808	0	0	1,812	3,986	319	3,063	5	-916	13,290	0	12,374
9:00	9	14.73	3,840,240	24,720	1,648	4.21	2,110,927	7,117	474	2,303	1,803	0	0	1,802	3,977	320	3,042	4	2,122	13,251	0	15,373
9:15	9	14.64	3,815,520	-26,587	-1,772	4.20	2,103,810	0	0	2,299	1,780	0	0	1,795	3,970	320	2,916	5	-1,772	13,085	0	11,313
9:30	9	14.74	3,842,107	7,222	481	4.20	2,103,810	0	0	2,289	1,784	0	0	1,799	3,972	321	2,931	4	481	13,101	0	13,583
9:45	9	14.71	3,834,885	-7,554	-504	4.20	2,103,810	0	0	2,295	1,787	0	0	1,797	3,966	321	2,938	11	-504	13,116	0	12,612
10:00	10	14.74	3,842,439	-4,616	-308	4.20	2,103,810	0	0	2,269	1,782	0	0	1,795	3,967	322	2,914	10	-308	13,060	0	12,752
10:15	10	14.76	3,847,055	1,106	74	4.20	2,103,810	0	0	2,285	1,783	0	0	1,801	3,959	323	2,909	8	74	13,067	0	13,141
10:30	10	14.75	3,845,949	-7,645	-510	4.20	2,103,810	0	0	2,238	1,777	0	0	1,794	3,952	323	2,864	11	-510	12,959	0	12,449
10:45	10	14.78	3,853,594	-42,018	-2,801	4.20	2,103,810	0	0	2,173	1,779	0	0	1,797	3,958	324	2,837	12	-2,801	12,879	0	10,078
11:00	11	14.95	3,895,612	-38,350	-2,557	4.20	2,103,810	0	0	2,032	1,768	0	0	1,794	3,925	818	2,775	11	-2,557	13,123	0	10,566
11:15	11	15.09	3,933,962	-38,331	-2,555	4.20	2,103,810	0	0	603	1,785	0	0	1,743	3,735	3,680	2,765	12	-2,555	14,322	0	11,767
11:30	11	15.24	3,972,293	-35,455	-2,364	4.20	2,103,810	0	0	15	473	0	0	1,802	3,768	3,944	2,950	10	-2,364	12,961	0	10,597
11:45	11	15.38	4,007,748	-23,616	-1,574	4.20	2,103,810	0	0	30	0	0	0	1,805	3,907	3,910	2,877	5	-1,574	12,536	0	10,961
12:00	12	15.47	4,031,364	-17,596	-1,173	4.20	2,103,810	0	0	45	0	0	0	1,808	3,898	3,914	2,691	3	-1,173	12,359	0	11,186
12:15	12	15.53	4,048,960	-10,405	-694	4.20	2,103,810	0	0	60	0	0	0	1,029	3,930	3,932	2,692	1	-694	11,644	0	10,950
12:30	12	15.57	4,059,364	-3,080	-205	4.20	2,103,810	0	0	75	0	0	0	434	3,945	3,955	2,713	8	-205	11,130	0	10,925
12:45	12	15.59	4,062,444	-5,945	-396	4.20	2,103,810	0	0	90	0	0	0	918	3,938	3,949	2,712	3	-396	11,611	0	11,214
13:00	13	15.61	4,068,389	-35,456	-2,364	4.20	2,103,810	0	0	105	0	0	0	1,531	3,871	3,863	2,508	4	-2,364	11,881	0	9,517
13:15	13	15.74	4,103,845	-27,303	-1,820	4.20	2,103,810	0	0	120	0	0	0	1,815	3,892	3,888	2,558	4	-1,820	12,277	0	10,457
13:30	13	15.85	4,131,149	-34,931	-2,329	4.20	2,103,810	0	0	135	0	0	0	1,811	3,623	3,907	2,640	3	-2,329	12,119	0	9,790
13:45	13	15.98	4,166,080	-20,696	-1,380	4.20	2,103,810	0	0	150	0	0	0	1,806	2,505	3,959	2,664	4	-1,380	11,087	0	9,708
14:00	14	16.06	4,186,776	-9,895	-660	4.20	2,103,810	0	0	165	0	0	0	1,804	2,492	3,968	2,554	4	-660	10,985	0	10,326
14:15	14	16.10	4,196,671	-18,049	-1,203	4.20	2,103,810	0	0	179	0	0	0	1,805	2,500	3,945	2,519	3	-1,203	10,951	0	9,748
14:30	14	16.17	4,214,720	-20,568	-1,371	4.20	2,103,810	0	0	194	0	0	0	1,800	2,501	3,925	2,428	3	-1,371	10,850	0	9,479
14:45	14	16.25	4,235,288	-20,248	-1,350	4.20	2,103,810	0	0	209	0	0	0	1,802	2,498	3,930	2,393	4	-1,350	10,837	0	9,487
15:00	15	16.33	4,255,536	-20,584	-1,372	4.20	2,103,810	0	0	224	0	0	0	1,802	2,506	3,961	2,416	3	-1,372	10,914	0	9,541
15:15	15	16.41	4,276,121	-22,204	-1,480	4.20	2,103,810	0	0	239	0	0	0	1,801	2,500	3,924	2,396	3	-1,480	10,863	0	9,383
15:30	15	16.49	4,298,324	-17,110	-1,141	4.20	2,103,810	0	0	254	0	0	0	1,800	2,512	3,943	2,425	4	-1,141	10,938	0	9,797
15:45	15	16.56	4,315,434	-13,352	-890	4.20	2,103,810	0	0	269	0	0	0	1,806	2,502	3,940	2,415	4	-890	10,936	0	10,046
16:00	16	16.61	4,328,785	-6,683	-446	4.20	2,103,810	0	0	284	0	0	0	1,800	2,501	3,941	2,419	3	-446	10,948	0	10,502
16:15	16	16.63	4,335,468	-3,094	-206	4.20	2,103,810	0	0	299	0	0	0	1,803	2,503	3,955	2,430	5	-206	10,994	0	10,788
16:30	16	16.64	4,338,563	-3,609	-241	4.20	2,103,810	0	0	314	0	0	0	1,803	2,504	3,943	2,412	4	-241	10,979	0	10,738
16:45	16	16.66	4,342,172	-1,624	-108	4.20	2,103,810	0	0	329	0	0	0	1,800	2,501	3,953	2,438	4	-108	11,025	0	10,917
17:00	17	16.66	4,343,796	-10,381	-692	4.20	2,103,810	0	0	344	0	0	0	1,803	2,495	3,980	2,463	2	-692	11,087	0	10,394
17:15	17	16.70	4,354,177	-84	-6	4.20	2,103,810	0	0	358	0	0	0	1,812	2,504	3,995	2,563	3	-6	11,236	0	11,230
17:30	17	16.70	4,354,261	-21,468	-1,431	4.20	2,103,810	0	0	373	0	0	0	1,797	2,499	3,979	2,523	6	-1,431	11,177	0	9,746
17:45	17	16.79	4,375,729	-3,347	-223	4.20	2,103,810	0	0	388	0	0	0	1,797	2,506	3,984	2,518	2	-223	11,195	0	10,972
18:00	18	16.80	4,379,076	-4,798	-320	4.20	2,103,810	0	0	403	0	0	0	1,808	2,507	3,983	2,517	0	-320	11,219	0	10,899
18:15	18	16.82	4,383,874	-916	-61	4.20	2,103,810	2,400	160	418	0	0	0	1,800	2,501	3,987	2,539	0	99	11,245	0	11,344
18:30	18	16.82	4,384,790	458	31	4.20	2,101,409	41,254	2,750	433	0	0	0	1,797	2,509	3,966	2,528	0	2,781	11,233	0	14,014
18:45	18	16.82	4,384,331	-7,559	-504	4.11	2,060,155	35,796	2,386	448	0	0	0	1,796	2,499	3,981	2,536	1	1,883	11,259	0	13,142
19:00	19	16.85	4,391,890	-204	-14	4.04	2,024,359	20,731	1,382	463	0	0	0	1,807	2,493	3,981	2,541	1	1,368	11,286	0	12,654
19:15	19	16.85	4,392,095	-5,133	-342	4.00	2,003,628	0	0	478	0	0	0	1,805	2,479	3,987	2,563	1	-342	11,313	0	10,970
19:30	19	16.87	4,397,228	5,419	361	4.00	2,003,628	12,909	861	493	0	0	0	1,799	2,512	3,989	2,553	1	1,222	11,346	0	12,568
19:45	19	16.85	4,391,809	-6,754	-450	3.97	1,990,720	40,355	2,690	508	0	0	0	1,798	2,498	3,988	2,551	1	2,240	11,344	0	13,584
20:00	20	16.87	4,398,563	-1,251	-83	3.89	1,950,365	34,359	2,291	523	0	0	0	1,799	2,500	3,977	2,554	1	2,207	11,355	0	13,563
20:15	20	16.88	4,399,814	-4,689	-313	3.83	1,916,006	12,559	837	538	0	0	0	1,805	2,745	3,979	2,568	1	525	11,636	0	12,161
20:30	20	16.90	4,404,503	10,174	678	3.80	1,903,447	0	0	1,559	0	0	0	1,786	3,899	3,891	2,432	1	678	13,568	0	14,246
20:45	20	16.86	4,394,328	-16,027	-1,068	3.80	1,903,447	-38,495	-2,566	2,297	0	0	0	1,796	3,885	3,871	2,441	2	-3,635	14,291	0	10,657
21:00	21	16.92	4,410,355	-7,193	-480	3.88	1,941,942	-24,503	-1,634	2,302	0	0	0	1,797	3,880	3,862	2,461	2	-2,113	14,303	0	12,190
21:15	21	16.95	4,417,548	4,369	291	3.93	1,966,445	-36,940	-2,463	2,301	0	0	0	1,800	3,912	3,886	2,544	2	-2,171	14,445	0	12,274
21:30	21	16.93	4,413,179	-8,250	-550	4.00	2,003,385	-244	-16	2,298	0	0	0	1,807	3,877	3,863	2,474	2	-566	14,322	0	13,755
21:45	21	16.96	4,421,430	4,361	291	4.00	2,003,628	-2,400	-160	2,298	0	0	0	1,798	3,878	3,865	2,472	2	131	14,313	0	14,444
22:00	22	16.95	4,417,069	2,693	180	4.00	2,006,028	-41,254	-2,750	2,301	0	0	0	1,799	3,871	3,851	2,478	2	-2,571	14,302	0	11,731
22:15	22	16.94	4,414,376	-5,855	-390	4.09	2,047,282	-35,792	-2,386	2,300	0	0	0	1,800	3,888	3,876	2,538	2	-2,776	14,405	0	11,629
22:30	22	16.96	4,420,231	2,030	135	4.16	2,083,074	-20,736	-1,382	2,299	0	0	0	1,795	3,875	3,871	2,476	3	-1,247	14,319	0	13,072
22:45	22	16.95	4,418,201	-2,666	-178	4.20	2,103,810	-36,818	-2,455	2,291	0	0	0	1,808	3,861	3,864	2,479	3	-2,632	14,306	0	11,674
23:00	23	16.96	4,420,866	-707	-47	4.27	2,140,628	-13,272	-885	2,299	0	0	0	1,804	3,879	3,864	2,500	3	-932	14,349	0	13,417
23:15	23	16.96	4,421,573	-1,364	-91	4.30	2,153,901	-29,353	-1,957	2,300	0	0	0	1,799	3,911	3,887	2,566	3	-2,048	14,465	0	12,417
23:30	23	16.97	4,422,937	-4,420	-295	4.36	2,183,253	-20,738	-1,383	2,295	0	0	0	1,795	3,878	3,873	2,483	3	-1,677	14,328	0	12,651
23:45	23	16.99	4,427,357	4,342	289	4.40	2,203,991	-31,749	-2,117	2,299	0	0	0	1,795	3,874	3,872	2,473	3	-1,827	14,316	0	12,489
0:00	0	16.97	4,423,015	-5,047	-336	4.46	2,235,740	-61,992	-4,133	2,300	0	0	0	1,798	3,878	3,857	2,472	3	-4,469	14,308	0	9,839

MONDAY 8/5/2024

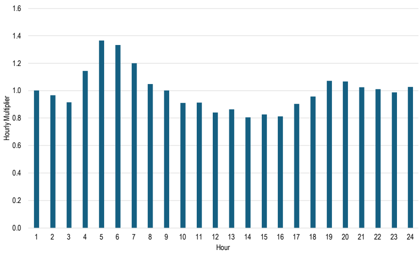
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	12,856	1.04
1	1:00	11,559	0.94
2	2:00	10,790	0.87
3	3:00	11,955	0.97
4	4:00	16,423	1.33
5	5:00	16,459	1.33
6	6:00	15,546	1.26
7	7:00	14,248	1.15
8	8:00	12,940	1.05
9	9:00	13,220	1.07
10	10:00	12,105	0.98
11	11:00	10,973	0.89
12	12:00	11,069	0.90
13	13:00	9,868	0.80
14	14:00	9,760	0.79
15	15:00	9,692	0.79
16	16:00	10,736	0.87
17	17:00	10,586	0.86
18	18:00	12,350	1.00
19	19:00	12,444	1.01
20	20:00	12,656	1.03
21	21:00	13,166	1.07
22	22:00	12,026	0.97
23	23:00	12,743	1.11
	Avg. (gpm)	12,340	1.00
	Avg. (mgd)	17.77	
	Max. (gpm)	16,459	



8/6/2024										Supply In (gpm)												
		Reservoir 1				Reservoir 2													Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
0:00	0	16.99	4,428,063	-2,746	-183	4.59	2,297,732	-35,790	-2,386	2,303	0	0	0	1,815	3,878	3,865	2,511	3	-2,569	14,375	0	11,806
0:15	0	17.00	4,430,808	-4,469	-298	4.66	2,333,523	-43,363	-2,891	2,283	0	0	0	1,799	3,847	3,842	2,457	4	-3,189	14,232	0	11,043
0:30	0	17.02	4,435,277	-493	-33	4.75	2,376,885	-56,818	-3,788	2,300	0	0	0	1,801	3,866	3,859	2,482	4	-3,821	14,310	0	10,489
0:45	0	17.02	4,435,770	-5,103	-340	4.86	2,433,703	-33,638	-2,243	2,276	0	0	0	1,795	3,864	3,837	2,451	4	-2,583	14,228	0	11,645
1:00	1	17.04	4,440,874	-2,313	-154	4.93	2,467,341	-66,297	-4,420	2,303	0	0	0	1,798	3,889	3,875	2,532	4	-4,574	14,400	0	9,826
1:15	1	17.05	4,443,187	7,541	503	5.06	2,533,638	-33,883	-2,259	2,298	0	0	0	1,794	3,846	3,852	2,461	4	-1,756	14,255	0	12,499
1:30	1	17.02	4,435,646	-7,191	-479	5.13	2,567,521	-72,508	-4,834	2,277	0	0	0	1,810	3,848	3,852	2,465	4	-5,313	14,256	0	8,943
1:45	1	17.04	4,442,837	-2,931	-195	5.27	2,640,029	-27,672	-1,845	2,268	0	0.00	0	1,801	3,843	3,838	2,454	4	-2,040	14,209	0	12,169
2:00	2	17.06	4,445,768	154	10	5.33	2,667,701	-66,296	-4,420	2,303	0	0	0	1,803	3,887	3,859	2,516	4	-4,409	14,373	0	9,963
2:15	2	17.06	4,445,614	1,818	121	5.46	2,733,998	-33,884	-2,259	2,277	0	0	0	1,796	3,852	3,843	2,456	5	-2,138	14,228	0	12,090
2:30	2	17.05	4,443,796	-10,540	-703	5.53	2,767,882	-102,217	-6,814	2,268	0	0	0	1,796	3,853	3,837	2,462	5	-7,517	14,221	0	6,704
2:45	2	17.09	4,454,336	6,252	417	5.73	2,870,099	-35,162	-2,344	2,301	0	0	0	1,800	3,865	3,843	2,475	5	-1,927	14,288	0	12,361
3:00	3	17.06	4,448,083	758	51	5.80	2,905,261	-29,342	-1,956	2,300	0	0	0	1,804	3,887	3,874	2,584	5	-1,906	14,454	0	12,548
3:15	3	17.06	4,447,325	-3,976	-265	5.86	2,934,603	-33,639	-2,243	2,297	0	0	0.0	1,806	3,843	3,850	2,474	5	-2,508	14,274	0	11,766
3:30	3	17.08	4,451,301	-1,161	-77	5.93	2,968,242	-36,954	-2,464	2,288	0	0	0	1,800	3,842	3,841	2,467	5	-2,541	14,244	0	11,703
3:45	3	17.08	4,452,462	15,156	1,010	6.00	3,005,197	-246	-16	2,303	0	0	0	1,802	3,863	3,868	2,500	5	994	14,341	0	15,335
4:00	4	17.02	4,437,306	34,002	2,267	6.00	3,005,443	0	0	2,301	0	0	0	1,810	3,932	3,911	2,779	6	2,267	14,738	0	17,005
4:15	4	16.89	4,403,304	11,821	788	6.00	3,005,443	0	0	2,300	0	0	0	1,795	3,903	3,883	2,622	6	788	14,510	0	15,298
4:30	4	16.85	4,391,483	-3,232	-215	6.00	3,005,443	0	0	2,298	0	0	0	1,794	3,889	3,867	2,611	6	-215	14,466	0	14,251
4:45	4	16.86	4,394,715	7,779	519	6.00	3,005,443	0	0	2,247	0	0	0	1,786	3,867	3,835	2,478	6	519	14,220	0	14,739
5:00	5	16.83	4,386,936	29,771	1,985	6.00	3,005,443	0	0	2,303	0	0	0	1,824	3,901	3,912	2,751	6	1,985	14,696	0	16,681
5:15	5	16.72	4,357,164	-2,005	-134	6.00	3,005,443	0	0	2,298	0	0	0	1,802	3,896	3,869	2,622	6	-134	14,493	0	14,359
5:30	5	16.72	4,359,169	16,331	1,089	6.00	3,005,443	0	0	2,302	0	0	0	1,803	3,596	3,895	2,689	6	1,089	14,292	0	15,380
5:45	5	16.66	4,342,838	3,276	218	6.00	3,005,443	0	0	2,301	0	0	0	1,800	2,505	3,938	2,661	6	218	13,211	0	13,429
6:00	6	16.65	4,339,562	33,011	2,201	6.00	3,005,443	0	0	2,301	0	0	0	1,799	2,503	3,945	2,694	7	2,201	13,249	0	15,450
6:15	6	16.52	4,306,551	13,831	922	6.00	3,005,443	0	0	2,298	0	0	0	1,796	2,501	3,931	2,637	7	922	13,170	0	14,092
6:30	6	16.47	4,292,720	-3,274	-218	6.00	3,005,443	-26,942	-1,796	2,301	0	0	0	1,798	2,504	3,922	2,636	7	-2,014	13,168	0	11,153
6:45	6	16.48	4,295,994	-5,266	-351	6.05	3,032,385	7,608	507	2,299	0	0	0	1,786	2,504	3,902	2,536	7	156	13,033	0	13,189
7:00	7	16.50	4,301,260	-3,350	-223	6.04	3,024,777	-30,510	-2,034	2,303	0	0	0	1,806	2,505	3,880	2,671	7	-2,257	13,173	0	10,916
7:15	7	16.51	4,304,610	238	16	6.10	3,055,286	-247	-16	2,294	0	0	0	1,802	2,502	3,888	2,604	7	-1	13,097	0	13,097
7:30	7	16.51	4,304,372	3,479	232	6.10	3,055,533	-29,330	-1,955	2,301	0	0	0	1,801	2,507	3,882	2,649	7	-1,723	13,148	0	11,425
7:45	7	16.50	4,300,893	-1,199	-80	6.16	3,084,864	-20,760	-1,384	2,299	0	0	0	1,799	2,501	3,893	2,638	7	-1,464	13,136	0	11,672
8:00	8	16.50	4,302,091	-8,190	-546	6.20	3,105,624	-6,596	-440	2,302	0	0	0	1,800	2,504	3,887	2,643	8	-986	13,144	0	12,159
8:15	8	16.54	4,310,282	5,152	343	6.21	3,112,220	-46,915	-3,128	2,300	0	0	0	1,801	2,497	3,903	2,649	8	-2,784	13,158	0	10,373
8:30	8	16.52	4,305,130	-10,291	-686	6.31	3,159,135	-46,423	-3,095	2,298	0	0	0	1,796	2,494	3,885	2,622	8	-3,781	13,103	0	9,322
8:45	8	16.56	4,315,422	1,253	84	6.40	3,205,558	-248	-17	2,300	0	0	0	1,799	2,502	3,884	2,621	4	67	13,111	0	13,178
9:00	9	16.55	4,314,168	-991	-66	6.40	3,205,805	-31,715	-2,114	2,276	0	0	0	1,795	2,493	3,898	2,660	5	-2,180	13,126	0	10,946
9:15	9	16.55	4,315,159	-1,278	-85	6.46	3,237,520	-74,887	-4,992	2,292	0	0	0	1,812	2,498	3,880	2,634	4	-5,078	13,120	0	8,043
9:30	9	16.56	4,316,437	-1,260	-84	6.61	3,312,407	-43,422	-2,895	2,295	0	0	0	1,800	2,498	3,885	2,693	4	-2,979	13,175	0	10,196
9:45	9	16.56	4,317,697	2,600	173	6.70	3,355,830	-25,767	-1,718	2,292	0	0	0	1,801	2,496	3,884	2,749	4	-1,544	13,226	0	11,681
10:00	10	16.55	4,315,097	-7,120	-475	6.75	3,381,597	-53,896	-3,593	2,276	0	0	0	1,799	2,495	3,878	2,751	4	-4,068	13,203	0	9,135
10:15	10	16.58	4,322,216	-2,751	-183	6.86	3,435,492	-20,767	-1,384	2,294	0	0	0	1,799	2,500	3,884	2,759	4	-1,568	13,240	0	11,672
10:30	10	16.59	4,324,967	6,116	408	6.90	3,456,259	-31,709	-2,114	2,292	0	0	0	1,798	2,496	3,874	2,772	4	-1,706	13,236	0	11,530
10:45	10	16.57	4,318,851	-5,973	-398	6.96	3,487,968	-62,014	-4,134	2,288	0	0	0	1,797	2,503	3,875	2,751	4	-4,532	13,218	0	8,686
11:00	11	16.59	4,324,824	-1,890	-126	7.09	3,549,982	-44,236	-2,949	2,262	0	0	0	1,799	2,490	3,885	2,759	4	-3,075	13,200	0	10,125
11:15	11	16.60	4,326,713	-1,372	-91	7.18	3,594,218	-62,404	-4,160	2,249	0	0	0	1,796	2,507	3,870	2,753	4	-4,252	13,180	0	8,929
11:30	11	16.60	4,328,085	-1,463	-98	7.30	3,656,622	-31,782	-2,119	2,215	0	0	0	1,811	2,495	3,892	2,742	4	-2,216	13,158	0	10,942
11:45	11	16.61	4,329,548	-7,984	-532	7.36	3,688,404	-61,974	-4,132	2,285	0	0	0	877	2,514	3,904	2,822	4	-4,664	12,407	0	7,743
12:00	12	16.64	4,337,532	-4,650	-310	7.49	3,750,378	-6,425	-428	2,280	0	0	0	0	2,496	3,881	2,823	4	-738	11,484	0	10,745
12:15	12	16.66	4,342,182	-40,573	-2,705	7.50	3,756,803	0	0	2,295	0	0	0	0	2,491	3,898	2,920	3	-2,705	11,607	0	8,902
12:30	12	16.81	4,382,755	-18,369	-1,225	7.50	3,756,803	0	0	2,272	0	0	0	0	2,499	3,889	2,884	4	-1,225	11,548	0	10,324
12:45	12	16.88	4,401,124	-41,448	-2,763	7.50	3,756,803	0	0	2,272	0	0	0	0	2,504	3,889	2,887	4	-2,763	11,556	0	8,793
13:00	13	17.04	4,442,572	-42,412	-2,827	7.50	3,756,803	0	0	2,301	0	0	0	0	2,500	3,904	3,035	3	-2,827	11,744	0	8,916
13:15	13	17.21	4,484,984	-43,956	-2,930	7.50	3,756,803	0	0	2,290	0	0	0	0	2,490	3,893	3,047	4	-2,930	11,725	0	8,794
13:30	13	17.37	4,528,940	-40,121	-2,675	7.50	3,756,803	0	0	2,269	0	0	0	0	2,500	3,878	3,000	3	-2,675	11,650	0	8,976
13:45	13	17.53	4,569,061	-33,113	-2,208	7.50	3,756,803	0	0	2,297	0	0	0	0	2,496	3,897	3,040	4	-2,208	11,734	0	9,526
14:00	14	17.66	4,602,174	-48,001	-3,200	7.50	3,756,803	0	0	2,301	0	0	0	0	2,498	3,900	3,055	4	-3,200	11,758	0	8,558
14:15	14	17.84	4,650,175	-22,252	-1,483	7.50	3,756,803	0	0	2,257	0	0	0	0	2,495	3,884	2,987	2	-1,483	11,625	0	10,141
14:30	14	17.93	4,672,427	-42,754	-2,850	7.50	3,756,803	0	0	2,301	0	0	0	0	2,494	3,910	3,044	1	-2,850	11,751	0	8,901
14:45	14	18.09	4,715,181	-31,820	-2,121	7.50	3,756,803	0	0	2,299	0	0	0	0	2,501	3,893	3,003	3	-2,121	11,699	0	9,577
15:00	15	18.21	4,747,001	-44,990	-2,999	7.50	3,756,803	0	0	2,303	0	0	0	0	2,503	3,904	2,903	4	-2,999	11,617	0	8,618
15:15	15	18.38	4,791,991	-38,419	-2,561	7.50	3,756,803	0	0	2,302	0	0	0	0	2,498	3,914	2,924	5	-2,561	11,644	0	9,082
15:30	15	18.53	4,830,410	-32,104	-2,140	7.50	3,756,803	0	0	2,296	0	0	0	0	2,489	3,902	2,919	7	-2,140	11,612	0	9,472
15:45	15	18.65	4,862,514	-34,566	-2,304	7.50	3,756,803	0	0	2,304	0	0	0	0	2,498	3,903	2,897	0	-2,304	11,601	0	9,297
16:00	16	18.79	4,897,080	-24,437	-1,629	7.50	3,756,803	0	0	2,297	0	0	0	0	2,503	3,899	2,904	0	-1,629	11,603	0	9,974
16:15	16	18.88	4,921,517	-27,153	-1,810	7.50	3,756,803	0	0	2,301	0	0	0	0	2,499	3,914	2,920	0	-1,810	11,634	0	9,824
16:30	16	18.99	4,948,670	-20,794	-1,386	7.50	3,756,803	0	0	2,302	0	0	0	0	2,506	3,918	2,863	0	-1,386	11,589	0	10,202
16:45	16	19.06	4,969,464	-13,796	-920	7.50	3,756,803	0	0	2,305	0	0	0	0	2,501	3,908	2,789	0	-920	11,503	0	10,583
17:00	17	19.12	4,983,260	-9,528	-635	7.50	3,756,803	0	0	2,300	0	0	0	0	2,495	3,905	2,806	0	-635	11,507	0	10,872
17:15	17	19.15	4,992,788	-4,222	-281	7.50	3,756,803	0	0	2,303	0	0	0	0	2,499	3,908	2,795	0	-281	11,505	0	11,224
17:30	17	19.17	4,997,010	-10,291	-686	7.50	3,756,803	0	0	2,302	0	0	0	0	2,495	3,898	2,790	0	-686	11,485	0	10,799
17:45	17	19.21	5,007,301	-18,988	-1,266	7.50	3,756,803	0	0	2,302	0	0	0	0	2,491	3,928	2,620	0	-1,266	11,341	0	10,075
18:00	18	19.28	5,026,289	-4,113	-274	7.50	3,756,803	2,400	160	2,299	0	0	0	0	2,497	3,953	2,669	0	-114	11,418	0	11,304
18:15	18	19.30	5,030,402	-3,729	-249	7.50	3,754,403	41,254	2,750	2,298	0	0	0	0	2,496	3,938	2,582	0	2,502	11,314	0	13,815
18:30	18	19.31	5,034,131	-2,325	-155	7.41	3,713,149	6,436	429	2,301	0	0	0	0	2,506	3,956	2,694	0	274	11,458	0	11,732
18:45	18	19.32	5,036,456	-2,962	-197	7.40	3,706,713	0	0	2,301	0	0	0	0	2,495	3,970	2,722	0	-197	11,487	0	11,289
19:00	19	19.33	5,039,417	-5,501	-367	7.40	3,706,713	2,399	160	2,296	0	0	0	0	2,495	3,961	2,668	0	-207	11,420	0	11,213
19:15	19	19.35	5,044,918	-4,420	-295	7.40	3,704,313	41,254	2,750	2,300	0	0	0	0	2,502	3,949	2,651	0	2,456	11,403	0	13,858
19:30	19	19.37	5,049,338	5,759	384	7.31	3,663,059	6,438	429	2,303	0	0	0	0	2,500	3,944	2,653	0	813	11,400	0	12,213
19:45	19	19.35	5,043,579	-11,127	-742	7.30	3,656,622	0	0	2,302	0	0	0	0	2,500	3,949	2,654	0	-742	11,406	0	10,665
20:00	20	19.39	5,054,707	-3,311	-221	7.30	3,656,622	0	0	2,297	0	0	0	0	2,489	3,960	2,679	0	-221	11,425	0	11,204
20:15	20	19.40	5,058,018	8,794	586	7.30	3,656,622	14,303	954	2,300	0	0	0	0	2,496	3,954	2,631	0	1,540	11,381	0	12,921
20:30	20	19.37	5,049,224	-21,913	-1,461	7.27	3,642,319	-4,272	-285	2,303	0	0	0	0	2,498	3,954	2,503	0	-1,746	11,258	0	9,512
20:45	20	19.46	5,071,137	3,309	221	7.28	3,646,591	16,235	1,082	2,300	0	0	0	0	2,502	3,911	2,426	0	1,303	11,139	0	12,442
21:00	21	19.44	5,067,828	-3,812	-254	7.25	3,630,356	17,003	1,134	2,300	0	0	0	0	2,513	3,941	2,525	0	879	11,279	0	12,158
21:15	21	19.46	5,071,641	1,343	90	7.21	3,613,353	6,822	455	2,298	0	0	0	0	2,492	3,903	2,438	0	544	11,131	0	11,676
21:30	21	19.45	5,070,298	-3,293	-220	7.20	3,606,531	-19,960	-1,331	2,298	0	0	0	0	2,500	3,913	2,414	0	-1,550	11,125	0	9,575
21:45	21	19.46	5,073,591	-2,109	-141	7.24	3,626,491	15,137	1,009	2,299	0	0	0	0	2,506	3,897	2,383	0	869	11,085	0	11,954
22:00	22	19.47	5,075,700	-5,117	-341	7.21	3,611,353	4,822	321	2,301	0	0	0	0	2,506	3,942	2,536	0	-20	11,285	0	11,265
22:15	22	19.49	5,080,817	3,364	224	7.20	3,606,531	0	0	2,301	0	0	0	0	2,496	3,921	2,431	0	224	11,150	0	11,374
22:30	22	19.48	5,077,453	-12,421	-828	7.20	3,606,531	0	0	2,297	0	0	0	0	2,485	3,916	2,414	0	-828	11,111	0	10,283
22:45	22	19.53	5,089,873	-7,279	-485	7.20	3,606,531	12,894	860	2,298	0	0	0	0	2,492	3,911	2,401	0	374	11,101	0	11,476
23:00	23	19.55	5,097,153	-4,970	-331	7.17	3,593,637	36,951	2,463	2,300	0	0	0	0	2,496	3,979	2,565	0	2,132	11,340	0	13,472
23:15	23	19.57	5,102,123	6,938	463	7.10	3,556,686	245	16	2,300	0	0	0	0	2,508	3,959	2,547	0	479	11,314	0	11,793
23:30	23	19.55	5,095,185	-7,059	-471	7.10	3,556,440	0	0	2,297	0	0	0	0	2,498	3,933	2,455	0	-471	11,184	0	10,713
23:45	23	19.57	5,102,243	-13,635	-909	7.10	3,556,440	0	0	2,300	0	0	0	0	2,506	3,880	2,363	0	-909	11,049	0	10,140
0:00	0	19.63	5,115,878	-7,184	-479	7.10	3,556,440	0	0	2,300	0	0	0	0	2,500	3,960	2,548	0	-479	11,309	0	10,830

TUESDAY 8/6/2024

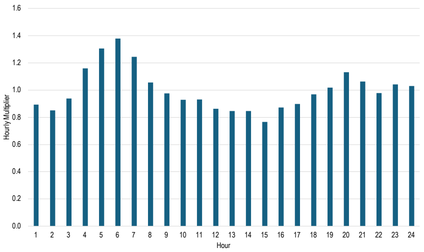
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	11,246	1.00
1	1:00	10,859	0.97
2	2:00	10,280	0.92
3	3:00	12,838	1.14
4	4:00	15,323	1.36
5	5:00	14,962	1.33
6	6:00	13,471	1.20
7	7:00	11,777	1.05
8	8:00	11,258	1.00
9	9:00	10,217	0.91
10	10:00	10,256	0.91
11	11:00	9,435	0.84
12	12:00	9,691	0.86
13	13:00	9,053	0.81
14	14:00	9,294	0.83
15	15:00	9,117	0.81
16	16:00	10,146	0.90
17	17:00	10,742	0.96
18	18:00	12,035	1.07
19	19:00	11,987	1.07
20	20:00	11,520	1.03
21	21:00	11,341	1.01
22	22:00	11,100	0.99
23	23:00	11,529	1.03
	Avg. (gpm)	11,228	1.00
	Avg. (mgd)	16.17	
	Max. (gpm)	15,323	



8/7/2024															Supply In (gpm)							
		Reservoir 1				Reservoir 2													Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
0:00	0	19.65	5,123,062	1,516	101	7.10	3,556,440	0	0	2,297	0	0	0	0	2,500	3,918	2,400	0	101	11,116	0	11,217
0:15	0	19.65	5,121,545	-16,073	-1,072	7.10	3,556,440	0	0	2,300	0	0	0	0	2,497	3,921	2,397	0	-1,072	11,115	0	10,044
0:30	0	19.71	5,137,618	-25,992	-1,733	7.10	3,556,440	0	0	2,303	0	0	0	0	2,514	3,898	2,401	0	-1,733	11,116	0	9,383
0:45	0	19.81	5,163,610	-6,780	-452	7.10	3,556,440	0	0	2,303	0	0	0	0	2,500	3,953	2,508	0	-452	11,264	0	10,812
1:00	1	19.84	5,170,390	-9,927	-662	7.10	3,556,440	0	0	2,298	0	0	0	0	2,488	3,906	2,381	0	-662	11,073	0	10,411
1:15	1	19.87	5,180,318	-22,771	-1,518	7.10	3,556,440	0	0	2,302	0	0	0	0	2,507	3,897	2,383	0	-1,518	11,090	0	9,572
1:30	1	19.96	5,203,089	-23,661	-1,577	7.10	3,556,440	0	0	2,301	0	0	0	0	2,499	3,905	2,384	0	-1,577	11,090	0	9,513
1:45	1	20.05	5,226,750	-18,016	-1,201	7.10	3,556,440	0	0	2,301	0	0.00	0	0	2,508	3,958	2,502	0	-1,201	11,270	0	10,069
2:00	2	20.12	5,244,766	-15,979	-1,065	7.10	3,556,440	0	0	2,299	0	0	0	0	2,494	3,913	2,407	0	-1,065	11,114	0	10,048
2:15	2	20.18	5,260,745	-40,032	-2,669	7.10	3,556,440	0	0	2,297	0	0	0	0	2,501	3,895	2,393	0	-2,669	11,087	0	8,419
2:30	2	20.34	5,300,777	-6,008	-401	7.10	3,556,440	12,885	859	2,299	0	0	0	0	2,505	3,904	2,397	0	458	11,106	0	11,564
2:45	2	20.36	5,306,785	-3,596	-240	7.07	3,543,555	36,959	2,464	2,302	0	0	0	0	2,498	3,962	2,587	0	2,224	11,350	0	13,575
3:00	3	20.37	5,310,381	-5,152	-343	7.00	3,506,596	13,131	875	2,302	0	0	0	0	2,504	3,946	2,495	0	532	11,247	0	11,779
3:15	3	20.39	5,315,533	-9,955	-664	6.97	3,493,466	39,351	2,623	1,024	0	0	0.0	0	2,508	3,975	2,591	0	1,960	10,098	0	12,058
3:30	3	20.43	5,325,488	7,525	502	6.90	3,454,115	61,150	4,077	3	0	0	0	0	2,500	3,973	2,584	0	4,578	9,060	0	13,639
3:45	3	20.40	5,317,963	11,308	754	6.77	3,392,965	92,702	6,180	7	0	0	0	0	2,510	4,035	2,840	0	6,934	9,392	0	16,326
4:00	4	20.36	5,306,655	-2,077	-138	6.59	3,300,263	93,016	6,201	10	0	0	0	0	2,503	3,993	2,703	0	6,063	9,209	0	15,271
4:15	4	20.37	5,308,732	8,024	535	6.40	3,207,248	57,105	3,807	13	0	0	0	0	2,500	3,971	2,631	0	4,342	9,115	0	13,457
4:30	4	20.34	5,300,708	20,562	1,371	6.29	3,150,143	75,240	5,016	17	0	0	0	0	3,876	3,917	2,644	0	6,387	10,453	0	16,840
4:45	4	20.26	5,280,146	12,449	830	6.14	3,074,903	52,542	3,503	20	0	0	0	0	3,955	3,918	2,803	1	4,333	10,697	0	15,029
5:00	5	20.21	5,267,697	13,855	924	6.03	3,022,362	73,435	4,896	23	0	0	0	0	3,936	3,918	2,759	1	5,819	10,638	0	16,457
5:15	5	20.16	5,253,842	8,999	600	5.89	2,948,926	49,757	3,317	26	0	0	0	0	3,947	3,911	2,735	1	3,917	10,621	0	14,539
5:30	5	20.12	5,244,843	10,649	710	5.79	2,899,170	80,329	5,355	30	0	0	0	0	3,927	3,925	2,709	2	6,065	10,593	0	16,658
5:45	5	20.08	5,234,195	18,847	1,256	5.63	2,818,840	66,240	4,416	33	0	0	0	0	3,948	3,933	2,745	2	5,672	10,662	0	16,335
6:00	6	20.01	5,215,347	8,659	577	5.50	2,752,601	54,124	3,608	36	0	0	0	0	3,947	3,927	2,725	3	4,186	10,639	0	14,824
6:15	6	19.98	5,206,688	4,387	292	5.39	2,698,477	49,760	3,317	40	0	0	0	0	3,921	3,928	2,717	3	3,610	10,610	0	14,220
6:30	6	19.96	5,202,301	14,223	948	5.29	2,648,717	50,984	3,399	43	0	0	0	0	3,929	3,916	2,687	4	4,347	10,579	0	14,926
6:45	6	19.90	5,188,078	6,701	447	5.19	2,597,733	42,859	2,857	46	0	0	0	0	3,913	3,921	2,690	4	3,304	10,574	0	13,878
7:00	7	19.88	5,181,377	8,536	569	5.10	2,554,874	13,123	875	49	0	0	0	0	3,935	3,926	2,458	5	1,444	10,374	0	11,817
7:15	7	19.85	5,172,841	9,134	609	5.07	2,541,751	39,355	2,624	53	0	0	0	0	3,928	3,918	1,509	5	3,233	9,413	0	12,646
7:30	7	19.81	5,163,706	14,823	988	5.00	2,502,397	41,494	2,766	56	0	0	0	0	3,925	3,904	1,430	6	3,754	9,320	0	13,074
7:45	7	19.75	5,148,884	22,355	1,490	4.91	2,460,903	8,844	590	59	0	0	0	0	3,934	3,930	1,447	6	2,080	9,377	0	11,457
8:00	8	19.67	5,126,529	1,348	90	4.90	2,452,058	41,246	2,750	63	0	0	0	0	3,921	3,927	1,436	6	2,840	9,352	0	12,192
8:15	8	19.66	5,125,181	1,559	104	4.81	2,410,813	41,156	2,744	66	0	0	0	0	3,925	3,913	1,431	7	2,848	9,343	0	12,190
8:30	8	19.66	5,123,622	1,196	80	4.73	2,369,657	15,393	1,026	69	0	0	0	0	3,912	3,919	1,436	7	1,106	9,344	0	10,450
8:45	8	19.65	5,122,426	16,389	1,093	4.70	2,354,263	0	0	73	0	0	0	0	3,914	3,911	1,435	7	1,093	9,339	0	10,432
9:00	9	19.59	5,106,036	9,685	646	4.70	2,354,263	12,919	861	76	0	0	0	0	3,927	3,911	1,433	4	1,507	9,351	0	10,858
9:15	9	19.55	5,096,351	12,244	816	4.67	2,341,344	36,929	2,462	79	0	0	0	0	3,926	3,910	1,438	3	3,278	9,356	0	12,634
9:30	9	19.50	5,084,108	10,103	674	4.60	2,304,415	242	16	82	0	0	0	0	3,931	3,922	1,442	6	690	9,382	0	10,072
9:45	9	19.47	5,074,005	2,200	147	4.60	2,304,173	0	0	86	0	0	0	0	3,934	3,911	1,450	3	147	9,384	0	9,530
10:00	10	19.46	5,071,805	10,948	730	4.60	2,304,173	12,917	861	89	0	0	0	0	3,938	3,913	1,803	4	1,591	9,747	0	11,338
10:15	10	19.42	5,060,857	-12,074	-805	4.57	2,291,256	36,931	2,462	92	0	0	0	0	3,935	3,919	2,036	3	1,657	9,986	0	11,643
10:30	10	19.46	5,072,931	3,465	231	4.50	2,254,324	242	16	96	0	0	0	0	3,947	3,910	2,036	4	247	9,993	0	10,241
10:45	10	19.45	5,069,466	-799	-53	4.50	2,254,082	2,405	160	99	0	0	0	0	3,915	3,901	2,035	3	107	9,953	0	10,060
11:00	11	19.45	5,070,265	1,969	131	4.50	2,251,677	41,257	2,750	102	0	0	0	0	3,346	3,934	2,097	5	2,882	9,485	0	12,367
11:15	11	19.44	5,068,296	-411	-27	4.41	2,210,420	6,429	429	106	0	0	0	0	2,506	3,958	2,365	4	401	8,938	0	9,339
11:30	11	19.45	5,068,706	-3,506	-234	4.40	2,203,991	0	0	109	0	0	0	0	2,488	3,952	2,449	3	-234	9,001	0	8,767
11:45	11	19.46	5,072,212	6,665	444	4.40	2,203,991	0	0	112	0	0	0	0	2,506	3,963	2,537	3	444	9,121	0	9,566
12:00	12	19.43	5,065,547	2,238	149	4.40	2,203,991	0	0	115	0	0	0	0	2,493	3,954	2,529	4	149	9,096	0	9,245
12:15	12	19.43	5,063,309	-7,207	-480	4.40	2,203,991	29,366	1,958	119	0	0	0	0	2,513	3,966	2,534	4	1,477	9,135	0	10,613
12:30	12	19.45	5,070,516	370	25	4.34	2,174,625	20,725	1,382	122	0	0	0	0	2,490	3,946	2,534	3	1,406	9,095	0	10,502
12:45	12	19.45	5,070,146	-2,285	-152	4.30	2,153,901	0	0	125	0	0	0	0	2,503	3,966	2,532	5	-152	9,130	0	8,978
13:00	13	19.46	5,072,431	-2,039	-136	4.30	2,153,901	9,289	619	129	0	0	0	0	2,504	3,955	2,528	3	483	9,118	0	9,601
13:15	13	19.47	5,074,470	227	15	4.28	2,144,612	13,974	932	132	0	0	0	0	2,499	3,969	2,493	3	947	9,096	0	10,042
13:30	13	19.47	5,074,243	-1,526	-102	4.25	2,130,638	19,988	1,333	135	0	0	0	0	2,501	3,962	2,419	1	1,231	9,019	0	10,250
13:45	13	19.47	5,075,770	-686	-46	4.21	2,110,649	6,840	456	138	0	0	0	0	2,494	3,958	2,412	4	410	9,008	0	9,418
14:00	14	19.48	5,076,456	-3,202	-213	4.20	2,103,810	0	0	142	0	0	0	0	2,487	3,954	2,413	5	-213	9,001	0	8,787
14:15	14	19.49	5,079,658	3,105	207	4.20	2,103,810	0	0	145	0	0	0	0	2,503	3,957	2,410	5	207	9,020	0	9,227
14:30	14	19.48	5,076,553	-8,495	-566	4.20	2,103,810	0	0	148	0	0	0	0	2,505	3,965	2,420	0	-566	9,038	0	8,471
14:45	14	19.51	5,085,048	-4,798	-320	4.20	2,103,810	0	0	152	0	0	0	0	2,846	3,953	2,408	0	-320	9,358	0	9,038
15:00	15	19.53	5,089,845	-3,113	-208	4.20	2,103,810	0	0	155	0	0	0	0	3,235	3,934	2,393	0	-208	9,717	0	9,509
15:15	15	19.54	5,092,958	5,269	351	4.20	2,103,810	0	0	158	0	0	0	0	3,911	3,884	2,345	0	351	10,299	0	10,650
15:30	15	19.52	5,087,689	-4,592	-306	4.20	2,103,810	0	0	162	0	0	0	0	3,903	3,887	2,337	0	-306	10,288	0	9,982
15:45	15	19.54	5,092,281	-419	-28	4.20	2,103,810	0	0	165	0	0	0	0	3,929	3,897	2,380	0	-28	10,371	0	10,344
16:00	16	19.54	5,092,700	-3,308	-221	4.20	2,103,810	0	0	168	0	0	0	0	3,933	3,908	2,409	0	-221	10,418	0	10,198
16:15	16	19.55	5,096,008	-4,617	-308	4.20	2,103,810	-3,281	-219	171	0	0	0	0	3,946	3,940	2,459	0	-527	10,516	0	9,990
16:30	16	19.57	5,100,625	13,421	895	4.21	2,107,090	-26,344	-1,756	175	0	0	0	0	3,922	3,930	2,423	0	-862	10,449	0	9,587
16:45	16	19.52	5,087,205	24,065	1,604	4.26	2,133,434	-1,331	-89	178	0	0	0	0	3,946	3,913	2,417	0	1,516	10,454	0	11,970
17:00	17	19.42	5,063,140	33,996	2,266	4.26	2,134,765	-14,265	-951	181	0	0	0	0	2,564	3,974	2,445	0	1,315	9,164	0	10,480
17:15	17	19.29	5,029,144	44,101	2,940	4.29	2,149,030	-4,870	-325	185	0	0	0	0	2,514	3,954	2,438	0	2,615	9,092	0	11,708
17:30	17	19.12	4,985,043	33,451	2,230	4.30	2,153,901	0	0	188	0	0	0	0	2,503	3,958	2,438	0	2,230	9,088	0	11,318
17:45	17	19.00	4,951,592	36,260	2,417	4.30	2,153,901	0	0	191	0	0	0	0	2,494	3,955	2,451	0	2,417	9,091	0	11,509
18:00	18	18.86	4,915,332	41,299	2,753	4.30	2,153,901	0	0	194	0	0	0	0	2,490	3,960	2,434	0	2,753	9,079	0	11,832
18:15	18	18.70	4,874,032	40,896	2,726	4.30	2,153,901	-29,350	-1,957	198	0	0	0	0	2,499	3,973	2,443	0	770	9,114	0	9,883
18:30	18	18.54	4,833,136	63,807	4,254	4.36	2,183,251	-20,740	-1,383	201	0	0	0	0	2,495	3,984	2,477	0	2,871	9,157	0	12,028
18:45	18	18.30	4,769,329	66,307	4,420	4.40	2,203,991	0	0	204	0	0	0	0	2,496	3,982	2,493	0	4,420	9,176	0	13,597
19:00	19	18.04	4,703,022	56,192	3,746	4.40	2,203,991	0	0	208	0	0	0	0	2,499	3,966	2,484	0	3,746	9,157	0	12,903
19:15	19	17.83	4,646,830	54,440	3,629	4.40	2,203,991	0	0	211	0	0	0	0	2,500	3,974	2,475	0	3,629	9,160	0	12,789
19:30	19	17.62	4,592,390	46,963	3,131	4.40	2,203,991	0	0	214	0	0	0	0	2,496	3,979	2,473	0	3,131	9,162	0	12,293
19:45	19	17.44	4,545,427	80,516	5,368	4.40	2,203,991	0	0	218	0	0	0	0	2,507	3,973	2,497	0	5,368	9,195	0	14,563
20:00	20	17.13	4,464,911	37,529	2,502	4.40	2,203,991	0	0	221	0	0	0	0	2,508	3,976	2,470	0	2,502	9,174	0	11,676
20:15	20	16.99	4,427,382	43,012	2,867	4.40	2,203,991	0	0	224	0	0	0	0	2,508	3,985	2,479	0	2,867	9,196	0	12,063
20:30	20	16.82	4,384,370	51,865	3,458	4.40	2,203,991	0	0	227	0	0	0	0	2,491	3,962	2,441	0	3,458	9,122	0	12,579
20:45	20	16.62	4,332,505	58,219	3,881	4.40	2,203,991	0	0	231	0	0	0	0	2,503	3,984	2,483	0	3,881	9,201	0	13,082
21:00	21	16.40	4,274,285	14,913	994	4.40	2,203,991	-12,891	-859	234	0	0	0	0	3,899	3,933	2,435	0	135	10,501	0	10,636
21:15	21	16.34	4,259,373	19,095	1,273	4.43	2,216,883	-36,953	-2,464	237	0	0	0	0	3,926	3,928	2,423	0	-1,191	10,515	0	9,325
21:30	21	16.27	4,240,278	40,666	2,711	4.50	2,253,836	-246	-16	241	0	0	0	0	3,935	3,915	2,419	0	2,695	10,509	0	13,204
21:45	21	16.11	4,199,612	25,196	1,680	4.50	2,254,082	0	0	244	0	0	0	0	3,929	3,927	2,461	0	1,680	10,561	0	12,241
22:00	22	16.01	4,174,416	23,539	1,569	4.50	2,254,082	0	0	247	0	0	0	0	3,927	3,908	2,427	0	1,569	10,509	0	12,079
22:15	22	15.92	4,150,877	17,421	1,161	4.50	2,254,082	0	0	251	0	0	0	0	3,942	3,918	2,430	0	1,161	10,541	0	11,703
22:30	22	15.86	4,133,456	38,157	2,544	4.50	2,254,082	0	0	254	0	0	0	0	3,934	3,917	2,441	0	2,544	10,546	0	13,089
22:45	22	15.71	4,095,298	42,191	2,813	4.50	2,254,082	-29,339	-1,956	257	0	0	0	0	3,952	3,940	2,494	0	857	10,644	0	11,501
23:00	23	15.55	4,053,107	23,581	1,572	4.56	2,283,421	-20,752	-1,383	260	0	0	0	0	3,921	3,921	2,449	0	189	10,552	0	10,741
23:15	23	15.46	4,029,526	28,245	1,883	4.60	2,304,173	0	0	264	0	0	0	0	3,921	3,932	2,436	0	1,883	10,553	0	12,436
23:30	23	15.35	4,001,282	23,198	1,547	4.60	2,304,173	0	0	267	0	0	0	0	3,921	3,930	2,437	0	1,547	10,556	0	12,102
23:45	23	15.26	3,978,084	29,817	1,988	4.60	2,304,173	0	0	270	0	0	0	0	3,933	3,912	2,461	0	1,988	10,576	0	12,564
0:00	0	15.15	3,948,266	-185,189	-12,346	4.60	2,304,173	50,091	3,339	274	0	0	0	0	3,925	3,920	2,413	0	-9,007	10,532	0	1,525

WEDNESDAY 8/7/2024

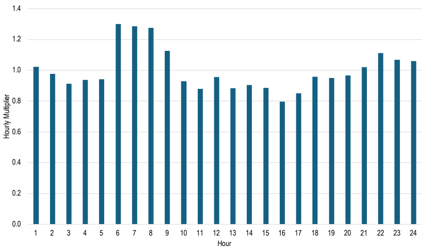
Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	10,364	0.89
1	1:00	9,891	0.85
2	2:00	10,901	0.94
3	3:00	13,450	1.16
4	4:00	15,149	1.31
5	5:00	15,997	1.38
6	6:00	14,462	1.25
7	7:00	12,249	1.06
8	8:00	11,316	0.98
9	9:00	10,774	0.93
10	10:00	10,820	0.93
11	11:00	10,010	0.86
12	12:00	9,834	0.85
13	13:00	9,828	0.85
14	14:00	8,881	0.77
15	15:00	10,121	0.87
16	16:00	10,436	0.90
17	17:00	11,253	0.97
18	18:00	11,835	1.02
19	19:00	13,137	1.13
20	20:00	12,350	1.06
21	21:00	11,351	0.98
22	22:00	12,093	1.04
23	23:00	11,961	1.03
	Avg. (gpm)	11,603	1.00
	Avg. (mgd)	16.71	
	Max. (gpm)	15,997	



8/8/2024										Supply In (gpm)												
		Reservoir 1				Reservoir 2													Tank Supply/Storage (gpm)	Total Supply In (gpm)	Total Supply Out (gpm)	Total Demand (gpm)
Time	Hour	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Level (ft)	Storage (gal)	Supply)(+)/ Storage(-) (gal)	Flow (gpm)	Well 1	Well 3	Well 5	Well 7	Well 9	Well 12	Well 14	MWRF	CM 2				
0:00	0	15.86	4,133,456	38,157	2,544	4.50	2,254,082	0	0	254	0	0	0	0	3,934	3,917	2,441	0	2,544	10,546	0	13,089
0:15	0	15.71	4,095,298	42,191	2,813	4.50	2,254,082	-29,339	-1,956	257	0	0	0	0	3,952	3,940	2,494	0	857	10,644	0	11,501
0:30	0	15.55	4,053,107	23,581	1,572	4.56	2,283,421	-20,752	-1,383	260	0	0	0	0	3,921	3,921	2,449	0	189	10,552	0	10,741
0:45	0	15.46	4,029,526	28,245	1,883	4.60	2,304,173	0	0	264	0	0	0	0	3,921	3,932	2,436	0	1,883	10,553	0	12,436
1:00	1	15.35	4,001,282	23,198	1,547	4.60	2,304,173	0	0	267	0	0	0	0	3,921	3,930	2,437	0	1,547	10,556	0	12,102
1:15	1	15.26	3,978,084	29,817	1,988	4.60	2,304,173	0	0	270	0	0	0	0	3,933	3,912	2,461	0	1,988	10,576	0	12,564
1:30	1	15.15	3,948,266	24,745	1,650	4.60	2,304,173	0	0	274	0	0	0	0	3,925	3,920	2,413	0	1,650	10,532	0	12,182
1:45	1	15.05	3,923,521	3,359	224	4.60	2,304,173	-29,335	-1,956	277	0	0.00	0	0	3,923	3,911	2,422	0	-1,732	10,533	0	8,802
2:00	2	15.04	3,920,163	11,288	753	4.66	2,333,507	-20,756	-1,384	280	0	0	0	0	3,901	3,887	2,375	0	-631	10,444	0	9,813
2:15	2	15.00	3,908,875	16,228	1,082	4.70	2,354,263	0	0	283	0	0	0	0	3,929	3,937	2,499	0	1,082	10,648	0	11,730
2:30	2	14.93	3,892,647	-2,297	-153	4.70	2,354,263	0	0	287	0	0	0	0	3,936	3,922	2,416	0	-153	10,562	0	10,409
2:45	2	14.94	3,894,945	2,062	137	4.70	2,354,263	0	0	290	0	0	0	0	3,922	3,906	2,411	0	137	10,530	0	10,667
3:00	3	14.93	3,892,882	17,248	1,150	4.70	2,354,263	0	0	293	0	0	0	0	3,913	3,903	2,417	0	1,150	10,527	0	11,677
3:15	3	14.87	3,875,635	12,266	818	4.70	2,354,263	0	0	297	0	0	0.0	0	3,941	3,925	2,496	0	818	10,659	0	11,476
3:30	3	14.82	3,863,368	14,521	968	4.70	2,354,263	0	0	300	0	0	0	0	3,919	3,903	2,394	0	968	10,517	0	11,485
3:45	3	14.77	3,848,848	-12,283	-819	4.70	2,354,263	-6,360	-424	303	0	0	0	0	3,898	3,870	2,343	0	-1,243	10,414	0	9,171
4:00	4	14.81	3,861,130	14,791	986	4.71	2,360,624	-19,832	-1,322	307	0	0	0	0	3,907	3,875	2,368	0	-336	10,456	0	10,120
4:15	4	14.76	3,846,339	7,807	520	4.75	2,380,456	-7,419	-495	310	0	0	0	0	3,941	3,942	2,505	0	26	10,698	0	10,723
4:30	4	14.73	3,838,532	26,261	1,751	4.77	2,387,875	-16,479	-1,099	313	0	0	0	0	3,935	3,912	2,452	0	652	10,613	0	11,265
4:45	4	14.63	3,812,271	19,185	1,279	4.80	2,404,354	0	0	316	0	0	0	0	3,932	3,922	2,449	0	1,279	10,620	0	11,899
5:00	5	14.55	3,793,086	36,154	2,410	4.80	2,404,354	0	0	320	0	0	0	0	3,926	3,911	2,445	0	2,410	10,602	0	13,012
5:15	5	14.41	3,756,932	110,967	7,398	4.80	2,404,354	0	0	323	0	0	0	0	3,950	3,960	2,667	0	7,398	10,901	0	18,298
5:30	5	13.99	3,645,965	79,159	5,277	4.80	2,404,354	0	0	326	0	0	0	0	3,939	3,925	2,542	0	5,277	10,732	0	16,009
5:45	5	13.68	3,566,806	40,354	2,690	4.80	2,404,354	0	0	330	0	0	0	0	3,945	3,934	2,510	0	2,690	10,719	0	13,410
6:00	6	13.53	3,526,453	88,949	5,930	4.80	2,404,354	-12,874	-858	333	0	0	0	0	3,944	3,934	2,505	0	5,072	10,717	0	15,788
6:15	6	13.19	3,437,503	86,895	5,793	4.83	2,417,228	-36,968	-2,465	336	0	0	0	0	3,970	3,965	2,701	0	3,328	10,972	0	14,301
6:30	6	12.85	3,350,608	64,237	4,282	4.90	2,454,197	-248	-17	340	0	0	0	0	3,936	3,934	2,520	0	4,266	10,730	0	14,996
6:45	6	12.61	3,286,371	63,761	4,251	4.90	2,454,445	0	0	343	0	0	0	0	3,946	3,916	2,536	0	4,251	10,741	0	14,992
7:00	7	12.36	3,222,611	71,270	4,751	4.90	2,454,445	0	0	346	0	0	0	0	3,941	3,922	2,997	0	4,751	11,206	0	15,957
7:15	7	12.09	3,151,340	60,656	4,044	4.90	2,454,445	0	0	349	0	0	0	0	3,951	3,925	3,236	0	4,044	11,462	0	15,506
7:30	7	11.86	3,090,684	32,782	2,185	4.90	2,454,445	0	0	353	0	0	0	0	3,922	3,905	3,166	0	2,185	11,346	0	13,532
7:45	7	11.73	3,057,903	49,295	3,286	4.90	2,454,445	0	0	356	0	0	0	0	3,933	3,907	3,156	0	3,286	11,352	0	14,639
8:00	8	11.54	3,008,607	26,602	1,773	4.90	2,454,445	0	0	359	0	0	0	0	3,920	3,905	3,137	0	1,773	11,322	0	13,095
8:15	8	11.44	2,982,005	36,183	2,412	4.90	2,454,445	0	0	363	0	0	0	0	3,932	3,911	3,115	0	2,412	11,321	0	13,733
8:30	8	11.30	2,945,822	23,972	1,598	4.90	2,454,445	0	0	366	0	0	0	0	3,908	3,920	3,093	0	1,598	11,288	0	12,886
8:45	8	11.21	2,921,850	23,583	1,572	4.90	2,454,445	0	0	369	0	0	0	0	3,927	3,911	3,124	0	1,572	11,330	0	12,903
9:00	9	11.12	2,898,267	16,985	1,132	4.90	2,454,445	-12,917	-861	372	0	0	0	0	3,917	3,912	3,110	2	271	11,313	0	11,584
9:15	9	11.05	2,881,282	2,397	160	4.93	2,467,362	-36,932	-2,462	376	0	0	0	0	3,913	3,906	3,062	4	-2,302	11,260	0	8,958
9:30	9	11.04	2,878,885	1,941	129	5.00	2,504,293	-242	-16	379	0	0	0	0	3,915	3,909	3,067	6	113	11,276	0	11,390
9:45	9	11.04	2,876,945	3,157	210	5.00	2,504,535	0	0	382	0	0	0	0	3,909	3,892	3,052	5	210	11,240	0	11,451
10:00	10	11.03	2,873,787	-863	-58	5.00	2,504,535	0	0	386	0	0	0	0	3,906	3,892	3,005	4	-58	11,193	0	11,135
10:15	10	11.03	2,874,651	-2,878	-192	5.00	2,504,535	0	0	389	0	0	0	0	3,933	3,895	3,062	4	-192	11,282	0	11,090
10:30	10	11.04	2,877,529	-2,334	-156	5.00	2,504,535	-12,913	-861	392	0	0	0	0	3,907	3,887	3,030	4	-1,016	11,220	0	10,204
10:45	10	11.05	2,879,862	-1,672	-111	5.03	2,517,449	-36,935	-2,462	396	0	0	0	0	3,906	3,872	3,110	4	-2,574	11,288	0	8,714
11:00	11	11.05	2,881,534	3,866	258	5.10	2,554,383	-243	-16	399	0	0	0	0	3,900	3,871	3,101	4	242	11,275	0	11,516
11:15	11	11.04	2,877,668	-2,377	-158	5.10	2,554,626	0	0	402	0	0	0	0	3,888	3,875	3,076	4	-158	11,245	0	11,087
11:30	11	11.05	2,880,045	-2,446	-163	5.10	2,554,626	0	0	405	0	0	0	0	3,887	3,870	3,057	4	-163	11,223	0	11,060
11:45	11	11.06	2,882,491	-3,854	-257	5.10	2,554,626	0	0	409	0	0	0	0	3,904	3,866	3,089	4	-257	11,272	0	11,015
12:00	12	11.07	2,886,345	7,272	485	5.10	2,554,626	0	0	412	0	0	0	0	3,937	3,890	3,157	4	485	11,401	0	11,885
12:15	12	11.05	2,879,072	-1	0	5.10	2,554,626	-29,363	-1,958	415	0	0	0	0	3,881	3,854	3,034	4	-1,958	11,188	0	9,230
12:30	12	11.05	2,879,074	-1,412	-94	5.16	2,583,989	-20,728	-1,382	419	0	0	0	0	3,896	3,874	3,083	4	-1,476	11,276	0	9,800
12:45	12	11.05	2,880,486	-11,004	-734	5.20	2,604,717	-2,720	-181	422	0	0	0	0	3,902	3,875	3,074	4	-915	11,277	0	10,362
13:00	13	11.09	2,891,490	5,524	368	5.21	2,607,437	-24,466	-1,631	425	0	0	0	0	3,886	3,885	3,092	4	-1,263	11,292	0	10,029
13:15	13	11.07	2,885,966	-6,778	-452	5.25	2,631,902	-5,952	-397	428	0	0	0	0	3,910	3,880	3,125	4	-849	11,347	0	10,499
13:30	13	11.10	2,892,744	7,249	483	5.27	2,637,854	-16,954	-1,130	432	0	0	0	0	3,903	3,874	3,095	4	-647	11,308	0	10,661
13:45	13	11.07	2,885,496	-2,831	-189	5.30	2,654,808	0	0	435	0	0	0	0	3,871	3,868	3,062	3	-189	11,240	0	11,051
14:00	14	11.08	2,888,327	-7,376	-492	5.30	2,654,808	0	0	438	0	0	0	0	3,877	3,869	3,068	4	-492	11,257	0	10,765
14:15	14	11.11	2,895,703	-5,459	-364	5.30	2,654,808	-2,400	-160	442	0	0	0	0	3,891	3,865	3,053	4	-524	11,254	0	10,730
14:30	14	11.13	2,901,162	-6,611	-441	5.30	2,657,208	-41,254	-2,750	445	0	0	0	0	3,888	3,878	3,046	4	-3,191	11,261	0	8,070
14:45	14	11.16	2,907,773	16,880	1,125	5.39	2,698,462	-8,836	-589	448	0	0	0	0	3,886	3,878	3,070	4	536	11,286	0	11,823
15:00	15	11.09	2,890,893	-25,176	-1,678	5.40	2,707,298	-41,254	-2,750	452	0	0	0	0	3,888	3,881	3,051	4	-4,429	11,276	0	6,847
15:15	15	11.19	2,916,069	21,496	1,433	5.49	2,748,552	-6,437	-429	455	0	0	0	0	3,880	3,878	3,039	4	1,004	11,256	0	12,260
15:30	15	11.10	2,894,573	-9,429	-629	5.50	2,754,989	-12,902	-860	458	0	0	0	0	3,884	3,877	3,054	4	-1,489	11,277	0	9,788
15:45	15	11.14	2,904,002	-7,949	-530	5.53	2,767,891	-36,945	-2,463	461	0	0	0	0	3,906	3,868	3,043	3	-2,993	11,281	0	8,288
16:00	16	11.17	2,911,952	8,288	553	5.60	2,804,835	-244	-16	465	0	0	0	0	3,893	3,882	3,070	2	536	11,313	0	11,849
16:15	16	11.14	2,903,663	-13,707	-914	5.60	2,805,080	-29,352	-1,957	468	0	0	0	0	3,872	3,878	3,043	3	-2,871	11,264	0	8,393
16:30	16	11.19	2,917,370	10,423	695	5.66	2,834,432	-35,470	-2,365	471	0	0	0	0	3,892	3,876	3,053	5	-1,670	11,298	0	9,628
16:45	16	11.15	2,906,947	7,283	486	5.73	2,869,903	-28,425	-1,895	475	0	0	0	0	3,859	3,876	3,044	5	-1,409	11,258	0	9,848
17:00	17	11.12	2,899,664	-15,347	-1,023	5.79	2,898,327	-6,934	-462	478	0	0	0	0	3,893	3,865	3,050	0	-1,485	11,286	0	9,800
17:15	17	11.18	2,915,010	39,292	2,619	5.80	2,905,261	0	0	481	0	0	0	0	3,893	3,877	3,041	0	2,619	11,293	0	13,913
17:30	17	11.03	2,875,718	-22,389	-1,493	5.80	2,905,261	0	0	485	0	0	0	0	3,933	3,922	2,401	0	-1,493	10,741	0	9,248
17:45	17	11.12	2,898,107	16,368	1,091	5.80	2,905,261	0	0	488	0	0	0	0	3,925	3,917	2,387	0	1,091	10,717	0	11,808
18:00	18	11.06	2,881,739	2,882	192	5.80	2,905,261	0	0	491	0	0	0	0	3,932	3,903	2,391	0	192	10,717	0	10,909
18:15	18	11.04	2,878,857	17,891	1,193	5.80	2,905,261	0	0	494	0	0	0	0	3,933	3,906	2,398	0	1,193	10,731	0	11,924
18:30	18	10.98	2,860,966	3,317	221	5.80	2,905,261	0	0	498	0	0	0	0	3,923	3,909	2,403	0	221	10,733	0	10,954
18:45	18	10.96	2,857,649	-11,964	-798	5.80	2,905,261	0	0	1,315	0	0	0	0	3,889	3,883	2,300	0	-798	11,387	0	10,589
19:00	19	11.01	2,869,612	-9,064	-604	5.80	2,905,261	0	0	2,283	0	0	0	0	3,860	3,861	2,242	0	-604	12,246	0	11,641
19:15	19	11.04	2,878,677	-165	-11	5.80	2,905,261	-2,395	-160	2,297	0	0	0	0	3,902	3,884	2,348	0	-171	12,431	0	12,260
19:30	19	11.04	2,878,842	4,387	292	5.80	2,907,656	-41,251	-2,750	2,283	0	0	0	0	3,869	3,844	2,224	0	-2,458	12,219	0	9,761
19:45	19	11.03	2,874,455	-5,836	-389	5.89	2,948,907	-6,445	-430	2,296	0	0	0	0	3,902	3,871	2,304	0	-819	12,374	0	11,555
20:00	20	11.05	2,880,291	-19,533	-1,302	5.90	2,955,352	12,891	859	2,299	0	0	0	0	3,885	3,885	2,335	0	-443	12,404	0	11,961
20:15	20	11.12	2,899,824	-9,944	-663	5.87	2,942,461	36,954	2,464	2,299	0	0	0	0	3,931	3,899	2,414	0	1,801	12,543	0	14,344
20:30	20	11.16	2,909,769	9,972	665	5.80	2,905,507	-12,644	-843	2,297	0	0	0	0	3,906	3,905	2,359	0	-178	12,467	0	12,289
20:45	20	11.12	2,899,796	-13,091	-873	5.83	2,918,151	-36,955	-2,464	2,301	0	0	0	0	3,915	3,883	2,363	0	-3,336	12,462	0	9,125
21:00	21	11.18	2,912,888	-11,152	-743	5.90	2,955,106	12,643	843	2,301	0	0	0	0	3,896	3,865	2,330	0	99	12,393	0	12,492
21:15	21	11.22	2,924,039	-1,311	-87	5.87	2,942,463	36,956	2,464	2,301	0	0	0	0	3,913	3,904	2,430	0	2,376	12,548	0	14,924
21:30	21	11.22	2,925,350	-5,578	-372	5.80	2,905,507	246	16	2,297	0	0	0	0	3,908	3,899	2,394	0	-355	12,498	0	12,142
21:45	21	11.24	2,930,928	-1,409	-94	5.80	2,905,261	0	0	2,296	0	0	0	0	3,921	3,883	2,350	0	-94	12,450	0	12,356
22:00	22	11.25	2,932,337	1,504	100	5.80	2,905,261	0	0	2,301	0	0	0	0	3,913	3,881	2,348	0	100	12,443	0	12,544
22:15	22	11.24	2,930,833	523	35	5.80	2,905,261	0	0	2,296	0	0	0	0	3,932	3,907	2,415	0	35	12,550	0	12,585
22:30	22	11.24	2,930,310	-2,826	-188	5.80	2,905,261	0	0	2,300	0	0	0	0	3,905	3,896	2,380	0	-188	12,481	0	12,293
22:45	22	11.25	2,933,136	1,371	91	5.80	2,905,261	0	0	2,296	0	0	0	0	3,911	3,879	2,341	0	91	12,427	0	12,518
23:00	23	11.25	2,931,765	-1,118	-75	5.80	2,905,261	0	0	2,300	0	0	0	0	3,895	3,859	2,295	0	-75	12,350	0	12,275
23:15	23	11.25	2,932,882	564	38	5.80	2,905,261	0	0	2,300	0	0	0	0	3,935	3,910	2,424	0	38	12,568	0	12,606
23:30	23	11.25	2,932,319	-14,146	-943	5.80	2,905,261	0	0	2,300	0	0	0	0	3,918	3,896	2,380	0	-943	12,494	0	11,551
23:45	23	11.30	2,946,465	10,255	684	5.80	2,905,261	0	0	2,297	0	0	0	0	3,895	3,867	2,328	0	684	12,387	0	13,071
0:00	0	11.26	2,936,210	2,936,210	195,747	5.80	2,905,261	2,905,261	193,684	2,294	0	0	0	0	3,898	3,858	2,304	0	389,431	12,354	0	401,785

THURSDAY 8/8/2024

Hour	Hour	Flow (gpm)	Hourly Multiplier
0	0:00	11,942	1.02
1	1:00	11,412	0.98
2	2:00	10,655	0.91
3	3:00	10,952	0.94
4	4:00	11,002	0.94
5	5:00	15,182	1.30
6	6:00	15,019	1.29
7	7:00	14,908	1.28
8	8:00	13,154	1.13
9	9:00	10,846	0.93
10	10:00	10,286	0.88
11	11:00	11,169	0.96
12	12:00	10,319	0.88
13	13:00	10,560	0.90
14	14:00	10,347	0.89
15	15:00	9,296	0.80
16	16:00	9,930	0.85
17	17:00	11,192	0.96
18	18:00	11,094	0.95
19	19:00	11,305	0.97
20	20:00	11,930	1.02
21	21:00	12,979	1.11
22	22:00	12,485	1.07
23	23:00	12,376	1.06
	Avg. (gpm)	11,681	1.00
	Avg. (mgd)	16.82	
	Max. (gpm)	15,182	



APPENDIX H.2

2025 ORANGE COUNTY WATER DEMAND MODEL TECHNICAL MEMORANDUM

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2025 Orange County Water Demand Projection Model Technical Memorandum

December 30, 2025

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List of Modeling Terms

Term	Working Definition
Billing Class	Group of customers defined in rate schedule for revenue collection
Billing Accounts	Group of accounts defined in rate schedule for revenue collection
Sector	One or more billing classes combined for modeling
Driver Unit (Driver)	Indicator of scale or growth for a given sector (counts)
Rate of Use	Measure of water use per driver unit
Econometric Model	Multiple regression model specifying economic variables
Explanatory Variable (i.e. water price and maximum monthly temperature)	A variable specified in a regression model to explain variability in water use
Coefficient	Elasticity (multiplier) that measures the response of water use to changes in explanatory variables
Model Fitting	Process of estimating parameters that measure the response of water use to changes in explanatory variables
Model Prediction	Calculation of water use for assumed values of explanatory variables
Nominal Income	The amount of money a person or an entity earns, without accounting for inflation or changes in purchasing power
Nominal Price	The stated price of an item without any adjustments for inflation representing its value in currency at the time of a transaction
Relative Sectoral Employment	Employment in each Commercial, Industrial, or Institutional sector

List of Acronyms

Term	Working Definition
CalAdapt	California Climate Adaptation Platform
CCF	Hundred Cubic Feet
CII	Commercial, Industrial & Institutional
CMIP6	Coupled Model Intercomparison Project (Phase 6)
DOF	California Department of Finance
GDP	Gross Domestic Product
GIS	Geographic Information System
LEHD/LODES	Longitudinal Employer Household Dynamics / Origin Destination Employment Statistics
MF	Multifamily (Residential)
MGD / MG / AFY	Million Gallons per Day / Million Gallons / Acre Feet per Year
NRW	Non-Revenue Water
PPH	Persons per Household
SF	Single-family (Residential)
UWMP	Urban Water Management Plan
UWUO	Urban Water Use Objective

Executive Summary

The Municipal Water District of Orange County (MWDOC) supplies water to 26 retail agencies, and the Orange County Water District (OCWD). The Orange County demand forecasts include the MWDOC service area as well as 3 cities who are direct customers of the Metropolitan Water District of Southern California (MWD): Anaheim, Fullerton, and Santa Ana. Water demand forecasts are a foundational element of water supply and infrastructure planning, and MWDOC and OCWD selected Hazen and Sawyer (Hazen) to update the demand forecasts for Orange County's retail agencies for the 2025 Urban Water Management Plan. The update is necessary both because current demands are lower than previously projected, and new demographic and climate projections were made available in 2025.

Hazen created four demand models for each Orange County retail agency. The four models represent demand sectors in which agency billing sector uses are similar in magnitude, and in which changes in billing sector water use can be attributed to the same variables. The four sectors are:

1) Single-family Residential
2) Multifamily Residential
3) Commercial, Industrial, and Institutional (CII)
4) Dedicated Irrigation (potable, recycled & raw water)

The demand across all four models, plus other uses for each agency, is summed to a total forecast for each agency, the MWDOC service area, the OCWD service area, and total Orange County.

Econometric Approach and Data Acquisition

A regression, or econometric, approach to demand forecasting statistically links retail level water use to weather, economic, and socioeconomic factors (explanatory variables). Orange County agencies provided comprehensive datasets of historical water use, and Hazen worked with MWDOC to obtain explanatory variables from reputable sources, including weather databases and Census-based reports. The explanatory variables used in the regression are based on Hazen’s experience regarding what factors affect water use nationwide and in Southern California.

By statistically linking water use to explanatory variables, econometric models provide a robust foundation for understanding variability and projecting future consumption patterns. Modeled water use is the product of the driver count, and the rate of water use per driver (**Equation ES-1**).

$$Water\ use = Driver\ Count * Rate\ of\ Use\ per\ Driver \qquad \textbf{Equation ES-1}$$

Driver units change into the future based on housing, employment, and population projections. The rate of water use per driver is based on the historical response of the use rate to explanatory variables (measured by coefficients) and the future values of those same explanatory variables. **Equation ES-2** shows an example use per account, where water price and temperature are examples of explanatory variables, and $C_{Intercept}$, C_R, and C_T are example coefficients.

$$Historical\ Use\ per\ Account = C_{Intercept} + C_R \times Historical\ Water\ Price + C_T \times Historical\ Temperatures + \cdots$$

Equation ES-2

The coefficients explain how (both in terms of magnitude and sign) water use responds to changes to explanatory variables.

Hazen identified driver units based on data provided by agencies and the Center for Demographic Research at Cal State Fullerton (CDR) that can be easily projected into the future. The rate of water use per driver is based on agency provided billing sector uses from 2010 through 2024. **Table ES-1** shows the driver units and rate of use for each of the four models.

Table ES-1: Summary of Demand Sectors

Sector	Driver Units	Rate of Use Definition
Single-family Residential	Accounts	Gallons / account / day
Multifamily Residential		Gallons / account / day
Commercial, Institutional, Industrial (CII)	Jobs	Gallons / job / day
Dedicated Irrigation (potable, recycled & raw water)	Accounts	Gallons / account / day

The rates of water use for each sector model are based on the historical responses to explanatory variables, and the future values of those explanatory variables. Addressing multiple influences on demand improves the accuracy and precision of all estimated parameters, and the Hazen team identified a large range of explanatory variables based on our experience with demand modeling and available data. **Table ES-2** displays the explanatory variables.

Table ES-2: Summary of Historical Data Collected for Model Development

Dataset	Data Source(s)
Observed weather (monthly precipitation, monthly maximum temperature)	Parameter-elevation Regressions on Independent Slopes Model (PRISM)
Water Price	Retail agency provided (2010 – 2024)
Drought Restrictions	State Water Resources Control Board
Gross Domestic Product (GDP)	Federal Reserve Bank of St. Louis Real Gross Domestic Product: All Industries in Orange County, CA
Median income	US Census American Community Survey (ACS)
Housing density	US Census American Community Survey (ACS), California State University Fullerton Center for Demographics Research (CDR), Southern California Association of Governments (SCAG) land use data
Persons Per Household	
Relative sectoral economic activity	US Census LODES, CDR
Passive Efficiency Estimates	Analysis of trend indicators and MWDOC/FLUME insight
COVID Binary Indicator	Assumed active from March 2020 – May 2023

The MWDOC Water Use Efficiency Group provided annual savings achieved by various active conservation measures. To avoid additional calculations and potential errors in the classification of historical conservation data, total historical conservation was captured in each sectoral model using a linear trend term. While historical conservation is captured in a linear trend, projected passive conservation is based on the 2021 Orange County Residential Water Efficiency Potential and Opportunities Study (2021 Study) and assumes a 1.9% decrease in annual residential demand from 2025 to 2030, at which point passive conservation will remain constant going forward. Active conservation is not accounted for in the models.

The process of identifying the explanatory variables to include in the regression equation and developing coefficients that accurately measure the response of water use to changes in these variables is the most time-intensive part of the demand forecasting process.

Econometric Model Development

Orange County water use varies by time with changes to the price of water, drought restrictions, and weather, as well as by geography. For example, different agency income levels and household densities result in different water use rates. Hazen fit the four sectoral econometric models using a panel regression approach to account for explanatory variables that vary primarily over geography as well as those that vary over time. The panel approach fits consumption data from all retail agencies simultaneously, improving model accuracy with a larger sample size.

Hazen evaluated model fits using R^2 values as well as visual confirmation that the modeled historical water use captured long-term trends, drought restrictions, and COVID pandemic work from home orders. The models demonstrated strong performance in replicating historical consumption patterns over the past decade. Most regressions achieved R^2 values of 0.80 or higher, indicating a high degree of explanatory power. Model results show:

- Single-family consumption is highly seasonal, and the econometric model correlates well to seasonality and temperature.
- Multifamily use is generally less responsive to weather than single-family demands as some outdoor use has been shifted into the irrigation sector. Seasonal price elasticity varies the least between months for the multifamily sector.
- CII use per job is positively correlated to each job proportion as well as gross domestic product throughout Orange County.
- Irrigation is much more responsive to temperature and precipitation than the other sectors. Seasonal price elasticity varies the most between months for the irrigation sector.

The Hazen team worked with each retail agency to calibrate sectoral model equations and quantify other uses (those not included in the single-family, multifamily, irrigation, or CII demand sectors).

Baseline Forecast

Forecasted demand is a function of both the change in driver units into the future as well as the change in explanatory variables. **Table ES-3** summarizes the future drivers and variables.

Table ES-3: Future Model Parameters

Data Category	Variable	Source	Assumptions
Driver Units	Single-family and multifamily accounts	CDR	Historical households per account; averages are multiplied by households projected by CDR
	Irrigation accounts	Agency Billing Data	Accounts are assumed to be constant into the future
	Sectoral employment	CDR	Proportion of jobs within CII sectors projected by CDR
Explanatory Variables	Monthly Maximum Temperature and Total Precipitation	PRISM	30-year historical normal weather
	Water Price	Retail Agencies	Prices increase by 3% per year above inflation for 2025-2030 and keeps pace with inflation thereafter (zero difference from inflation trend)

Data Category	Variable	Source	Assumptions
	Water Use Restrictions	State & Local Restrictions	None
	Seasonality		Sine/cosine functions to capture monthly pattern
	Median income	US Census	Constant income at 2022 value (real dollars)
	Housing density	CDR	Derived from CDR housing unit projections, assuming residential area remains at 2024 levels
	Persons Per Household	CDR	CDR projected demographics
	Gross Domestic Product	Federal Reserve	Long-term GDP trend
	Relative Sectoral Employment	CDR	Calculated based on CDR projections
	Passive Efficiency Estimates	Flume Insight	Assumes a 2% decrease in residential demand due to conservation by 2030 (linearly extrapolated), then no change
	COVID Binary Indicator		None (occurred between March 2020 and May 2023)

The baseline scenario assumes no active conservation measures.

Residential use (single-family and multifamily) accounts for approximately 60% of total Orange County demand and is expected to drive changes to the total demand forecast, despite CII use increasing as jobs increase. **Figure ES-1** indicates that multifamily growth is expected to outpace single-family growth out to 2050.

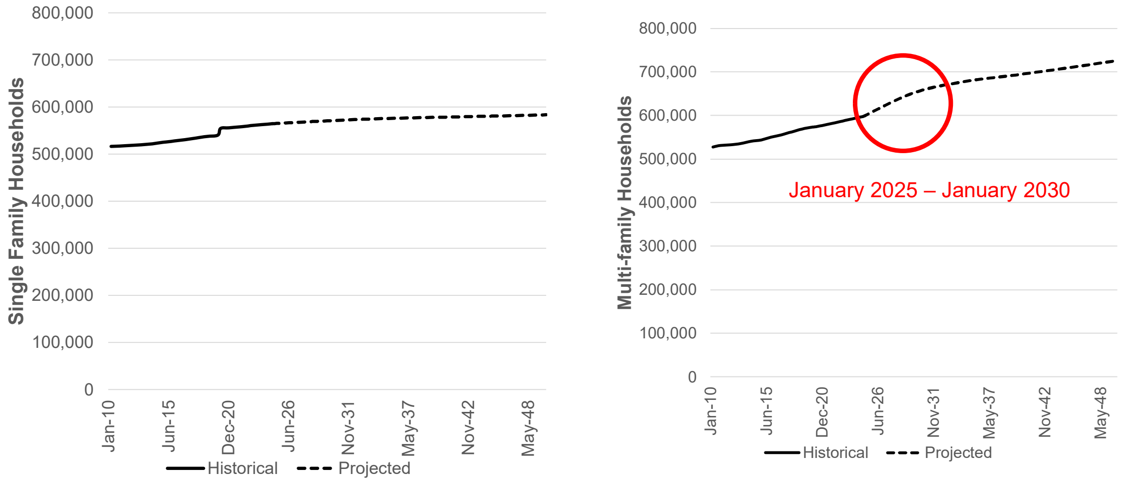


Figure ES-1: Single-family and Multifamily Growth

Additionally, **Figure ES-2** shows that average persons per household is expected to decrease for both residential sectors while household density increases.

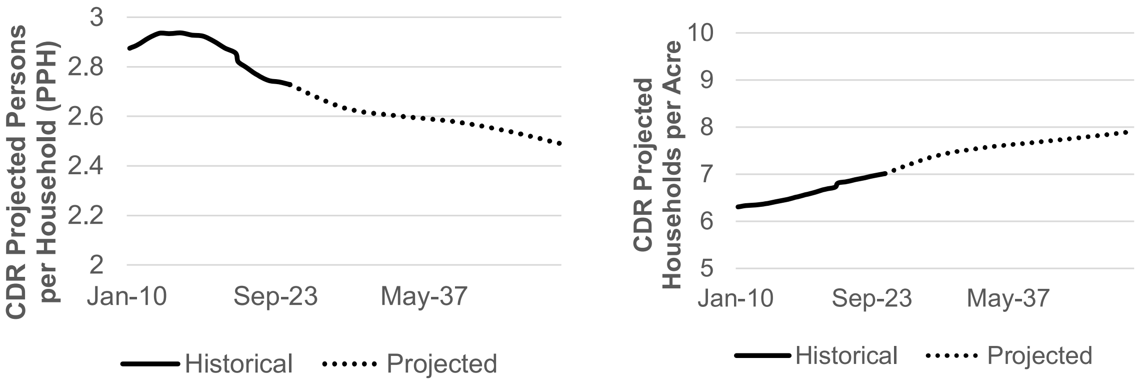


Figure ES-2: Demographic Parameters

While increasing density, decreasing persons per household, and increasing prices are expected to moderate demand, they do not fully offset growth in multifamily driver units. **Table ES-4** shows the slow growth trend out to 2050 for all of Orange County.

Table ES-4: Orange County Forecast

Forecast Year	2025	2030	2035	2040	2045	2050
Single-family Demand (AFY)	196,682	189,600	189,594	190,010	189,146	188,368
Multifamily Demand (AFY)	91,462	93,631	95,823	97,339	97,976	98,583
Irrigation Demand (AFY)	88,837	86,849	86,849	86,966	86,849	86,849
CII Demand (AFY)	82,873	87,224	89,565	91,928	93,866	95,492
Other Demands (AFY)	28,194	28,007	28,314	28,613	28,735	28,831
Total Demand (AFY)	488,049	485,312	490,145	494,856	496,572	498,124

Single-family demand remains relatively flat due to limited growth in single-family housing units, and multifamily demands are forecasted to increase steadily, driven by rising multifamily housing development. Irrigation demand is expected to remain flat, and other uses (e.g., fire flows, construction) are projected as a fixed percentage of total use. Under expected future conditions, total Orange County demand is projected to remain relatively stable through 2050.

Alternative Forecasts and UWMP Scenarios

As part of this model, alternative demand forecasts were developed to evaluate the impacts of climate change and long-term water rate increases on future water use in Orange County. Using CMIP6 climate models and downscaled LOCA2 data from CalAdapt, the model applied temperature and precipitation deltas to historical weather patterns across four Flume-defined microclimate quadrants. These projections were used to simulate two climate scenarios, dry/warm and wet/cool. The dry/warm scenario showed increased water demand due to higher temperatures, while the wet/cool scenario, when paired with a 3% annual price increase above inflation, demonstrated demand suppression.

The 2025 Urban Water Management Plan (UWMP) requires agencies to project long-term water demand under three hydrologic conditions, normal year, single dry year, and five consecutive dry years, over a 20-year horizon in 5-year increments. In this model, the single dry year scenario used a hot-dry index (HDI) to identify the year with the most weather-sensitive demand, with 2014 selected for most agencies. The multiple dry year was developed to describe the potential impact of consecutive dry years. **Figure ES-3** summarizes all forecasts.

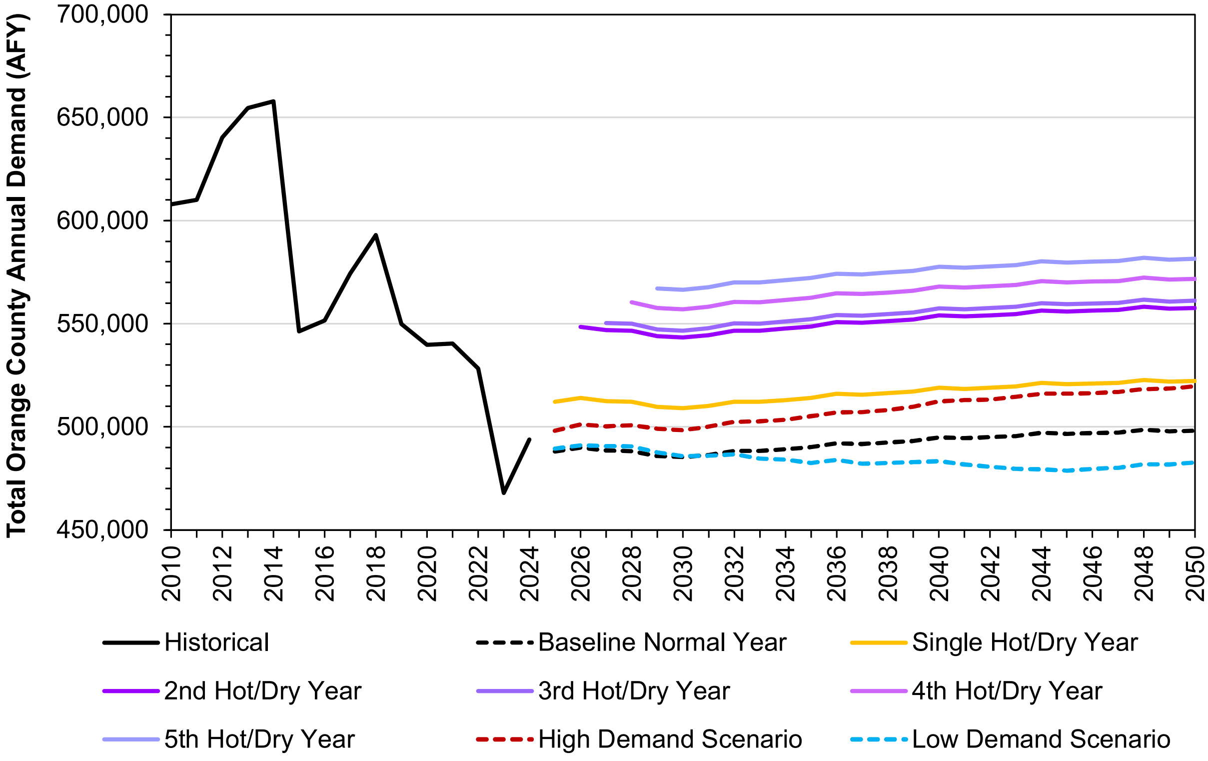


Figure ES-3: Baseline, Alternative, and UWMP Forecasts

Although Orange County demands are forecast to be relatively flat into the future, Figure ES-3 shows that annual variations in weather could cause high fluctuations.

1. Introduction

The Municipal Water District of Orange County (MWDOC) supplies water to 26 retail agencies and the Orange County Water District (OCWD). The 3 cities: Anaheim, Fullerton, and Santa Ana, who are direct customers of the Metropolitan Water District of Southern California (MWD) are also analyzed to provide a complete picture of the county. Water demand forecasts are a foundational element of water supply and infrastructure planning. MWDOC, OCWD, and representatives of the retail agencies selected an econometric model approach for the update. Hazen and Sawyer (Hazen) developed the demand model was developed by regressing historical water consumption against several explanatory variables known to influence water demand (including weather, water price, regional economic conditions, and housing density).

This technical memorandum (TM) describes the econometric demand model developed to produce regionally consistent forecasts across all Orange County agencies. Model development was funded by both MWDOC as the imported water wholesale provider and OCWD the OC Groundwater Basin manager.

Table 1-1 highlights a range of available approaches to long-term demand forecasting. Among these, an econometric approach incorporates high-resolution data at the agency scale and integrates many explanatory variables to properly identify the individual influence of each variable on historical and future demand.

Table 1-1: Pros and Cons of Several Demand Models

Model	Pro's	Con's
Time Series	• Simple and easily estimated in a Spreadsheet	• Trends are simply extended into the future • Model provides no indication of what causes trends in water use
Gross per Capita	• Ability to decouple the rate of water use from growth	• GPCD is often held constant at the historical rate • No indication of what causes trends in GPCD
End Use Accounting	• Estimates the amount of use associated with individual purposes • Addresses technological change and water use efficiency	• Consists of many assumptions for each time period • Difficult to explain observed variability in water use due to weather, price, or demographic influences
Regression (Econometric)	• Links water use statistically to explanatory variables • Provides estimates of how variability in explanatory factors affect water use • Allows for scenario design around inputs	• Difficult to address the historical impacts of technology • Statistical parameters contain a degree of potential error • Uncertainty in future values of inputs

MWDOC, OCWD, and Hazen chose the econometric approach as it provides estimates of how variability in explanatory variables affect water use. An econometric model also facilitates future scenario planning because the future values of explanatory variables are easy to change to present different scenarios.

The model relies on a comprehensive dataset of historical water-use data collected from Orange County retail agencies. Water use is provided from 2010 to 2025 (where available) for almost 40 different billing sectors; the 15-year history enables Hazen to fit the models to a range of historical droughts, price variations, and socioeconomic patterns. Hazen fit the approximately 40 different billing sectors into 4 demand sectors to limit the total project effort while providing a reliable forecast.

Prior to developing the forecasts, model calibration and fine tuning for each of the four demand sectors occurred at the individual retail agency level. The forecasts for individual agencies were then summed to the regional level.

This TM first discusses data collection and the model fitting process and ends with the demand forecasts as presented in **Figure 1-1**.

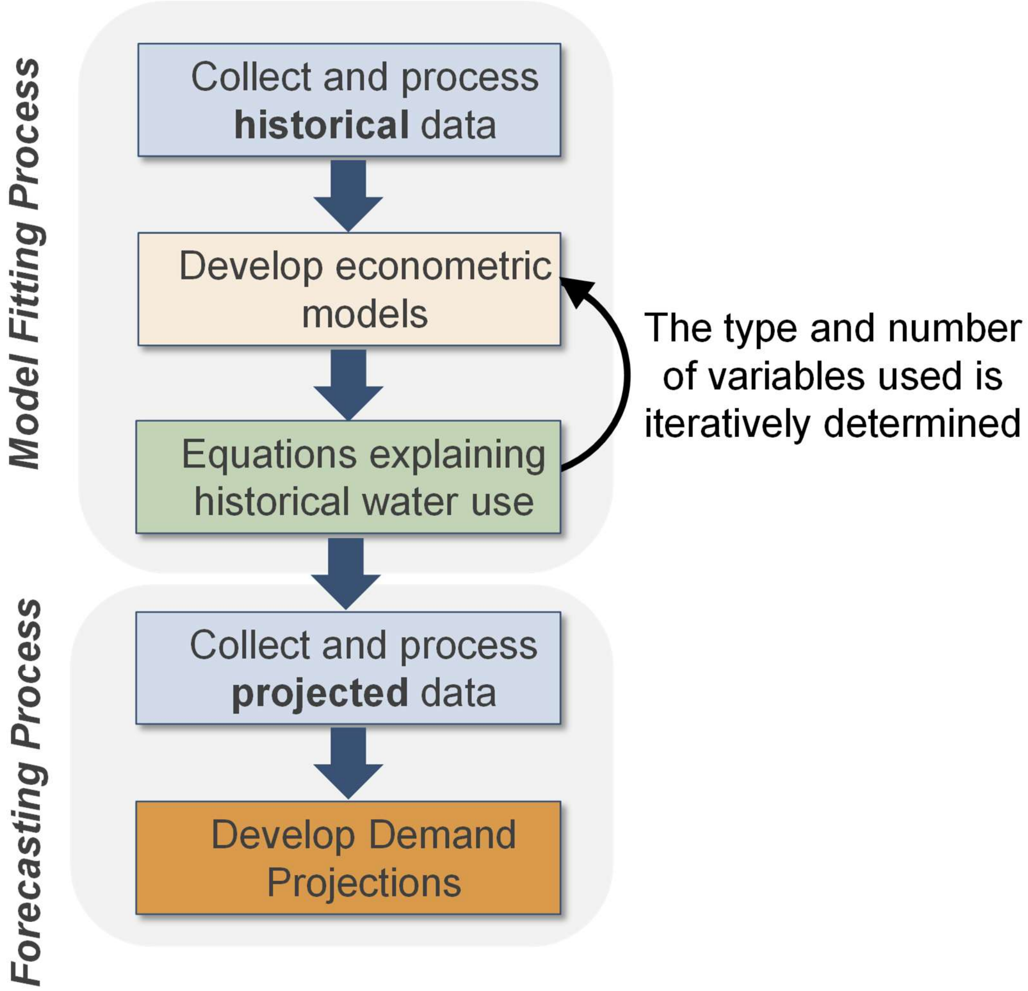


Figure 1-1: Econometric Demand Forecast Development Process

The process of identifying the explanatory variables to include in the regression equation and developing coefficients that accurately measure the response of water use to changes in these variables is called model fitting. Fitting the model is the most time-intensive part of the demand forecasting process, because a model must be fitted for each demand sector, and the type and number of variables used are iteratively determined. Once the model is fitted, the coefficients derived for historical water use are applied to the assumed future values of the associated explanatory variables to generate a forecast.

2. Historical Data Collection and Review

Demand model development requires a robust historical data set comprised of water consumption, driver units (billing accounts), and explanatory variables to explain historical changes in water use. The explanatory variables used in the models reflect both data availability and Hazen's nationwide demand modeling experience, which has focused heavily on variables that affect long term demand in California. **Table 2-1** provides a summary of the data used to develop the econometric models.

Table 2-1: Summary of Historical Data Collected for Model Development

Data Category	Dataset	Data Source(s)
Water Use	Historical billed consumption and accounts	Retailer billing records (2010 – 2024)
Driver Units	For SF, MF, and Irr uses: Single-family, and multifamily, commercial, and irrigation accounts, Dedicated Irrigation (potable, recycled & raw water)	Retailer billing records (2010 – 2024)
	For CII uses: CII Sectoral employment	US Census
Explanatory Variables	Observed weather (monthly precipitation, monthly maximum temperature)	Parameter-elevation Regressions on Independent Slopes Model (PRISM)
	Water Price	Retail agency provided (2010 – 2024)
	Drought Restrictions	State Water Resources Control Board
	Gross Domestic Product (GDP)	Federal Reserve Bank of St. Louis Real Gross Domestic Product: All Industries in Orange County, CA
	Median income	US Census American Community Survey (ACS)
	Housing density	US Census American Community Survey (ACS), California State University Fullerton Center for Demographics Research (CDR), Southern California Association of Governments (SCAG) land use data
	Persons Per Household	
	Relative sectoral economic activity	US Census LODES, Center for Demographics Research (CDR)
	Passive Efficiency Estimates	Analysis of trend indicators and MWDOC/FLUME insight
	COVID Binary Indicator	Assumed active from March 2020 – May 2023

The following sections provide a detailed description of each dataset summarized in Table 2-1. Data sources documented in this section are limited to historical datasets; a review of datasets describing projected future conditions and assumptions are documented in **Section 4**.

2.1 Data Collected from Retail Agencies

Orange County retail agencies responded to a questionnaire spreadsheet that asked for their historical billed water consumption volumes and account data by customer class for the 2010 to 2024 period, as well as water rate schedules covering the same period, and, where possible, a summary of water shortage management activities implemented over the last decade. **Figure 2-1** summarizes the historical duration of data provided by each agency as well as an identification of the billing cycle (monthly or bimonthly) that defines the general frequency of water bills.

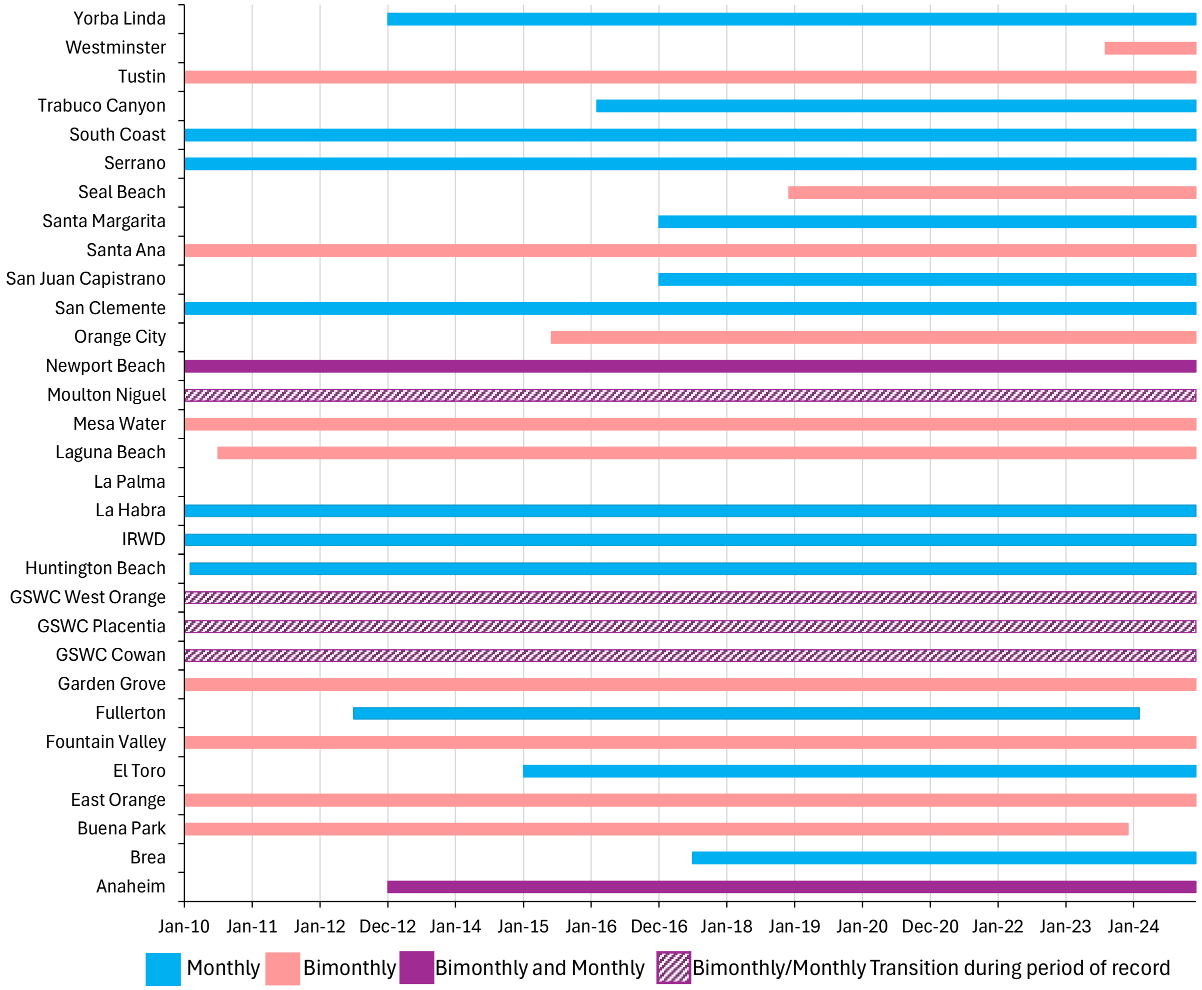


Figure 2-1: Summary of Time Range of Available Billing Data Provided by Retail Agencies

The water use and account data provided by the agencies varied. Billing sectors and their definitions can be agency-specific (almost 40 billing classifications were collected from 29 retail agencies), and water use data was not always consistently available back to 2010 for all retailers. Billing cycles differ between agencies: monthly, bimonthly, or a combination of the two.

After the water use and account data were obtained, the data needed to be standardized into consistently defined demand sectors and to a monthly basis. The following sections discuss how billing-sector data were standardized into four demand sectors, and how water use per account was standardized to yield monthly use per account accounting for differences in billing cycles.

2.1.1 Standardized Agency Billing Sectors

Retail agencies provided billing and account data organized by each agency's own internal billing classifications. Billing classifications were relatively consistent across retail agencies for defining residential water use, as most retail agencies characterized separate classifications for single-family and multifamily sectors. Water use of mobile home and other housing customer classes not associated with single-family detached structures was generally found to be similar to water use rates within the multifamily sector.

Billing classifications were less consistent in describing non-residential uses. Most agencies defined a commercial billing classification; however, the distinction and definition of industrial, institutional, and irrigation classes were inconsistent across retail agencies. For example, certain retail agencies include industrial or institutional uses within their commercial billing classification. Similarly, landscape use is not necessarily limited to a single end use, and not all retailers reported irrigation use as a class. Water billed within a landscape or irrigation category could represent use at commercial, industrial, institutional, and residential properties. Uncertainty and inconsistency in retail agency definitions of commercial, industrial, and institutional water use can affect the accuracy and performance of statistical demand models. To address this, the commercial, industrial, and institutional sectors were combined into an aggregate Commercial, Industrial, Institutional (CII) sector for modeling.

Table 2-2 provides the general breakdown of sector classifications across MWDOC agencies.

Table 2-2: Summary of Standardized Water Use Sectors

Standardized Water Use Sector (Modeled Sector)	Description
Single-family	Water use associated with single-family residential homes.
Multifamily	Water use associated with multifamily residential properties. Multifamily use shows less seasonal variation than single-family use due to shared irrigable area per dwelling unit and some multifamily irrigation is likely to be attributed to the irrigation class. Multifamily use generally includes all residential accounts not defined as single-family
CII (Commercial, Industrial, Institutional)	Water use associated with commercial developments, industrial applications, and institutional activity. CII use includes non-irrigation recycled uses.
Irrigation	Water use associated with outdoor (typically non-residential) and agricultural irrigation. This irrigation use includes recycled water for irrigation.
Other	Other water use includes classifications not well represented by the water use sectors above (including fire flows, temporary meters, construction, power uses, water loss, and other small miscellaneous uses).

Agency staff provided additional information (via email and phone conversations) to support parsing landscape and recycled water use into modeled sectors. **Figure 2-2** shows the agency billing classes separated into the four modeled sectors and the Other category.

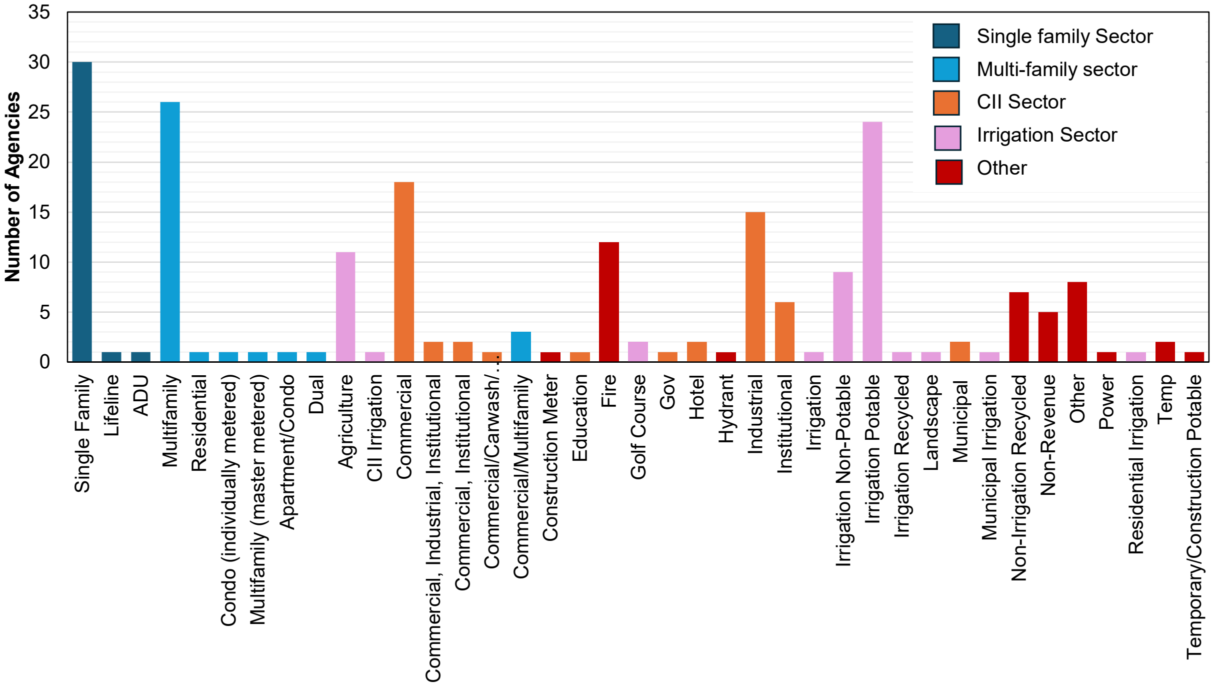


Figure 2-2: Billing Sectors by standardized demand sector

Figure 2-2 indicates that across all agencies, single-family and multifamily use were the most consistently classified.

2.1.2 Standardized Agency Rate of Use

Retail agencies have different billing and meter reading frequencies. Additionally, within each agency, meter reading cycles can vary by customer. Many agencies universally adopt either monthly or bimonthly billing; however, some utilize a combination of the two billing cycles depending on customer class and date. Water use rates for the different agency billing cycles were standardized to a calendar-month to better reflect the actual seasonal timing of water use for each of the four modeled sectors (other uses are applied as a percentage of total use across the single-family, multifamily, CII, and irrigation sectors).

Water use billed at monthly intervals can generally overlap with two consecutive calendar months. A smoothing equation extracts a single calendar-month use from the two monthly billing periods. For example, April water use is equal to the fraction of the April consumption billed in April plus the fraction of the April consumption billed in May (**Equation 2-1**).

$$April\ Use = \left(Billed\ April\ Consumption \times \frac{April\ Accounts}{April\ Accounts + May\ Accounts}\right) + \left(Billed\ May\ Consumption \times \frac{May\ Accounts}{April\ Accounts + \qquad Accounts}\right) \quad \textbf{Equation 2-1}$$

Customers billed at bimonthly intervals are divided into two groups, and each group is billed every second month. Bimonthly meter readings contain water use that occurs over a span of three calendar months. For example, April use equals the fraction of April consumption billed in April and June (billing group 1) plus the fraction of April consumption billed in May (billing group 2), per **Equation 2-2**.

$$April\ Use = \left(\left(\frac{1}{4} Billed\ April\ Consumption + \frac{1}{4}\ Billed\ June\ Consumption\right) \times \frac{\frac{1}{2}April\ Accounts + \frac{1}{2}June\ Accounts}{\frac{1}{2}April\ Accounts + May\ Accounts\quad \frac{1}{2}June\ Accounts}\right) + \left(\frac{1}{2} Billed\ May\ Consumption \times \frac{May\ Accounts}{\frac{1}{2}April\ Accounts + May\ Accounts + \frac{1}{2}June\ Accounts}\right)$$

Equation 2-2

Figure 2-3 depicts smoothed water use for an agency whose billing structure changes from bimonthly to monthly in late 2022.

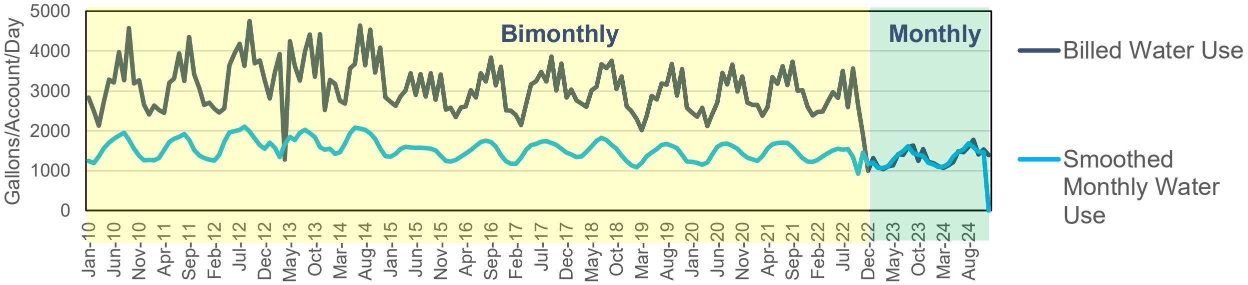


Figure 2-3: Example smoothing of consumption for an Agency with a Billing Structure that Changes Over Time

If an agency employs both monthly and bimonthly billing cycles for billing sectors that fall into a single model demand sector, a weighting of smoothed monthly (m) and bimonthly (b) water use (q) is employed to average use ($q_{M,avg}$) over the two cycles (**Equation 2-3**).

$$q_{M,avg} = w_m \times q_m + w_b \times q_b$$

Equation 2-3

The weighting factors are defined in **Equations 2-4** and **2-5**.

$$w_m = \frac{A_{M,m}+A_{M+1,m}}{(A_M+2A_{M+1,b}+A_{M+2,b})+(A_{M,m}+A_{M+1,m})}$$

Equation 2-4

$$w_b = \frac{A_{M,b}+2A_{M+1,b}+A_{M+2,b}}{(A_M+2A_{M+1,b}+A_{M+2,b})+(A_{M,m}+A_{M+1,m})}$$

Equation 2-5

2.1.3 Development of Retail Agency Driver Units

Driver units reflect the scale of a water use sector indicative of the number of water users. Total water consumption (Q) is derived by multiplying the number of driver units (N) by the rate of water use per driver unit (q), as shown in **Equation 2-6**.

$$Q = N \cdot q \rightarrow q = \frac{Q}{N}$$ **Equation 2-6**

To be useful for model development and forecasting, driver units must have a consistent historical record coincident with consumption and have a corresponding future dataset representing projected driver unit counts. Driver units were selected for each model sector, as shown in **Table 2-3**. The following sections detail the data sources and data processing used to develop estimates of drivers for each retail agency and model sector.

Table 2-3: Driver Units and Rates of Use for each Demand Sector

Sector	Driver Units	Rate of Use Definition
Single-family Residential	Accounts	Gallons / account / day
Multifamily Residential		Gallons / account / day
Commercial, Institutional, Industrial (CII)	Jobs	Gallons / job / day
Dedicated Irrigation (potable, recycled & raw water)	Accounts	Gallons / account / day

Other water uses that are small and do not neatly fit above classifications are projected using a long-term average of historical consumption.

2.1.4 Residential Housing Units

Driver units for both single-family and multifamily residential water use were set to the number of accounts provided by retail agencies. Distinct housing unit data was available through the Center for Demographic Research at California State University, Fullerton (CDR) by retailer service area boundaries.

The number of single-family accounts recorded by retail agencies may be slightly greater than the number of single-family housing units reported by CDR due to auxiliary dwelling units (ADUs), other property-specific meter additions, and subtle differences in how the single-family class is defined (e.g., some agencies may include individually metered townhomes). Multifamily dwellings are generally billed collectively on a single meter, and the number of units per account is higher than for single-family accounts.

The total number of accounts are used as a driver for the residential sectors, and units per account is used as an explanatory variable providing a means of using CDR projections of residential households as a driver for residential sector forecasts. Both values are reported in **Table 2-4**.

Table 2-4: 2024 Estimated Residential Driver Units by Retailer

	Total SF Units	Total SF Accounts	SF Units/Account	Total MF	Total MF Accounts	MF Units/Account
Anaheim	46,323	52,743	0.88	69,041	4,311	16.02
Brea	9,979	11,091	0.90	8,855	210	42.18
Buena Park	14,885	16,865	0.88	11,142	696	16.01
East Orange CWD	1,141	1,174	0.97	96	26	3.69
El Toro WD	6,725	5,670	1.19	18,193	2,619	6.95
Fountain Valley	13,266	16,090	0.82	7,061	190	37.20
Fullerton	25,248	26,687	0.95	25,334	1,933	13.11
Garden Grove	28,148	30,114	0.93	22,611	1,795	12.60
GSWC Cowan	2,376	2,443	0.97	85	48	1.77
GSWC Placentia	9,497	11,886	0.80	7,023	1,222	5.75
GSWC West Orange	19,397	24,710	0.79	18,209	3,511	5.19
Huntington Beach	39,828	44,950	0.89	43,299	4,329	10.00
Irvine Ranch WD	72,377	71,228	1.02	105,949	40,636	2.61
La Habra	10,728	11,094	0.97	9,920	877	11.31
La Palma	Not Provided					
Laguna Beach CWD	7,076	7,093	1.00	3,583	1,125	3.19
Mesa WD	15,943	14,350	1.11	26,671	6,302	4.23
Moulton Niguel	33,583	47,418	0.71	35,269	2,017	17.48
Newport Beach	14,994	19,706	0.76	20,291	4,077	4.98
Orange City	26,112	23,452	1.11	22,480	6,091	3.69
San Clemente	12,664	12,478	1.01	9,419	3,706	2.54
San Juan Capistrano	6,684	6,802	0.98	6,079	3,148	1.93
Santa Ana	35,197	35,334	1.00	47,658	3,732	12.77
Santa Margarita WD	38,217	38,260	1.00	22,574	15,137	1.49
Seal Beach	4,666	4,438	1.05	10,011	569	17.58
Serrano WD	2,214	2,229	0.99	24	Not Provided	
South Coast WD	9,997	10,994	0.91	8,483	1,591	5.33
Trabuco Canyon WD	3,620	3,907	0.93	497	31	16.03
Tustin	10,252	12,035	0.85	12,329	849	14.52
Westminster	16,273	19,724	0.83	13,139	1,103	11.92
Yorba Linda WD	20,674	23,510	0.88	5,919	264	22.43

2.1.5 CII Jobs

Total employees, or jobs, within the CII sector are estimated from the U.S. Census Bureau Longitudinal Employer Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) dataset (U.S. Census Bureau, 2020). The most recent LODES data set provides total employment data from 2002 to 2022 at a census tract level based on job location. LODES also categorizes jobs by North American Industry Classification System (NAICS) sector, which is the standard used by federal statistical agencies.

Jobs were appropriately calculated for each agency's service area in two steps:

1) Geoprocessing jobs to water service area boundaries: Census tract-level jobs by industry are geo-processed to align with Orange County retail agency service area boundaries. During

geoprocessing, a scaling ratio is developed for each agency, for each census tract. The number of jobs within a census tract multiplied by an agency-specific scaling ratio equals the number of jobs for a given retail agency in that tract.

2) Verifying job numbers with CDR data: CDR provided employment data for city boundaries in Orange County from 2019 to 2025. The CDR jurisdictional forecasts are spatially aligned with Orange County water agency boundaries using the same technique applied to the LODES data, and the 2019 job numbers were compared with the LODES 2019 job numbers.

Comparison of the LODES data to the CDR data helped with the assignment of appropriate GIS census tracts and agency boundaries. The differences are shown in **Table 2-5**.

Table 2-5: 2019 LODES and CDR Jobs Comparison

Agency	Total 2019 Jobs (LODES)	Total 2019 Jobs (CDR)	CDR Projection Difference from LODES (CDR-LODES)/LODES
Anaheim	196,461	209,100	6.43%
Brea	43,818	45,716	4.33%
Buena Park	36,214	37,474	3.48%
East Orange CWD	493	354	-28.19%
El Toro WD	21,280	18,290	-14.05%
Fountain Valley	32,804	31,917	-2.70%
Fullerton	66,899	66,622	-0.41%
Garden Grove	53,476	60,948	13.97%
GSWC Cowan (assumes City of Orange service)	986	1,383	40.21%
GSWC Placentia	15,885	18,238	14.81%
GSWC West Orange	53,365	51,862	-2.82%
Huntington Beach	71,084	84,726	19.19%
Irvine Ranch WD	364,318	422,026	15.84%
La Habra	17,795	18,643	4.77%
La Palma	5,230	5,589	6.86%
Laguna Beach (includes Emerald Bay)	7,317	10,343	41.36%
Mesa Water	107,313	98,526	-8.19%
Moulton Niguel WD	60,584	70,203	15.87%
Newport Beach	51,627	48,769	-5.54%
Orange City	112,543	109,218	-2.95%
San Clemente	17,994	20,669	14.87%
San Juan Capistrano	15,058	16,990	12.83%
Santa Ana	161,955	164,884	1.81%
Santa Margarita WD	39,661	43,717	10.22%
Seal Beach	10,484	13,059	24.56%

Agency	Total 2019 Jobs (LODES)	Total 2019 Jobs (CDR)	CDR Projection Difference from LODES (CDR-LODES)/LODES
Serrano WD	1,521	2,288	50.43%
South Coast WD	13,305	14,936	12.26%
Trabuco Canyon WD	1,312	2,605	98.52%
Tustin	37,530	22,765	-39.34%
Westminster	30,892	28,153	-8.87%
Yorba Linda WD	24,139	25,866	7.15%

The differences in actual job numbers across the two data sources vary by agency. The actual jobs implemented in the forecast were based on conversations with each agency. For most retail agencies, the job growth rate predicted by CDR, rather than actual job numbers, is used. However, in cases where agencies indicated that CII demands differed from observed Fiscal Year 2024-2025 values, Hazen substituted the job source (CDR or LODES) that provided a forecast closer to observations.

2.2 Collection and Processing of Explanatory Variables

Explanatory variables are variables specified in a regression model to explain variability in water use, such as water rates, maximum monthly temperature, housing density, and other socioeconomic parameters. Explanatory variables used in the econometric demand model are identified based on adherence to three key characteristics:

1) Logical or understood connection to explaining changes in water consumption;
2) Historical records available for the historical modeling period; and
3) Availability of future projections consistent with the desired forecast horizon (2025-2050) or a reasonable means for assuming or deriving projected values.

Table 2-6 provides an overview of the collected explanatory variables for Orange County water agencies' demand models and their relevance to explaining changes in water consumption.

Table 2-6: Summary of Explanatory Variables

Explanatory Variable	Relevance to Water Consumption
Temperature	Higher than normal temperatures are associated with higher demands.
Precipitation	Higher than normal rainfall is associated with lower demands.
Price	Economic theory suggests a negative correlation with demand.
Economic Index	Water demand is positively correlated with real GDP, which is modeled as departure from the long-term trend.
Median Income	Economic theory suggests a positive correlation between income and demand; generally, areas with higher median incomes tend to use more water.

Explanatory Variable	Relevance to Water Consumption
Mix of industries	The representation of industries within a geographical area is related to the amount of water used within the CII sector.
Housing density	Housing density is negatively correlated with demand; on average, residences with more units per acre (or smaller parcel sizes relative to dwellings) tend to use less water for outdoor uses.
Persons per Household	Positively correlated with demand; generally, residences with more people tend to use larger amounts of water on average.
Households per account	Higher units per account are associated with higher average demands per account.
Conservation	Decreases the amount of water customers consume.
Drought Restrictions	The presence of drought restrictions on water use tends to decrease the amount of water consumed by customers.
COVID Pandemic	The presence of COVID restrictions tends to increase the amount of water consumed by residential customers and decrease the amount used in the CII sector.

The following sections document the raw data sources and the processing involved to derive each explanatory variable.

2.1.6 Historical Weather Data

Based on Hazen's modeling experience, total monthly precipitation and maximum monthly temperature will have the greatest impact on demand. These weather characteristics best define demand when calculated for each retail service area boundary, which accounts for microclimates driven by elevation gradients and proximity to large water bodies. The Northwest Alliance for Computational Science and Engineering at Oregon State University produces the PRISM (PRISM Climate Group 2004) weather dataset from a wide monitoring network, including the California Data Exchange Center (CDEC) and the California Irrigation Management Information System (CIMIS) gages. PRISM provides gridded weather data at a 4-kilometer resolution, and Python scripts were then used to process the total monthly precipitation (inches per month) and monthly average maximum daily temperature (degrees Fahrenheit) for each member agency's service area based on the coordinates of agency centroids.

Weather data are normalized to average conditions to disconnect weather variations from systematic seasonal cycles. Historical normal weather values were calculated for each member agency as the average monthly values over the period 1991 to 2024. Departures from the historical normal were then calculated as the actual monthly value minus the monthly historical norm in the natural log-scale, as shown in **Equation 2-6**.

$$Departure = \ln X_{i,m,t} - \overline{\ln X_{\iota,m}}$$

Equation 2-6

Where $X_{i,m,t}$ is an observed weather value for agency i in month m for year t and $X_{i,m}$ is the historical normal value for agency i in month m. A positive departure indicates above-normal conditions, and a negative value indicates below-normal conditions.

2.1.7 Water Price

Agencies provided historical water prices (in dollars per volumetric unit), which Hazen used to measure the effects of pricing on water usage. Three types of price structures were present across the agencies:

- Uniform volumetric prices which are constant across demand sectors or equivalent for all demand sectors, which do not vary by amount of water purchased;
- Volumetric tier prices, which vary by amount of water purchased by demand sector or are equivalent for all demand sectors; or
- Water-balance based (also called budget-based) prices in which prices for single and multifamily demand sectors are based on specific indoor use thresholds and outdoor irrigation characteristics.

Several agencies changed price structures over time; however, volumetric prices used in modeling reflect the marginal (or incremental) portion of the water rate that can be avoided by reducing consumption, consistent with economic theory. Any changes to price structure are incorporated in the marginal rate. The marginal price of water used in the demand model is defined as the cost of the 10th hundred cubic foot (CCF) for the single-family residential sector, and the cost of the 20th CCF for the multifamily residential, irrigation, and CII sectors.

Prior to modeling, all marginal prices were converted into real, inflation-adjusted, 2022 dollars using the Bureau of Labor Statistics, Consumer Price Index – All Urban Consumers for the Urban West (Series ID: CUUR0400SA0, CUUS0400SA0).-

2.1.8 Economic Indices

Water demand is positively correlated with economic fluctuations of the business cycle. Periods of economic growth generally see increased water use. Annual Real Gross Domestic Product (GDP) is used to reflect general economic trends. GDP for all industries in Orange County, CA, was downloaded from the Federal Reserve Bank of St. Louis Economic Research Division (FRED Economic Data). The trend in the time series of the GDP index was removed during model development to better identify short-term fluctuations in economic activity. Departure from the trend **(Figure 2-4**) was calculated by running a regression on the natural log of GDP on a linear time counter (each subsequent year means the time counter is increased by 1) and the residual is used as the explanatory variable. This is standard econometric practice for addressing common statistical problems with trending variables and allows for a more flexible interpretation of forecast scenarios.

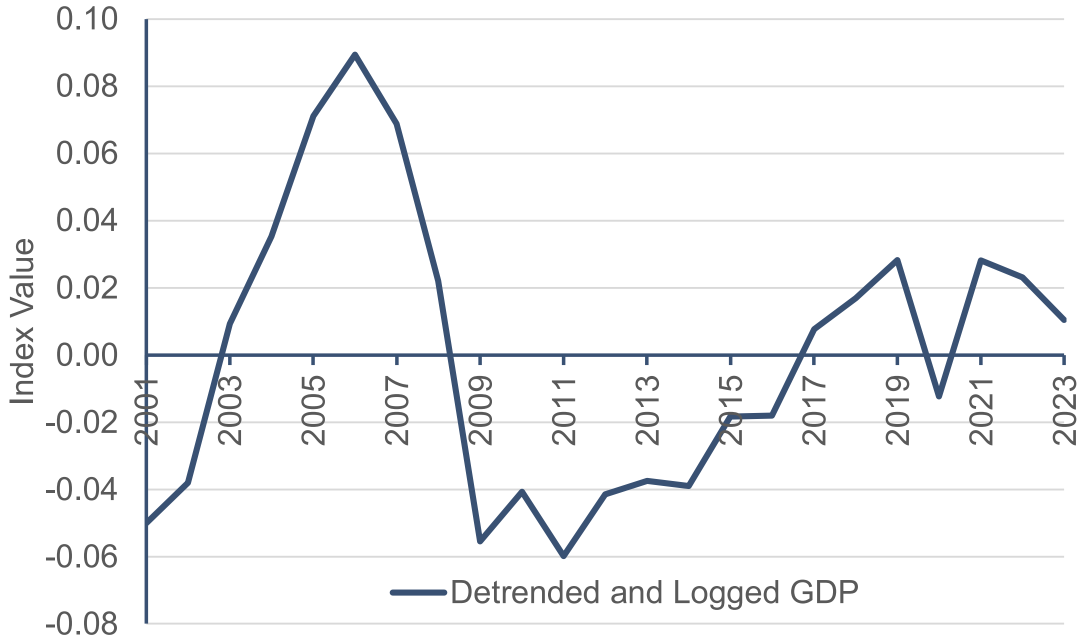


Figure 2-4: GDP Departure from Trend

The detrended GDP series shows the timing and magnitude of economic expansion prior to the effects of the Great Recession (after 2008) and COVID (in 2020) on macroeconomic output, while highlighting periods of positive and negative economic growth relative to the long-term trend.

2.1.9 Median Household Income

Median household income was identified as a potential explanatory variable for the residential sectors. Economic theory suggests a positive correlation between income and demand; generally, areas with higher median incomes tend to use more water. Median income was estimated from the US Census American Community Survey (ACS) data as the median value of all census tracts within each retailer's service area boundary. Median income was adjusted for inflation by normalizing to 2022-dollar values and held constant over time for each retailer (**Table 2-7**) because future changes in income are unknown and will likely change slowly.

Table 2-7: 2024 Median Income by Retailer (2022 $)

Agency	Income
Anaheim	$102,629
Brea	$119,135
Buena Park	$106,284
East Orange CWD	$192,611
El Toro WD	$118,718
Fountain Valley	$113,579
Fullerton	$104,061
Garden Grove	$91,554
GSWC Cowan	$191,042
GSWC Placentia	$191,042
GSWC West Orange	$191,042
Huntington Beach	$124,294
Irvine Ranch WD	$142,613
La Habra	$105,816
La Palma	$116,923
Laguna Beach CWD	$145,655
Mesa WD	$120,134
Moulton Niguel	$137,457
Newport Beach	$169,322
Orange City	$130,669
San Clemente	$131,079
San Juan Capistrano	$144,210
Santa Ana	$92,739
Santa Margarita WD	$153,652
Seal Beach	$127,699
Serrano WD	$164,156
South Coast WD	$134,980
Trabuco Canyon WD	$175,218
Tustin	$122,041
Westminster	$92,741
Yorba Linda WD	$144,687

2.1.10 Mix of Industries

Additional explanatory variables were developed to reflect the mix of CII activity within each member agency’s service area. The presentation of the model drivers covers the LODES employment data and the geoprocessing used to generate the number and category of jobs for each retail agency. Historical employment data supplied by LODES was categorized by the North American Industry Classification System (NAICS) of the US Census Bureau. The LODES NAICS sectors were aggregated into four employment categories previously defined by CDR in other employment-related datasets: Retail, Public School K-12, Service, and Other **(Table 2-8)**.

Table 2-8: NAICS Sector Jobs by Model Sector

CDR Sector	LODES NAICS sector
Retail	- Retail Trade
K-12 Public School	- No exact LODES NAICS match for this CDR sector. The NAICS sector *Educational Services* was incorporated both into services and included as a separate explanatory variable to determine its relative importance to CII demand.
Service	- Information - Real Estate and Rental and Leasing - Professional, Scientific and Technical Services - Management of Companies and Enterprises - Administrative and Support and Waste Management and Remediation Services - Health Care and Social Assistance - Arts, Entertainment, and Recreation - Accommodation and Food Services - Educational Services
Other	- Agriculture, Forestry, Fishing and Hunting - Mining - Utilities - Construction - Manufacturing - Wholesale Trade - Transportation and Warehousing - Public Administration

The log of the percentage of each of these four sectors relative to total jobs was used as an explanatory variable to linearize the data and improve its suitability for modeling. For example, for the Retail sector in **Equation 2-7**.

$$Retail = log\left(1 + \left(100 \times \frac{Jobs\ in\ the\ CDR\ Service\ Classification}{Total\ Jobs}\right)\right) \qquad \textbf{Equation 2-7}$$

The CDR grouping Other was not included as an explanatory variable representing a reference point captured within the CII model intercept terms.

2.1.11 Housing Density

Housing density is negatively correlated with demand; on average, residences with more units per acre (or smaller parcel sizes) tend to use less water for outdoor uses. Housing density is calculated as the CDR provided housing units for each retail agency divided by the total single-family and multifamily parcel area, respectively. The total parcel area for each agency was determined based on processed GIS records from the Southern California Association of Governments (SCAG) and verified with ESRI's Regrid Nationwide Parcel Boundaries for the United States. **Table 2-9** shows the total parcel area for each agency.

Table 2-9: 2024 Total Residential Acreage

Agency	Single-family Residential Acreage	Multifamily Residential Acreage
Anaheim	9,977.09	4,912.70
Brea	1,811.03	482.29
Buena Park	2,466.53	476.03
East Orange	473.04	17.42
El Toro	1,088.96	1,753.94
Fountain Valley	2,337.74	205.75
Fullerton	6,162.68	1,148.85
Garden Grove	5,099.65	965.29
Gold Cowan	1,528.76	7.22
Gold Placentia	1,843.66	346.31
Gold West Orange	3,148.31	826.74
Huntington Beach	6,451.57	1,823.83
IRWD	19,932.92	6,120.52
La Habra	2,053.92	526.46
La Palma	454.42	42.67
Laguna Beach	1,448.16	384.09
Mesa Water	2,436.95	1,338.02
Moulton Niguel	9,375.38	2,232.31
Newport Beach	2,962.92	814.65
Orange City	5,841.42	1,165.48
San Clemente	4,091.96	722.78
San Juan Capistrano	4,087.79	545.10
Santa Ana	5,336.01	2,189.99
Santa Margarita	14,333.86	1,608.48
Seal Beach	542.81	513.34
Serrano	1,050.94	0.46
South Coast	2,088.12	584.61
Trabuco Canyon	1,754.56	30.76
Tustin	2,547.23	690.39
Westminster	2,541.25	680.32
Yorba Linda	6,556.85	508.99

Figure 2-5 shows the household density (households per acre) for each agency. (Serrano WD has no multifamily housing and the households per acre is abnormally high and is not shown.)

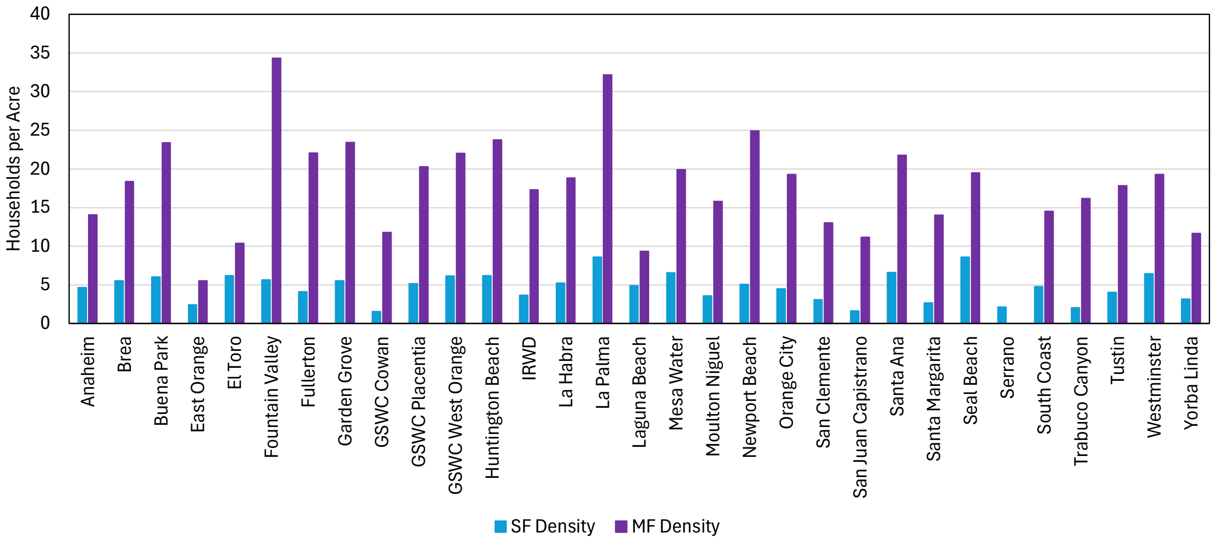


Figure 2-5: 2024 Household Density (average households per acre)

Multifamily density can be as much as an order of magnitude (i.e., ten times) higher than single-family density.

2.1.12 Persons per Household

Generally, households with more people tend to use larger amounts of water i.e. "persons per household" is an explanatory variable that is positively correlated with demand. The American Community Survey (ACS) is census-based data that provides information on housing units, total household population, and a breakdown of single-family and multifamily populations. ACS datasets are available at the census tract level. To derive ACS data specific to Orange County water agency boundaries, a geoprocessing approach was implemented to match census tract boundaries with MWDOC's service area boundaries, as was done for employment data. Using the single-family and multifamily population split, an estimate of persons per household (PPH) for both single-family and multifamily housing was developed based on water agency boundaries

Hazen used ACS data because it calculates population in each single-family and multifamily household categories. CDR provides total population. To ensure consistency with the CDR provided housing unit and population data, the ACS-derived single-family and multifamily PPH estimates were calibrated to align with the CDR's single-family and multifamily housing unit data.

The persons per household ratio was calculated separately for single-family and multifamily residences as shown in **Figure 2-6**.

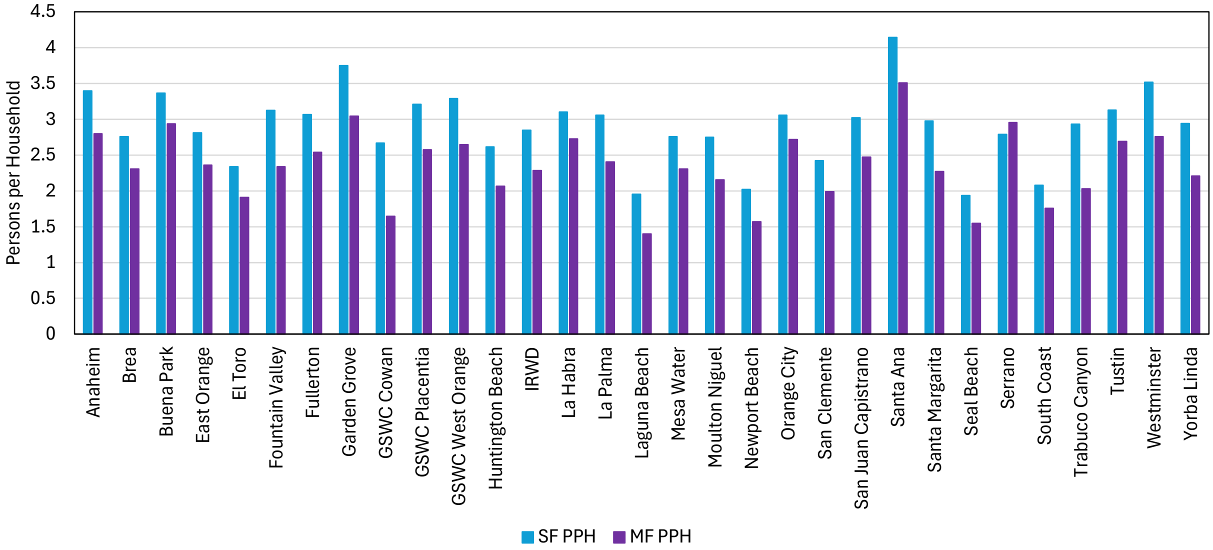


Figure 2-6: 2024 Estimated Persons per Household

In general, single-family homes have more residents per household.

2.1.13 Households Per Account

The number of households is not always equal to the number of accounts. Higher units per account is associated with higher demands. Average annual units per account for each residential class was used to (a) account for differences in the number of units per account in the historical modeling and (b) to permit the translation of CDR projections of households to be translated into accounts for forecasting purposes.

2.1.14 Conservation

The MWDOC Water Use Efficiency Group (WUE) provided annual savings achieved by various active conservation measures (represented by rebate program participation from the start of that specific program to present) for each MWDOC member agency and the adjacent cities of Anaheim, Fullerton, and Santa Ana. The sum of residential and commercial programs yields the total active annual conservation for each retail agency. Many of these programs were not specified as residential versus CII and were difficult to label as either passive conservation (water savings that occur without incentives) or active conservation practices.

To avoid additional calculations and potential errors in the classification of historical conservation data, total historical conservation was depicted in each sectoral model as a linear increasing trend. The coefficient derived for this trend in the regression explains whether agency water use that could not be explained by the other explanatory variables tended to increase or decrease with time; decreases over time were attributed to conservation, independent of the effects of price.

2.1.15 Drought Restrictions

The presence of drought restrictions tends to decrease the amount of water consumed by customers. Water use restrictions were represented by the presence of Statewide drought declarations or mandatory restrictions (both assigned a binary value of 0 or 1, meaning either the restriction is in place or it is not), and the state-required cutback (as a decimal from 0 to 1 corresponding to the restriction percentage) if a restriction was in place. The time series of historical water restrictions is shown in **Figure 2-7**.

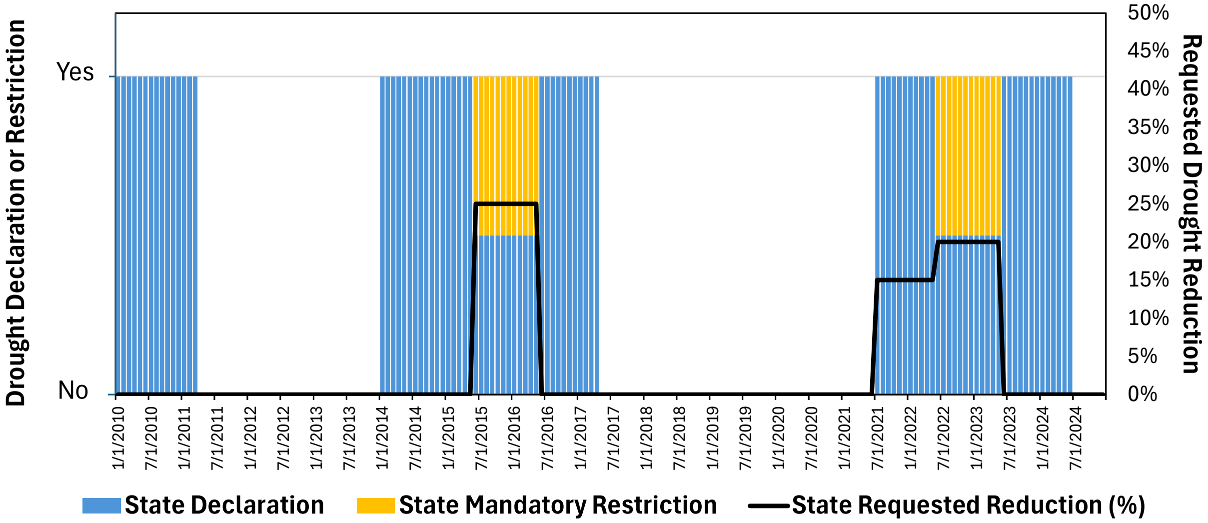


Figure 2-7: Time Series of Historical Water Restrictions Imposed by the State

Retail agencies also provided their agency-specific drought stages, which were categorized as level 1, level 2, or level 3 and greater. During the model fitting process, Hazen determined that while the State Declarations resolved water use for the single-family, multifamily, and CII sectors, the agency-specific drought stages (which did not always coincide with the State binary or percentage requests) yielded a better fit across the irrigation sector models.

2.1.16 COVID

COVID is introduced as a binary variable for March 2020 through May 2023, the period in which the World Health Organization designated COVID-19 a pandemic. The presence of COVID restrictions tended to increase the amount of water consumed by residential customers and decreased the amount used in the CII sector.

3. Model Approach and Development

The development of historical econometric models provides a significant analytical benefit for forecasting demand, as Historical models enable the capture of cause-and-effect relationships among weather, prices, socioeconomic factors, and other factors that drive water demand variability. Quantifying these causal relationships enables forensically sound analysis of "what-if" scenarios that are uncertain but important for planning considerations (for example, climate change, development patterns, and drought recovery).

3.1 Modeling Approach

The econometric demand model relies on the comprehensive set of historical water use data discussed in **Section 2** to develop a set of equations that equates total water use to the rate of water use per driver multiplied by the specific sectoral driver (**Equation 3-1**). Each of the four demand sectors modeled (single-family, multifamily, CII, and irrigation) has a separate equation.

$$\underset{Q}{Water\ use} = \underset{N}{Driver\ Count} \times \underset{q}{Rate\ of\ Use\ per\ Driver}$$

Equation 3-1

Driver units for a particular demand sector (e.g., household water accounts or employment) will change in the future. The rate of water use per driver (e.g. gallon/account/day) is based on the historical response of the water use rate to the explanatory variables (independent variables in the econometric equations) and on the future values of those explanatory variables.

Linear regression produces the coefficients for each explanatory variable to closely reproduce the historical rate of use per driver unit. **Equation 3-2** shows an example linear regression for single-family water use, where water rates and temperatures are examples, and represent only a subset of possible explanatory variables. C_R and C_T represent the water rate coefficient and temperature coefficient, respectively.

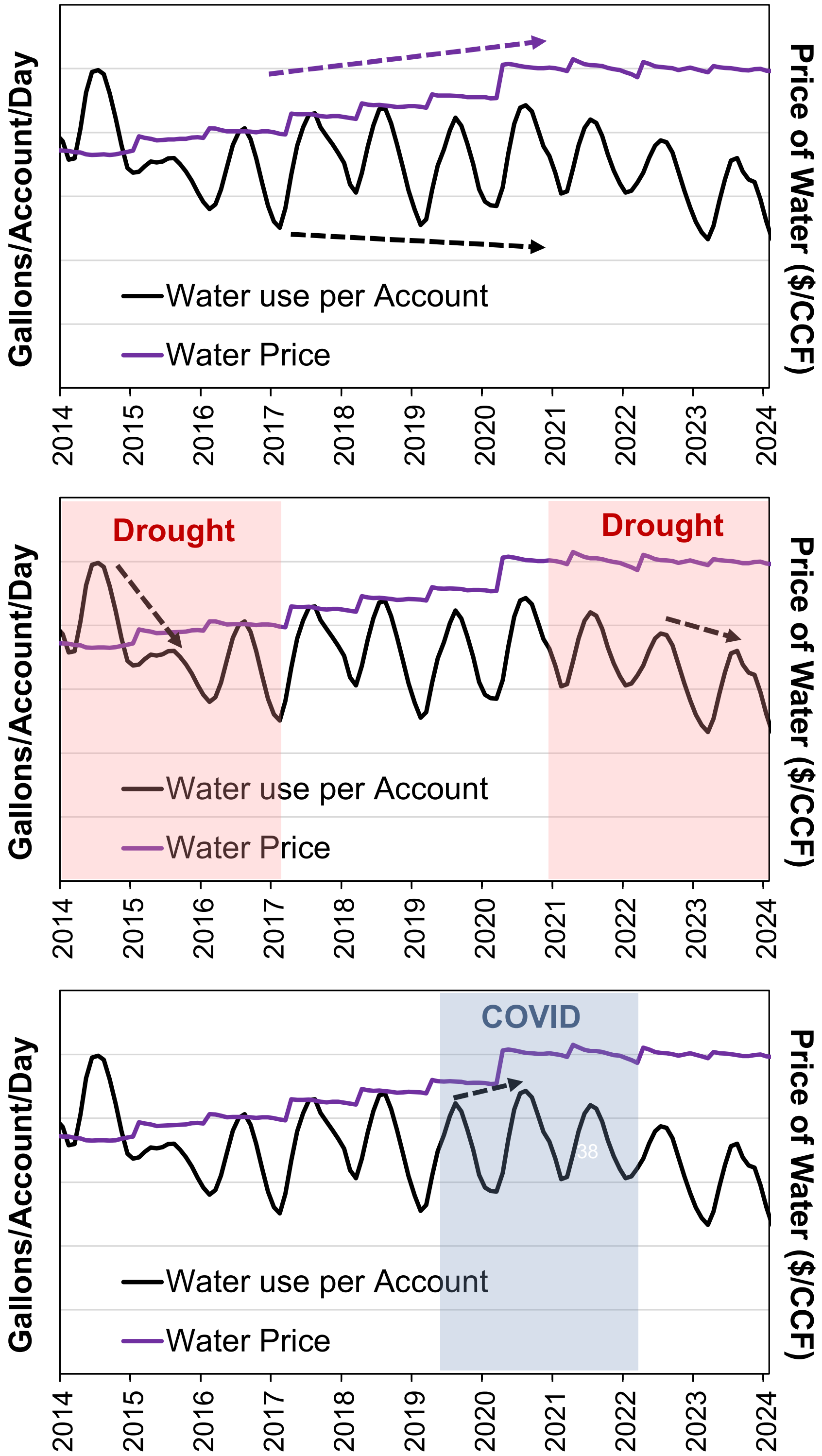
$$Rate\ of\ Use\ per\ Driver = \frac{Historical\ Single\ Family\ Use}{Single\ Family\ Account} = C_{Intercept} + C_R \times$$
$$Historical\ Water\ Rates + C_T \times Historical\ Temperatures + \ldots$$

Equation 3-2

Panel fixed effects ordinary least squares (OLS) regression is used to estimate the coefficients that relate multiple independent explanatory variables (such as weather and water price) to the dependent variable (water user per account) by minimizing the sum of the squares in the difference between observed and predicted values of the water use rate. OLS regression can be coded to incorporate:

- A systematic and predictable relationship between the explanatory variable and use per account;
- Agency-specific coefficients (the effect of seasonal trends might differ between agencies); and
- Potential interdependence, or interactions, between fixed effects (for example, the dependence of water use on price may differ depending on the season).

The derivation of appropriate coefficient values (both sign and magnitude) through regression requires sound judgment of demand behavior and the inclusion of numerous explanatory variables to address multiple influences on demand. **Figure 3-1** illustrates that excluding key explanatory variables from the regression, which account for reasons not associated with responses to price (such as mandatory state restrictions or local conservation), could incorrectly attribute changes in demand to the volumetric price of water (i.e., incorrectly magnifying the effect price has on demand).



Long term decrease in water use and increase in water price: we expect water use to be negatively correlated to price

Assigning a coefficient to water price without accounting for drought restrictions would generate a price coefficient that is too negative

Assigning a coefficient to water price without accounting for COVID could bias the price coefficient

Figure 3-1: Improving Coefficient Accuracy by Addressing Multiple Demand Factors

There are additional expectations for model coefficients affiliated with the explanatory variables that helped in model development. Estimated coefficients needed to be rational (both in signs and magnitudes), aligning with Hazen's experience and yielding as high of an explanatory power as practically possible. Orange County water use varies widely by geography (agency) and time. A panel regression modeling approach is best suited to explicitly account for variables that have historically varied highly across geography but not time (for example, median income, persons per household, and housing density). The panel approach enhances forecast accuracy for each agency by simultaneously fitting consumption data from all member agencies. The larger sample size enables more robust fits for agencies with data gaps. All agencies still receive their own unique statistical equations and outputs, although some coefficients may apply to all (or be the same across) agencies. Because consumption data was not consistently available back to 2010 for all member agencies, the dataset represents what is called an "unbalanced panel" (not all retail agencies have the same number of observations for the same time periods), requiring these special techniques to account for missing information and potential cross-sectional biases.

3.2 Model Development

The development of econometric models is an iterative process as outlined in **Section 3.2.1.** Model fitting results in a set of explanatory variables used to forecast water use. In **Section 3.3**, model fits and performance are organized by water-use sector.

3.2.1 Model Fitting

Table 3-1 outlines the model fitting process.

Table 3-1: Iterative Process for Developing Econometric Models

Model Fitting Procedure	Description
Pre-process model input data	Conduct necessary pre-processing calculations prior to model fitting: • Geographical processing of driver units. • Calculate per-unit use. • Calculate natural logarithms of per-unit use and appropriate explanatory variables. • Calculate departures from normal conditions for appropriate explanatory variables (i.e., economic trend and weather). • Calculate any index, "dummy", or interacted parameters (e.g., seasonal cycle, geography, drought severity). • Smooth monthly and bimonthly data to adjust for irregular billing cycles.
Fit regression models for each sector	Use statistical estimation software (e.g., R, SAS, EViews) to fit linear regression equations to per unit use with the initially selected explanatory variables.
Examine coefficient estimates and measure of fit	Check measures of fit (such as R^2) and coefficient values for reasonable magnitude, direction/sign, and significance.

Model Fitting Procedure	Description
Refine the model to improve measures of fit and coefficient estimates	If the model fit is poor or if coefficient estimates are illogical or insignificant, several actions can be taken, including but not limited to: • Identifying and removing outlier data points that have significant leverage on coefficient estimates. • Remove explanatory variables with insignificant or illogical coefficient estimates from the regression equation. • Testing alternate specifications of explanatory variables.
Check models for cross-sector consistency	Model fits and explanatory variables are compared across sectors to judge estimates relative to prior expectations, for example, testing if the relative effects of price and socioeconomic variables vary by sector in a logical way based on past experience.

The models are fit to historical data using a combination of data management and statistical analysis software (R, SAS, or EViews). The model estimation results were checked to ensure strong measures of fit (e.g., R^2) and that coefficients were significant and reasonable. Goodness of fit is a holistic exercise requiring judgement based on two classifications of indicators:

1) Overall summary statistics used to evaluate relative model performance: these may include R^2, Measures of average error (mean absolute error, standardized error metrics such as SAME and RMSE), and measures of bias; and

2) Visual inspection applied to plots of historical data provides an indication of the model's ability to represent long-term trends, perform as expected during periods of interest (for example, COVID and State water use restrictions), allows the modeler to evaluate the presence of systematic biases and assess the variance in the underlying data.

Section 3.3 summarizes the statistical model fits and their performance in comparison to historical observations of water consumption.

3.2.2 Summary of Explanatory Variables

The initial selection of explanatory variables is discussed in detail in Section 2. However, during the model fitting process, derivatives of initially selected variables were also developed and included in model equations. For example, an agency's monthly water use may also be influenced by the precipitation, or temperature, in the prior month. In some cases, time lags of 1 to 3 months in weather variables improved the estimation of weather impacts on demand.

Table 3-2 details the explanatory variables used to develop the demand models and identifies the expected sign and magnitude of the coefficient estimates resulting from the linear regression. The coefficient sign represents whether an explanatory variable will have a negative or positive impact on demand, for example, water use will decrease as price increases and the price coefficient should be negative. The coefficient magnitude illustrates the importance of the explanatory variable relative to all others. For example, a persons per household coefficient of 0.3 indicates that persons per household has a lesser influence on demand than a coefficient of -0.5 assigned to density.

Table 3-2: Description of Demand Model Explanatory Variables

Explanatory Variable	Log Transformed?	Expectations about Coefficient Estimates	Description
Departure from normal monthly maximum temperature (lagged values of temperature were also evaluated and included as explanatory variables as the influence of weather on water demand can persist for several months.)	Yes	Positive Sign	Represents the difference from long-term temperature. Higher than normal temperatures are associated with increased demands.
Departure from normal monthly precipitation (lagged values precipitation were also evaluated and included as explanatory variables as the influence of weather on water demand can persist for several months.)	Yes	Negative sign	Represents the difference from long-term precipitation. Higher than normal rainfall is associated with lower demands.
Seasonal index	No	Larger magnitudes for agencies with greater seasonal peaking	Reflects the cyclical pattern in water use, where demands are generally higher in the summer and lower in the winter. Represented in the model as a sine / cosine pair of variables. (Most sectors have a single sine/cosine pair representing the seasonal cycle).
Price	Yes	Negative sign with absolute value between 0 and 1	Economic theory suggests negative correlation with demand.
GDP	Yes	Positive Sign	Water demand is positively correlated with economic fluctuations of the business cycle. The index is modeled as departures from long-term trends.
Mix of jobs across industries	Yes	N/A	The representation of jobs in many industries within a geographical area is related to the amount of water used within the CII sector. There is generally no expectations on the range of coefficient estimates.
Housing density	Yes	Negative sign (commonly between 0 and -1)	Housing density is negatively correlated with demand; on average, residences with more units per acre (or smaller parcel sizes) tend to use less water on outdoor uses.

Explanatory Variable	Log Transformed?	Expectations about Coefficient Estimates	Description
Median income	Yes	Positive sign (commonly between 0 and 1)	Economic theory suggests positive correlation of income with demand; generally geographical areas with higher median incomes tend to use more water.
Persons per household	Yes	Positive sign (commonly between 0 and 1)	Positively correlated with demand; generally, residences with more people tend to use larger amounts of water
Water Use Restrictions	No	Negative sign	Reflects the effect of drought restrictions

Most explanatory variables are log-transformed because some variables are orders of magnitude larger than others (for example, income is in the tens of thousands of dollars while monthly precipitation may be smaller than 1 inch). Log transformation compresses the large values and spreads out smaller ones, balancing the data and facilitating the regression's ability to interpret how each variable affects demand.

3.3 Single-family Regression Development

This section reviews the development of the statistical regression for the single-family residential sector.

3.3.1 Explanatory Variables and Fitted Coefficients

The fit for the final single-family regression is presented in **Table 3-3**. While all coefficients are generated with the panel regression approach, Hazen relied on experience and the model fitting process to allows some coefficients to vary by agency (shown as a range of values) and restricted some to be constant across all agencies (and a single value is shown in Table 3-3). Coefficient estimates are within the expected range for all explanatory variables).

Table 3-3: Single-family Regression Variables and Coefficients

Explanatory Variable	General Directional Influence	Model Coefficient Range
Persons per Household	+	0.32
Single-family Units per Account	+	0.52
Housing Density	-	-0.52
Average Agency Income	+	0.09
Marginal Price (per 10 CCF)	-	-0.12
Departure from normal monthly maximum temperature	+	0 to 0.93
Departure from normal monthly maximum temperature (lagged 1 month)	+	0 to 0.95
Departure from normal monthly precipitation	-	0 to -0.031
Departure from normal monthly precipitation (lagged 1 month)	-	0 to -0.05
Departure from normal monthly precipitation (lagged 2 months)	-	0 to -0.023
Departure from normal monthly precipitation (lagged 3 months)	-	0 to -0.0139
Residual Trend	-	-0.0027 to 0.0003
COVID Indicator	+	0.02 to 0.15
State Requested Percent Restriction	-	0 to -0.81
State Drought Declaration	-	-0.08 to 0.01

Variables with an increasing effect on water demands included temperature, economic index, median income, and persons per household. Variables with a negative effect on water demands included precipitation, price, housing density, and water-use restrictions. Consumption is highly seasonal in the Orange County region, and the econometric model correlates well to seasonality and temperature. The single-family sector model produced the best fit among the four demand sectors.

3.3.2 Historical Model Performance

Visual inspection of the time series plots and review of the model fit parameters showed good performance across all agencies. **Figure 3-2** shows an example model fit for a single retail agency in the single-family sector in gallons per account per day. The model accounts for all dips in demand.

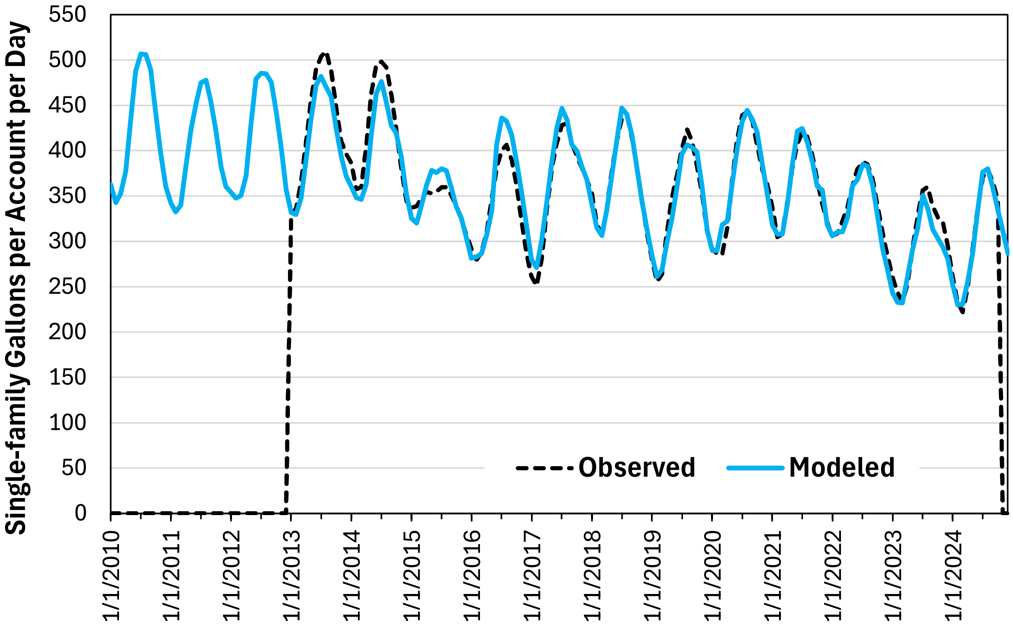


Figure 3-2: Modeled vs Historical Water Use per Account for Single-Family for One Agency

The R^2 values for all retail agencies are all above 80%, which indicates that the explanatory variables used in the model as well as their multipliers (model coefficients) explain 80% or more of the historical variability in the single-family use per account measurements.

3.4 Multifamily Regression Development

This section reviews the development of the statistical regression model for the multifamily residential sector.

3.4.1 Explanatory Variables and Fitted Coefficients

Most explanatory variables for the multifamily sector are the same as for the single-family sector. Median income and a 2-month lagged departure from precipitation were dropped. These modifications to the model design resulted in stronger measures of fit and more reasonable coefficient estimates. Final coefficient estimates presented in **Table 3-4** are within the expected range for all explanatory variables

Table 3-4: Multifamily Regression Variables and Coefficients

Explanatory Variable	General Directional Influence	Model Coefficient Range
PPH	+	0.5 (restricted)*
Housing Density	-	-0.33
MF Units per Account	+	0.79
Marginal Price (per 20 CCF)	-	-0.035
Departure from normal monthly maximum temperature	+	0 to 1.07
Departure from normal monthly maximum temperature (lagged 1 month)	+	0 to 1.46
Departure from normal monthly precipitation	-	0 to -0.04
Departure from normal monthly precipitation (lagged 1 month)	-	0 to -0.06
Residual Trend	-	-0.007 to 0.0017
COVID Indicator	+	-0.05 to 0.14
State Requested Percent Restriction	-	-0.8 to 0.32
State Drought Declaration	-	-0.16 to -0.04

*The persons per household coefficient was set to 0.5, which was lower than the initial econometric estimate (which was >1). This change avoided instabilities, with little effect on the other coefficient estimates.

The multifamily use per account is less influenced by water price than single-family (lower coefficient).

3.4.2 Historical Model Performance

Visual inspection of the time series plots and review of the model fit parameters showed good model performance, with most fits exceeding an R^2 of 80%. **Figure 3-3 s**hows the performance of the multifamily regression for an example agency.

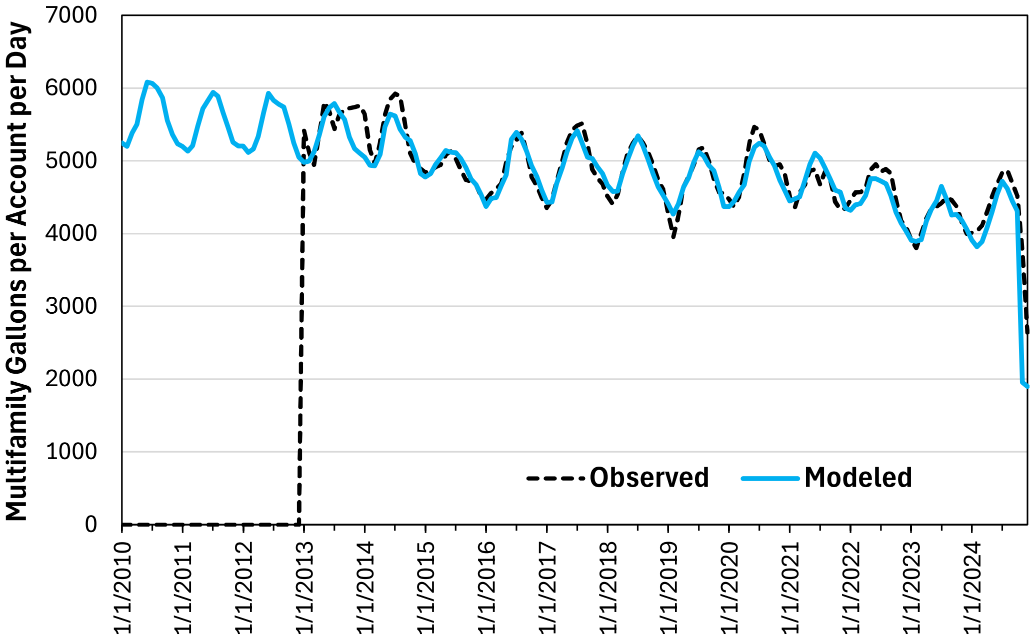


Figure 3-3: Modeled vs Historical Water Use per Account for Multifamily for an Agency

Multifamily use is generally less responsive to weather than the single-family demands; some of the outdoor use has been shifted over into the irrigation sector, and the reported multifamily use is primarily indoor.

3.5 CII Regression Development

Different billing classification schemes among retail agencies introduced definitional uncertainty in sectoral water use and driver units. For example, certain agencies lacked a distinct industrial billing classification while others combined commercial and institutional categories. Additional verification of water use at the account level was not possible, given the data constraints for this project. In response to these constraints and uncertainties, total use within the commercial, industrial, and institutional sectors was consolidated into a single composite CII regression. The benefit of combining these classifications is a more “parsimonious representation” (i.e., a simpler, clearer approach) with one sector, while providing a means to use the mix of industries to explain CII water-use variability across retail agencies.

3.5.1 Explanatory Variables and Fitted Coefficients

Explanatory variables for the final CII regression equation, along with their coefficients, are reported in **Table 3-5**.

Table 3-5: CII Regression Variables and Coefficients

Explanatory Variable	General Directional Influence	Model Coefficient Range
Proportion of Total Jobs in Retail	+	0.42
Proportion of Total Jobs in Education	+	0.287
Proportion of Total Jobs in Services	+	0.294
GDP	+	0.81
Marginal price (per 20 CCF)	-	-0.114
Departure from normal monthly maximum temperature	+	0 to 1.63
Departure from normal monthly maximum temperature (lagged 1 month)	+	0 to 0.7
Departure from normal monthly precipitation	-	0 to -0.50
Departure from normal monthly precipitation (lagged 1 month)	-	0 to -0.06
Departure from normal monthly precipitation (lagged 2 month)	-	0 to -0.034
Residual Trend	-	-0.01 to 0.01
State Requested Percent Restriction	-	-0.24 to 0.17

The coefficients for CII indicate the job proportion used: total services portion, total education portion, and total retail portion. CII use per job is positively correlated with each job proportion as well as gross domestic product throughout Orange County.

3.5.2 Historical Model Performance

Visual inspection and performance metrics showed good model performance, including the same seasonal cycle and quantities. Like other classes, most fits exceed an R^2 of 80%. **Figure 3-4** shows the model performance for an example agency.

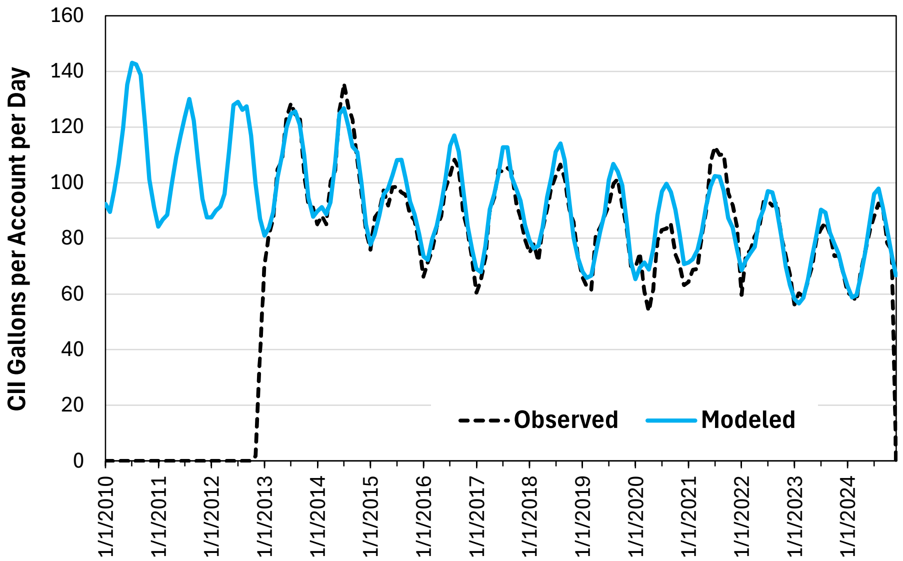


Figure 3-4: Modeled vs Historical Water Use per Account for CII Use for an Agency

3.6 Irrigation Regression Development

This section reviews the development of the statistical regression model for the irrigation sector. Both potable and recycled irrigation water demands were included in the analysis.

3.6.1 Explanatory Variables and Fitted Coefficients

Explanatory variables for the final Irrigation regression equation, along with their coefficients, are reported in **Table 3-6**.

Table 3-6: Irrigation Regression Variables and Coefficients

Explanatory Variable	General Directional Influence	Model Coefficient Range
Marginal Price (per 20 CCF)	-	-0.14
Normal monthly maximum temperature	+	0 to 2.58
Normal monthly maximum temperature (lagged 1 month)	+	0 to 2.34
Normal monthly precipitation	-	0 to -0.13
Normal monthly precipitation (lagged 1 month)	-	0 to -0.11
Normal monthly precipitation (lagged 2 month)	-	0 to -0.068
Agency Stage 1	-	-0.46
Agency Stage 2	-	-0.13
Agency Stage 3	-	-0.37
COVID		-0.18 to 0.26

During the model fitting process, historical precipitation values were found to generate a better fit than departures from normal weather precipitation. Additionally, irrigation use is better defined by agency-declared stages than by State declarations. Irrigation is much more responsive to temperature and precipitation than the other sectors, as expected.

3.6.2 Historical Model Performance

Visual inspection and performance metrics showed good model performance, matching the seasonal cycles and quantities with high overall accuracy. **Figure 3-5** shows the model performance for an example agency.

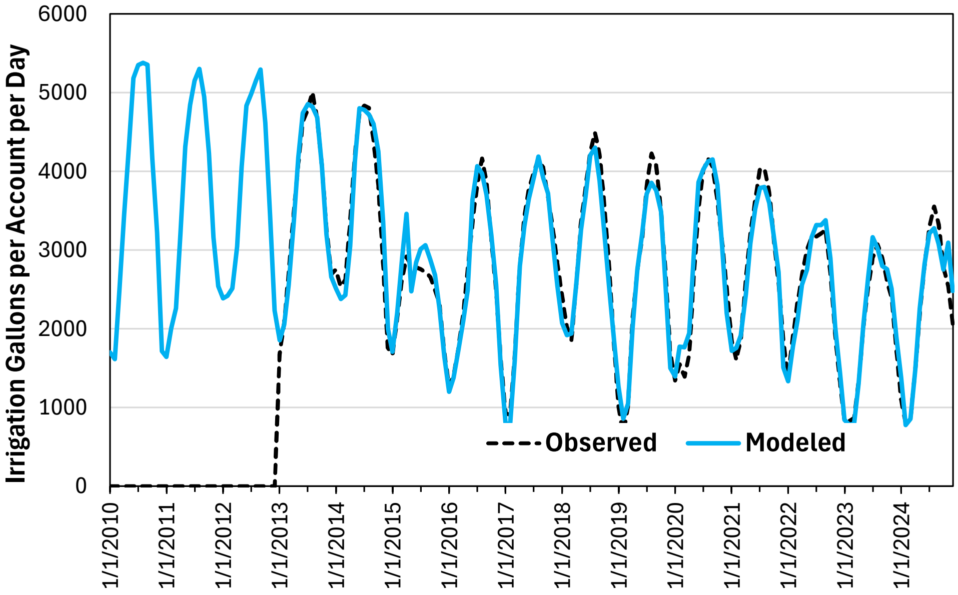


Figure 3-5: Modeled vs Historical Water Use per Account for Irrigation for an Agency

3.7 Price Elasticity

The sensitivity of the quantity of water demand to a change in its price is known as the price elasticity. The sector-specific results showed average price elasticities across the year, but the demand models allow the elasticity to vary by time of year. As water use becomes more discretionary in the summer, the estimated price elasticity (the response to price changes) tends to increase. Comparison of the four elasticity values in **Figure 3-6** reveals that multifamily demand is the least price-responsive (i.e., the least elastic of the demand sectors). The other sectors show a blend in terms of when the price signal starts mattering more. For single-family use, price changes have a large impact in late spring and early summer. Prices for CII and irrigation have the biggest impact in the summer (irrigation price elasticity approaches a coefficient of -0.25, which means that a 1% increase in the volumetric price of water leads to a 0.25% decrease in water use per account). The average regional response to price varies for a given sector over the calendar year.

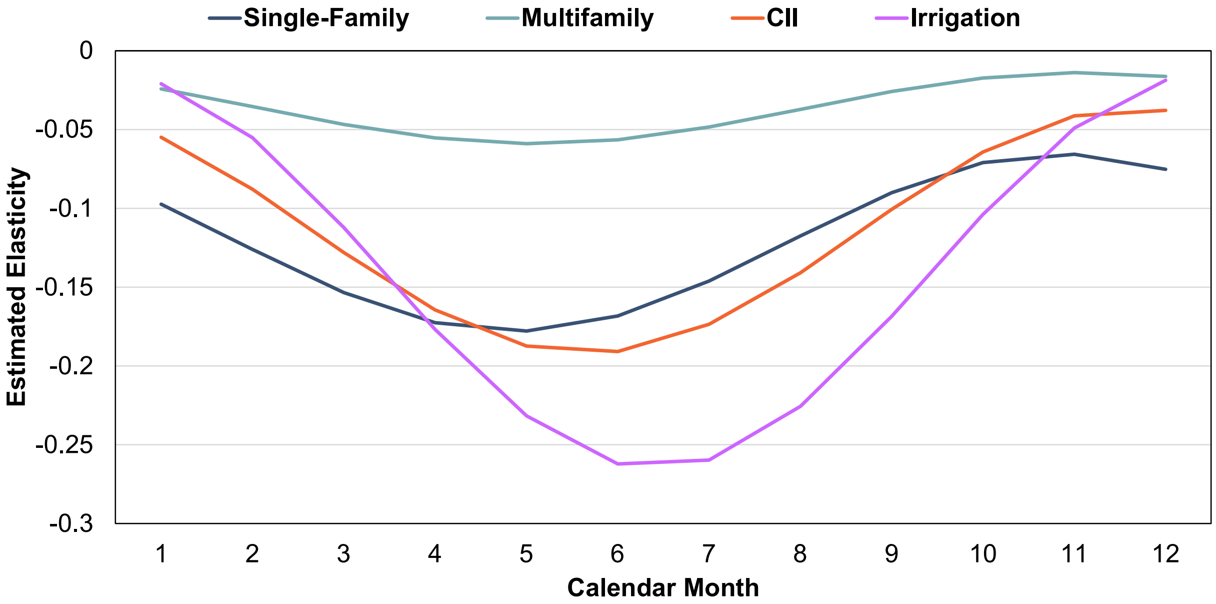


Figure 3-6: Estimated Seasonal Price Elasticities by Demand Sector for Orange County Water Agencies

Even though the model coefficient for price is equal for each agency across all four sectors, the actual water rate data each agency provided is in the panel dataset, so the data by which this price coefficient is multiplied differs. Additionally, agencies adopt different block structures (different prices for the 10th or the 20th CCF) over time. Both the spatial and temporal variability in water rates allows us to estimate these elasticities, even though the coefficients are applied at the regional level.

3.8 Model Development Summary

The econometric regressions show strong performance in explaining historical patterns of consumption over the 15 years from 2010 to 2024, including two major droughts and the COVID pandemic. Most of the regressions had R-squared values of 0.80 or greater. None of the regressions demonstrated a large, consistent bias. Based on this analysis, the estimated regression equations reflect a suitable basis for forecasting.

The overall model approach allows for demand forecast scenario analysis based on varying assumptions of future conditions. Several forecast scenarios may be explored, including climate change-adjusted weather, alternate assumptions around the timing and magnitude of drought recovery, alternate assumptions around urban development, and/or different assumptions around future economic conditions. For any of these future scenarios, the model coefficients presented in this section should be maintained as they reflect the best-fitted estimates of the causal relationships between external socioeconomic conditions and historical water demand, given the available modeling data.

Model scenarios can also be developed to address uncertainties in future explanatory variables, such as housing/job growth and density. Future inputs in these scenarios could be conducted as a sensitivity analysis or be driven by alternate growth projections. On a regular basis, overall model performance should be evaluated. Annually, forecasted consumption and input assumptions (driver unit counts, economic conditions, water rates, etc.) can be compared with observed conditions as data becomes available to monitor predictive performance. Less frequent (approximately every 5 years), model explanatory variables should be re-evaluated. Major events, such as another drought or a severe economic recession, may necessitate reexamination and/or refitting model coefficients and may cause changes in longer-term expectations over the forecast period.

4. Future Demand Analysis

The four sector-specific econometric models are used to establish baseline demand projections from 2025 to 2050 at a monthly timestep for each retail agency[1]. Prior to forecasting, the models are calibrated to a specific observation year, and other uses are quantified (other uses are miscellaneous uses not included in the original four demand sectors).

Hazen worked with each agency separately to change the calibration factors or household and job variables to yield a forecast start year value (Fiscal Year 2024-2025) that was reasonably close to agency observations. Calibration refers to adjustments for residual biases in the output of fitted econometric models to establish a historical point in time to anchor projections of the future to a recent, representative historical period for each agency and sector. The calibration approach implemented a simple scalar calibration at the per-account (rate-of-use) level for each agency and sector. The use of simple scalar (i.e., a constant multiplicative factor) preserves the econometric relationships (e.g., weather and price elasticities) while removing differences/errors in the statistical model predictions for the selected calibration period.

For each member agency and model sector a calibration factor was calculated as the ratio needed to make the model's average predicted per-unit use equal the observed per-unit use over the selected calibration period. Calculated factors were then applied multiplicatively to all forward-looking monthly rate-of-use predictions. Model output for each sector (water use per unit) was multiplied by calibration factors to account for biases in the historical model fits. Calibration factors were derived from the ratio of predicted to observed water demand for historical normal weather years for each retail agency, or historical water demand based on agency-requested time periods (**Equation 4-1**).

$$Calibration\ Factor = \frac{Historical\ (observed)\ water\ use}{Modeled\ (predicted)\ water\ use} \qquad \textbf{Equation 4-1}$$

Calibration factors were unique to each retail agency and sector and are summarized in **Table 4-1**.

Table 4-1: Calibration Factors

Agency	SF Calibration Factor	MF Calibration Factor	CII Calibration Factor	Irr Calibration Factor
Anaheim	0.99	0.99*	1.09*	0.78
Brea	1.00	1.00	0.98	1.08
Buena Park	0.99	0.99	1.04	0.97
East Orange CWD	1.06	0.99	0.99	0.99
El Toro WD	1.00	1.00	1.02	0.69
Fountain Valley	1.03	1.01	1.04	0.33
Fullerton	1.01	1.00	0.98	0.99
Garden Grove	1.02	1.01	1.32	0.99

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[1] Due to the timing of the project, water use data were collected up to December 2024. The model projections begin in January 2025.

Agency	SF Calibration Factor	MF Calibration Factor	CII Calibration Factor	Irr Calibration Factor
GSWC Cowan	0.97	1.00*	0.00	0.91
GSWC Placentia	1.00	1.43*	0.00	0.93
GSWC Orange	0.98	1.33*	0.55	0.97
Huntington Beach	1.00	0.93	0.98	0.80
Irvine Ranch WD	1.01	0.99*	0.85*	0.66
La Habra	1.01	0.99	1.02	1.01
La Palma	1.00	1.00	1.00	1.00
Laguna Beach CWD	0.97	1.00	1.10	0.84
Mesa WD	1.00	1.00	1.01	1.00
Moulton Niguel	1.02	1.01	0.26	1.08
Newport Beach	1.03	1.01	1.08	0.77
Orange City	1.00	1.00*	0.94*	1.11
San Clemente	1.01	1.00	0.99	0.64
San Juan Capistrano	1.00	0.93	1.00	0.96
Santa Ana	1.03	1.01	1.00	1.39
Santa Margarita WD	1.00	0.99	0.61	0.83
Seal Beach	0.95	0.97	1.01*	1.01
Serrano WD	1.07*	0.00	0.00	1.05
South Coast	1.03	0.99	1.14	0.66
Trabuco Canyon WD	0.96	0.93	1.00	0.68
Tustin	1.02	1.00	1.04	0.99
Westminster	1.00	1.17	0.99	1.05
Yorba Linda WD	1.07	1.08	1.03	1.02
*Agencies have several billing sectors within this demand sector and have several different calibration factors in their specific spreadsheet model				

Total water use was summed for each sector to derive annual total use for each agency (**Equation 4-2**).

$$Forecast\ Water\ Use = \sum_{Four\ Demand\ Sectors} Driver\ Count \times Use\ per\ Driver \times Calibration$$ **Equation 4-2**

Other uses are predominantly low flows and include fire flows, temporary meters, construction and power uses, and losses. **Equation 4-3** shows these computed as a fraction of the annual total use after calibration.

$$Other\ Use\ \% = \frac{(Delivered - Bill\quad)}{Billed}$$ **Equation 4-3**

Table 4-2 quantifies the other uses for each agency.

Table 4-2: Other Uses by Agency

Agency	Other Use (Percent of Volume Billed)
Anaheim	3%
Brea	7%

Agency	Other Use (Percent of Volume Billed)
Buena Park	8%
East Orange CWD	12%
El Toro WD	3%
Fountain Valley	6%
Fullerton	4%
Garden Grove	8%
GSWC Cowan	6%
GSWC Placentia	6%
GSWC Orange	6%
Huntington Beach	11%
Irvina Ranch WD	5%
La Habra	4%
La Palma	4%
Laguna Beach	8%
Mesa Water	13%
Moulton Niguel	5%
Newport Beach	8%
Orange City	6%
San Clemente	4%
San Juan Capistrano	6%
Santa Ana	6%
Santa Margarita WD	4%
Seal Beach	4%
Serrano WD	5%
South Coast WD	2%
Trabuco Canyon WD	16%
Tustin	12%
Westminster	8%
Yorba Linda WD	10%

Calibrated models with other uses are used to forecast future total water use[2].

4.1 Baseline Scenario Assumptions

Future growth in driver units (housing and jobs) was tied to CDR projections through 2050. Future conditions for all other explanatory variables were selected to represent expected changes or to remain constant. **Table 4-3** summarizes the baseline demand scenario assumptions for driver units and explanatory variables.

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[2] Values of calibration factors (Table 4-1) and other uses % (Table 4-2) may change from these initial values as agencies refine their individual model.

Table 4-3: Future Model Parameters and Assumptions for Baseline Demand Forecast

Data Category	Variable	Source	Assumptions
Driver Units	Single-family and multifamily accounts	CDR	Historical households per account; averages are multiplied by households projected by CDR
	Irrigation accounts	Agency Billing Data	Accounts are assumed to be constant into the future
	Sectoral employment	CDR	Proportion of jobs within CII sectors projected by CDR
Explanatory Variables	Monthly Maximum Temperature and Total Precipitation	PRISM	30-year historical normal weather
	Water Price	Retail Agencies	Prices increase by 3% per year above inflation for 2025-2030 and keeps pace with inflation thereafter (zero difference from inflation trend)
	Water Use Restrictions	State & Local Restrictions	None
	Seasonality		Sine/cosine functions to capture monthly pattern
	Median income	US Census	Constant income at 2022 value (real dollars)
	Housing density	CDR	Derived from CDR housing unit projections, assuming residential area remains at 2024 levels
	Persons Per Household	CDR	CDR projected demographics
	Gross Domestic Product	Federal Reserve	Long-term GDP trend
	Relative Sectoral Employment	CDR	Calculated based on CDR projections
	Passive Efficiency Estimates	Flume Insight	Assumes a 2% decrease in residential demand due to conservation by 2030 (linearly extrapolated), then no change
	COVID Binary Indicator		None (occurred between March 2020 and May 2023)

Future assumptions were defined for every element of the water demand models, including sectoral driver units and explanatory variables.

4.2 Development of Forecast Inputs

Data sources documented in this section are limited to projected future datasets.

4.2.1 Retailer Driver Units

Driver units reflect the size or scale of a water use sector and allow for differentiation of the rate of use from total consumption. CDR provided the Orange County Projections 2022 (OCP-2022) as an update of the 2018 Orange County Projections. OCP-2022 estimates single-family residential housing units, multifamily residential housing units, jobs by sector, and total population at five-year intervals from 2025 through 2050.

CDR job projections were available at census tract level geographies, which required geoprocessing to retail service area boundaries. Geoprocessing was performed using GIS overlays of census tract boundaries and retail agency service area boundaries to aggregate CDR projections by retail agency as described in Section 2. CDR projections at the retailer level did not always align in magnitude with the historical driver units. To ensure consistency between historical and future datasets, the future time series for driver units were developed by calculating the rate of change in the CDR projections and applying the corresponding CDR rate of change to the last historical value of the driver units.

The econometric forecast models were developed using individual retail agencies' socioeconomic data. The averaged Orange County trends were examined for their potential impacts on future demands. **Figure 4-1** shows that average persons per household decreases and average household density increases. These trends are expected to provide decreased residential demand. Residential coefficients are positive for PPH, indicating demand will decrease as PPH decreases. Residential coefficients are negative for household density, indicating demand will decrease as housing density increases.

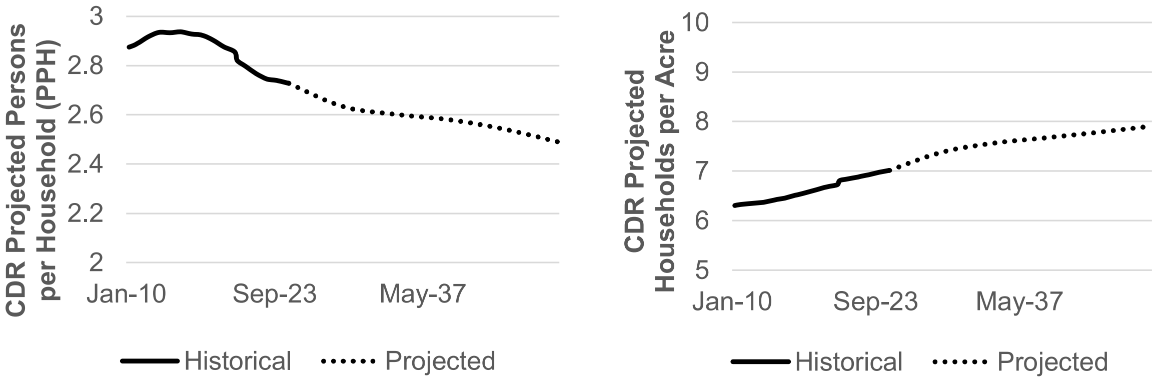

Figure 4-1: Historical and Projected Demographic Values for Orange County (2010 – 2050)

The decrease in demand inferred from the future explanatory variable values may be counteracted by the forecasted increase in driver units. Within the residential sector, average multifamily household growth exceeds average single-family household growth. **Figure 4-2** demonstrates that between 2025 and 2030, projected multifamily households increase substantially while single-family households show very little growth.

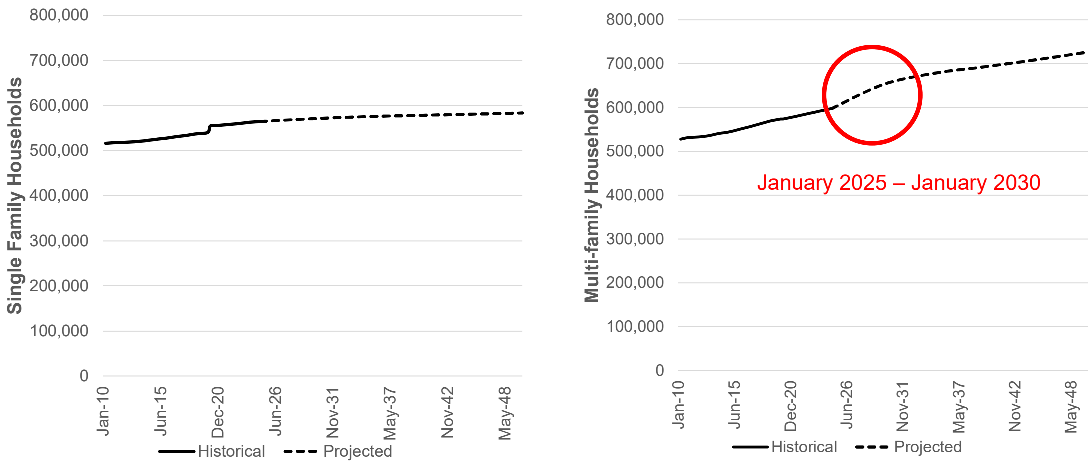

Figure 4-2: Historical and Projected Household Growth for Orange County (2010 – 2050)

CII demand is expected to increase corresponding to a projected average increase in jobs throughout Orange County (**Figure 4-3**).

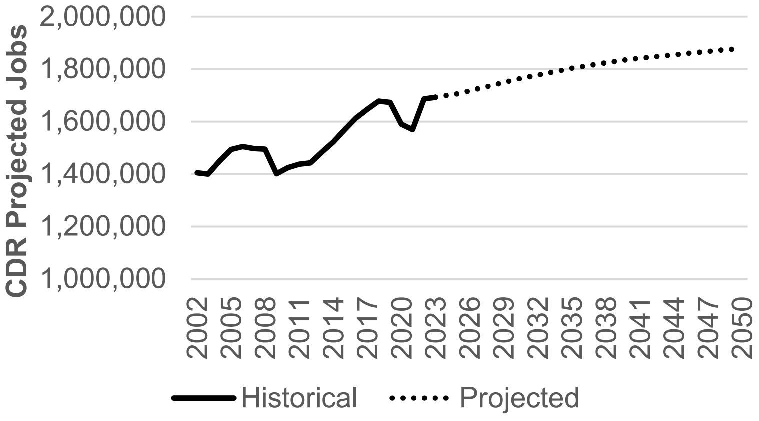

Figure 4-3: Historical and Projected Job Numbers for Orange County (2002 – 2050)

Although the counteracting explanatory variable values and driver units indicate that demands may remain flat into the future, variations in demand by sector exist at the retail agency level and underscore the importance of the econometric models for each agency.

4.2.2 Weather and Climate

For the model baseline scenario, future precipitation and temperature values were assumed to be equal to historical normal values. Historical normal values were calculated as the average monthly values based on all values from 1991 to 2024. The demand model uses departures from historical normal precipitation and temperature for the residential and CII forecasts and unadjusted historical normal precipitation and temperature for the irrigation forecasts. Given this, future weather inputs in the residential and CII forecasts are reflected by projected departure values of 0 for the precipitation and temperature variables. Future weather inputs for the irrigation sector consist of monthly normal precipitation values.

Alternative demand scenarios (**Section 5**) consider the potential effects of climate change on precipitation and temperature using CMIP6 data from CalAdapt. CMIP6 represents the sixth phase of the World Climate Research Program (WCRP) Coupled Model Intercomparison Project (CMIP) and includes 134 models from 53 modelling centers. CMIP6 relies on Shared Socio-economic Pathways (SSPs) that describe plausible futures of societal development and impacts on greenhouse gas emissions. A 2021 report explains why the CalAdapt models best represent the California climate.[3]

4.2.3 Water Price

Projections of future water rates were included as an explanatory variable in the water demand model. The future values for water prices assumes 5 years of a 3% (above inflation) increase in price per year, after which prices are held at nominal prices adjusted for inflation. Additional water pricing scenarios can be generated as agencies formulate and become more certain about future price paths.

4.2.4 Detrended Economic Factor

The future economy was assumed to run at its long-run trend rate of growth; thus real GDP is assumed to increase at the long-term rate. The detrended GDP value used to project future demands is 0, indicating no difference from the long-term GDP growth.

4.2.5 Median Income

Median income was included as an explanatory variable in the water demand model. Median income by retailer was held constant at the historical 2024 level, denominated in inflation-adjusted 2022-dollar values.

4.2.6 Housing Density

Housing density was included as an explanatory variable in the single-family and multifamily residential model sectors. Separate variables were created for single-family housing density and multifamily housing density. The baseline density projection assumed a “build up” scenario where housing units could vary within a constant land area, thereby affecting average density. Future values for the density variables are derived from the projected number of single-family or multifamily housing units (**Section 2**) divided by the land area classified as residential land use within the retail service area boundary (which is assumed to stay constant throughout the forecast).

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[3] Interim Deliverable for EPC-20-006, Prepared by: Will Krantz, David Pierce, Naomi Goldenson, Danile Cayaan; November 29, 2021

4.2.7 Persons Per Household

The ACS-derived single-family and multifamily PPH estimates were calibrated to align with the CDR’s single-family and multifamily projected housing unit data.

4.2.8 Relative Sectoral Employment

Ratios of sectoral employment were included as explanatory variables in the CII model sector. These sectoral employment ratios represent the estimated mix of CII activity within each retail service area. The projected number of jobs by sector was obtained from the 2025 CDR projections of four aggregated NAICS sectors.

4.2.9 Seasonality

Seasonal indices were included as explanatory variables in the water demand model. These seasonal indices are represented in the model as a sine/cosine pair of variables to capture the cyclical monthly pattern in water use, where demands are generally higher in the summer and lower in the winter. Most sectors had a single sine/cosine pair representing the seasonal cycle; some have two sine/cosine pairs to more effectively capture seasonal effects associated with the academic calendar. These factors are maintained for the forecast horizon.

4.2.10 Conservation

The 2021 Orange County Residential Water Efficiency Potential and Opportunities Study (2021 Study) assumes that total County-wide passive conservation in the residential sectors will increase by 695 acre-feet per year through 2030, after which it will remain constant. The conservation increase to 2030 represents a 1.9% decrease in annual demand, as shown in **Table 4-4**.

Table 4-4: Projected County-wide Passive Conservation[4]

Year	Residential Demand (AFY)	Passive Conservation Volume (AFY)	Percent Demand Reduction
2025	222,572	695	0.31%
2026	222,572	1390	0.62%
2027	222,572	2085	0.94%
2028	222,572	2780	1.25%
2029	222,572	3475	1.56%
2030	222,572	4170	1.87%
2035	2021 Study does not report post-2030 demand and conservation; percent demand reduction is assumed to stay constant		1.87%
2040-2050			1.87%

---

[4] Data shown on Table 4-4 were obtained from the 2021 Orange County Residential Water Efficiency Potential and Opportunities Study.

The model output does not include projected active water conservation.

4.3 Baseline Sectoral Forecasts

This section provides a summary of the baseline demand forecasts by each model sector. The model output does not include projected active water conservation. This section provides a summary of the baseline demand forecasts by each model sector. The baseline scenario results represent a projection of future water demand for Orange County, assuming **no additional active conservation**.

4.3.1 Forecast Expectations

Figure 4-4 summarizes the Orange County averaged annual demand projections as well as the historical values.

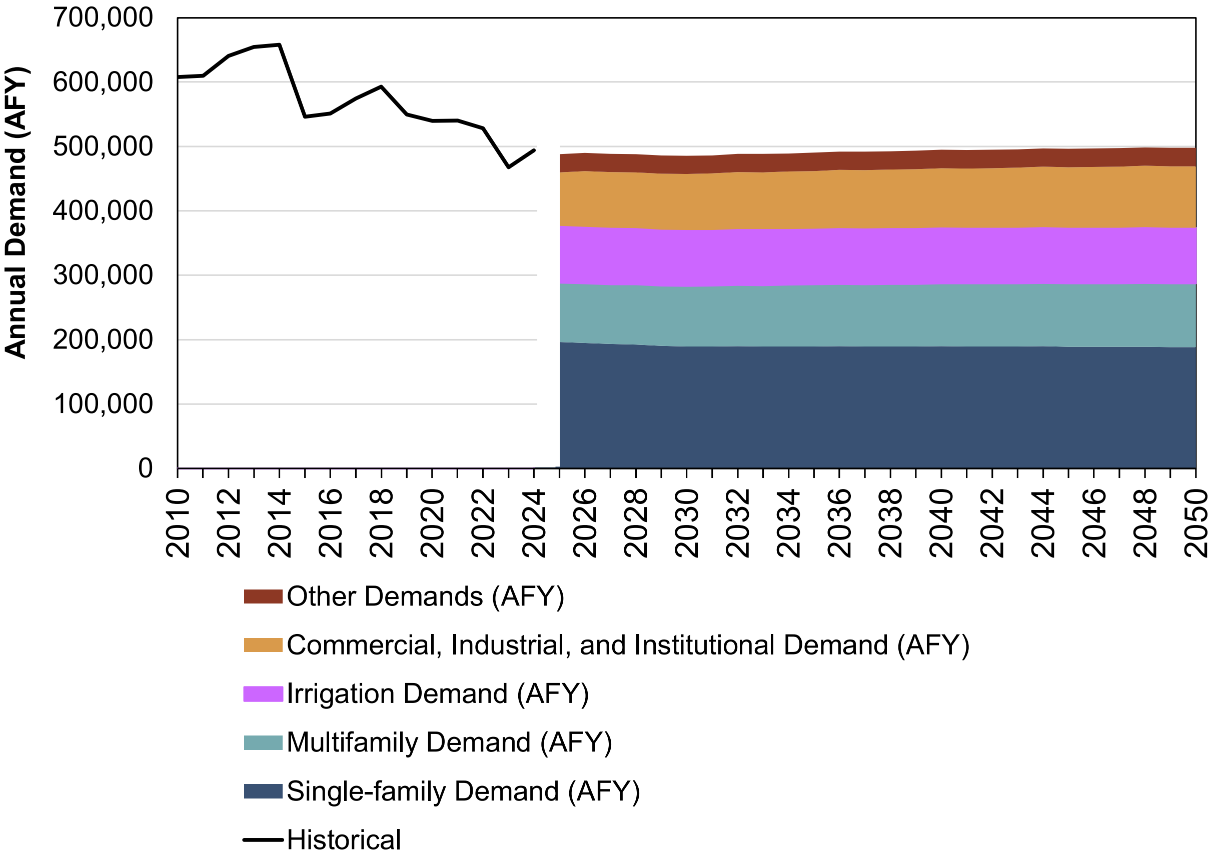

Figure 4-4: Total Orange County Demands

Annual county-wide single-family residential projected water demand values are projected to decrease from 2025 to 2030, then remain relatively constant through 2050. Multifamily residential projected water demand values are projected to steadily increase from 2025 through 2050. This increase is largely driven by rising multifamily housing units over time. CII demands are projected to steadily increase from 2025 through 2050. This increase is largely driven by an increase in the driver units of total non-agricultural jobs. Irrigation demand decreases due to higher water prices from 2025 to 2030, then remains constant thereafter.

4.3.2 Forecast Summary

The baseline scenario results represent a projection of future water demand for Orange County, assuming **no additional active conservation**. The scenario assumptions outlined in Section 4 reflect a reasonable estimate of the future conditions of parameters known to influence water demand derived from multiple available sources. The forecast uses ACS and CDR data to depict local and regional trends in demographics and development in the demand model. Consistent with regional trends, demands in the single-family sector are forecasted to remain relatively flat over the next 25 years as there is not expected to be substantial growth in single-family housing units.

Growth in residential demand is largely forecast to occur in the multifamily sector, consistent with anticipated increases in multifamily housing. Demands in the CII sector are also expected to increase, which is consistent with CDR forecasts of total jobs in the county. Increasing water rates and housing density are expected to have some modulating effect on demand (as housing density and water rates increase, water demand decreases); however, under the baseline scenario, projected changes in the values of these variables do not completely counteract the effects of growth in overall driver units.

5. Alternative Forecasts

Alternative forecasts were established using new climate data and possible additional water rate increases. Alternative demand scenarios consider the potential effects of climate change on precipitation and temperature using CMIP6 data from CalAdapt. A 2021 report explains why the CalAdapt models best represent the California climate.[5]

5.1.1 Future Climate Change

CMIP6 is the sixth phase of the World Climate Research Program (WCRP) Coupled Model Intercomparison Project (CMIP) and includes 134 models from 53 modelling centers. CMIP6 relies on Shared Socio-economic Pathways (SSPs) that describe plausible futures of societal development and impacts on greenhouse gas emissions. Downscaling originally included only dynamic downscaling, in which high-resolution physics-based simulations are used to help models reproduce the location and frequency of events that drive regional weather and climate. The State has introduced statistical downscaling, in which dynamically downscaled simulations train a new version of Localized Construction Analogs (LOCA) to downscale a broader set of GCMs than would be computationally feasible with dynamical downscaling.

Alternative forecasts were established using new climate data with the same quadrants Flume developed (**Figure 5-1**) to evaluate varying microclimates and the age of housing stock across Orange County (North and South Coastal, and North and South Inland).

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[5] Interim Deliverable for EPC-20-006, Prepared by: Will Krantz, David Pierce, Naomi Goldenson, Danile Cayaan; November 29, 2021

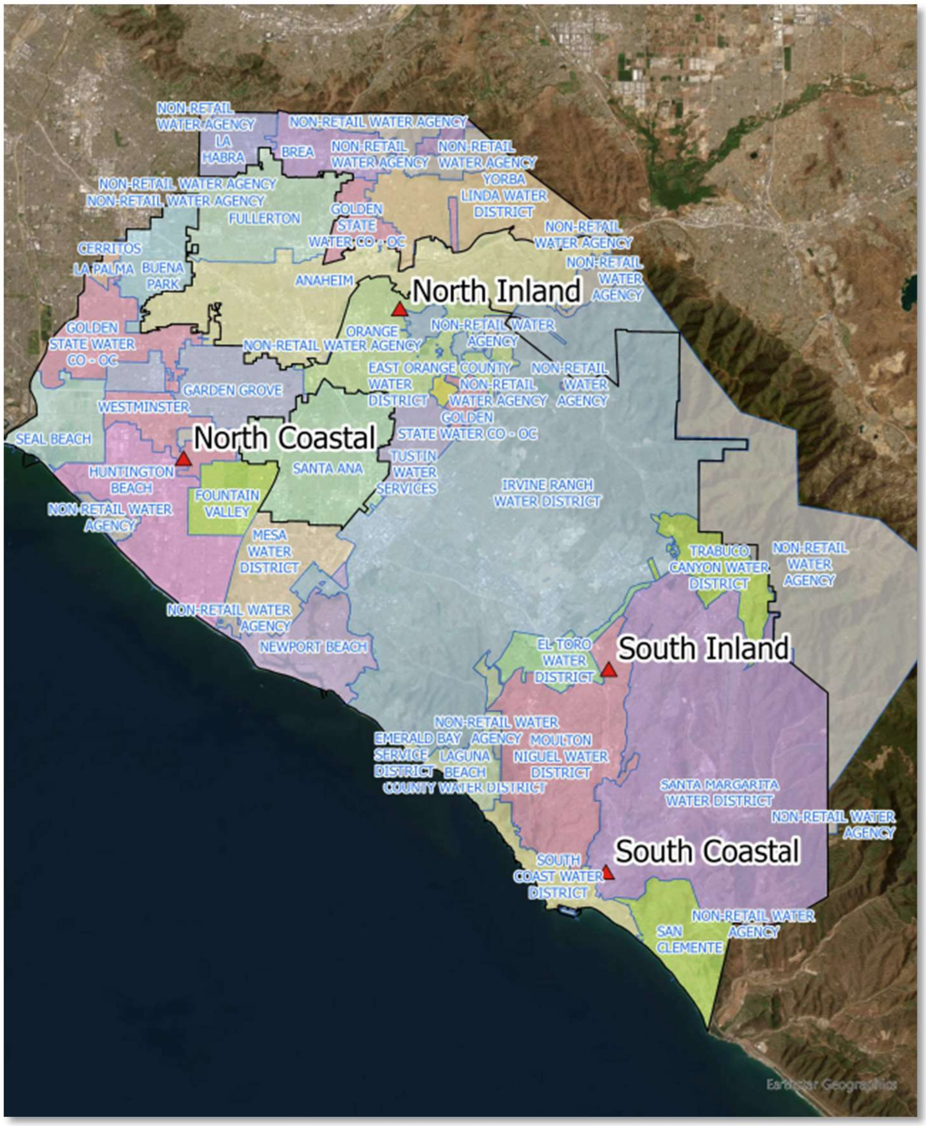

Figure 5-1: Flume Quadrants

Each retail agency was matched to the Flume-specific quadrant. **Figure 5-22** plots the CMIP6 model runs for the South Coastal Flume quadrant and plots the model results on a temperature-precipitation climate graph with quadrants of dry/warm, wet/warm, dry/cool, and wet/cool.

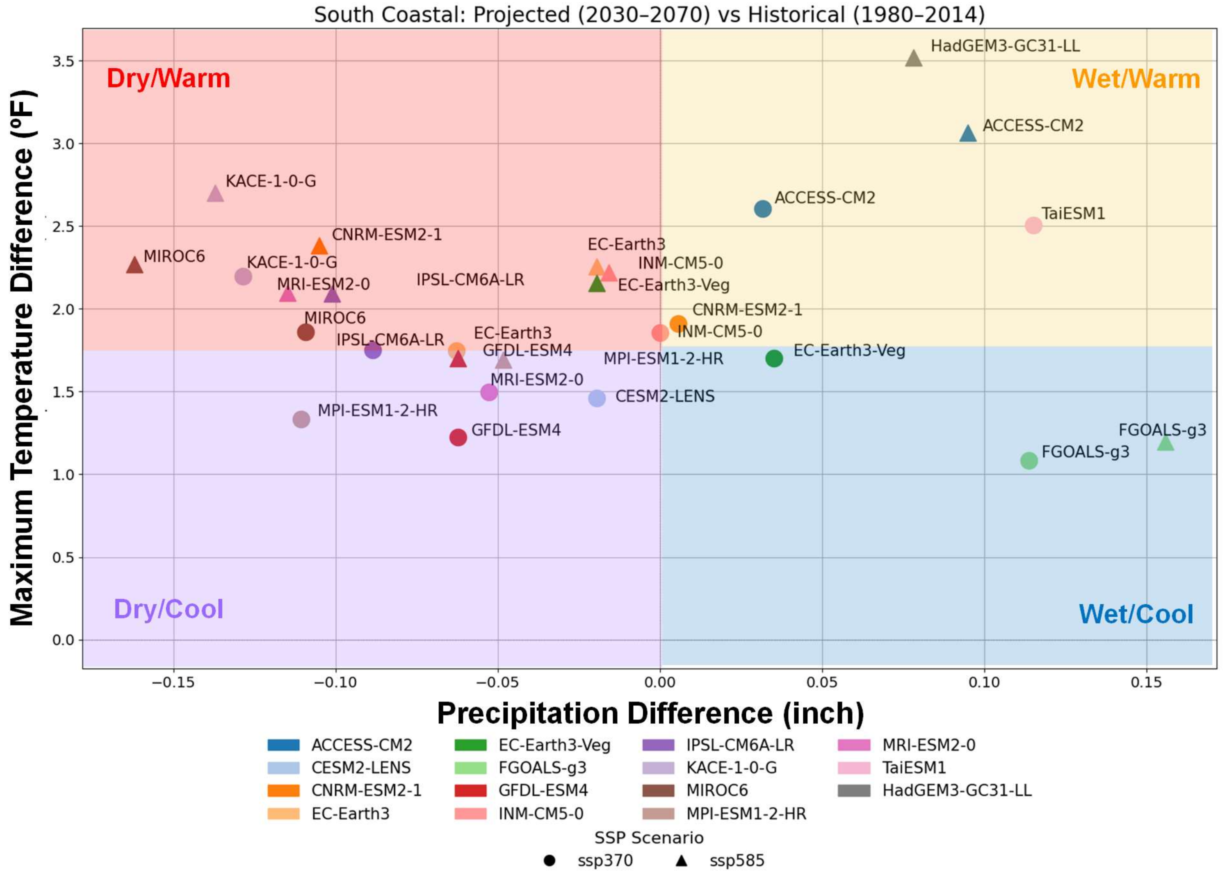

Figure 5-2: Climate Forecasts

Climate data is applied to the baseline weather patterns in a two-step process:

1) Download the CMIP6 datasets for each of the four Flume quadrants using Python scripts, then calculate the difference in the modeled future and modeled historical (delta, Δ) for temperature and precipitation (**Equations 5-1** and **5-2**):

$$\Delta Temp = Modeled\ Future\ Temp - Modeled\ Historical\ Temp$$

Equation 5-1

$$\Delta Precip = \frac{Modeled\ Future\ Precip}{Modeled\ Historical\ Precip}$$

Equation 5-2

The historical records produced for each model span 1950 to 2014, and the modeled historical data in the equations consist of the average weather parameter for each month over that period. Modeled futures extend from 2015 to 2100.

2) Apply the changes, or deltas, to the historical normal weather values. The historical normal has the same value each month, but applying a different delta value each month allows the climate change impacts to differ in the future. Each agency was matched to the Flume-specific quadrant and the appropriate regional delta values.

Future climate projections based on many CMIP6 models indicate a general increase in water demands over the forecast period (**Figure 5-3**). Note that the models shown are applied to a total baseline demand scenario prior to member agency review and final numbers were published.

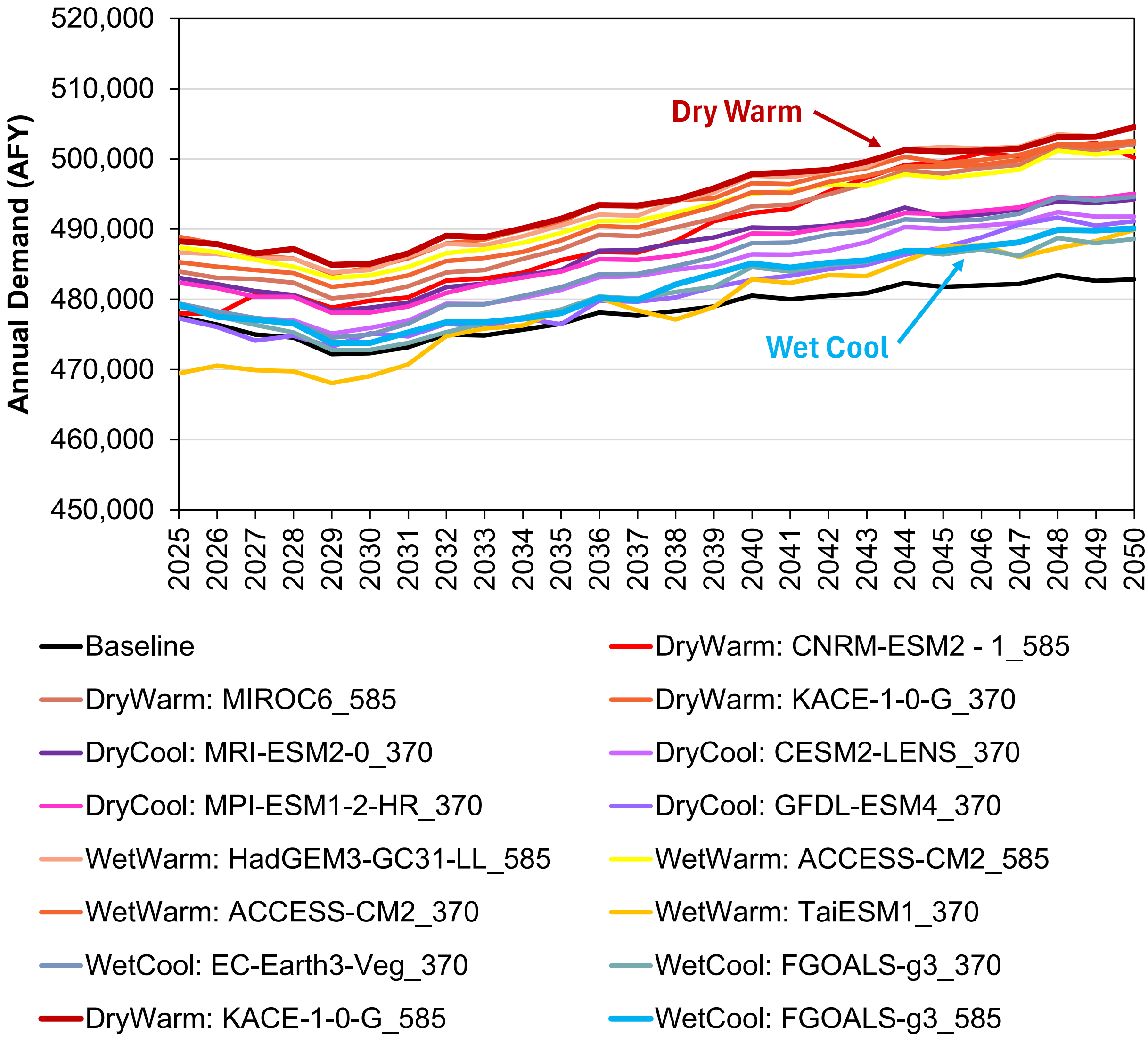

Figure 5-3: CMIP6 Climate Change Futures

CMIP6 data from the 15 model runs that were determined to be a good fit for California were substituted for baseline weather conditions in the demand model, and the resulting total Orange County demand was used to define a dry warm (high demand) scenario and a wet cool (lower demand) scenario to provide a range of possible climate impacted outcomes. Both scenarios predict increasing temperatures, and as a result, water demands that are higher than baseline demands.

5.1.2 Alternative Forecasts

The dry warm, and wet cool CMIP6 scenarios are depicted relative to historical Orange County demands in **Figure 5-4**.

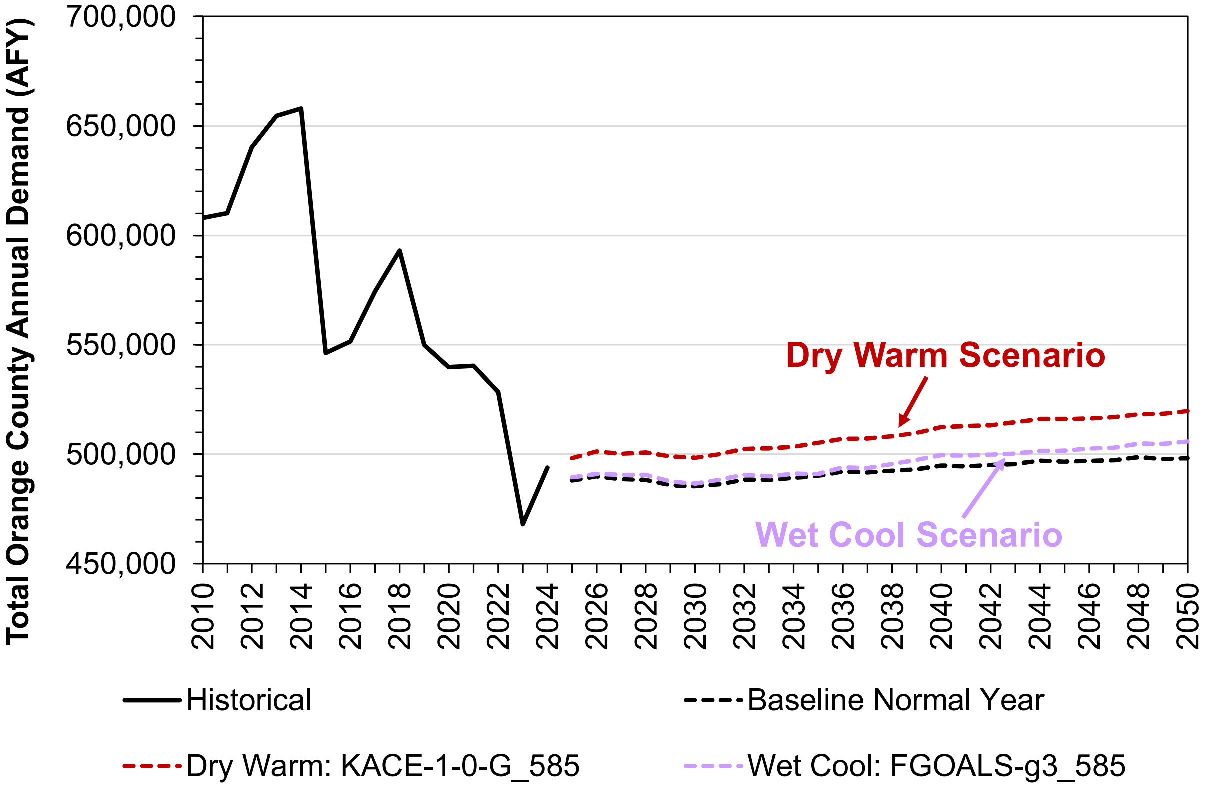

Figure 5-4: Future CMIP6 Scenarios

To create a possible envelope of demands with only two additional (non-baseline) forecasts, a long-term price increase (in addition to inflation) was imposed on the wet-cool simulation to illustrate additional price pressure (i.e., further decrease in demands). The price increase was assumed to be 3% per year for the entire forecast period. **Figure 5-5** shows that the general increases in demand are suppressed when price increases are included in the forecast.

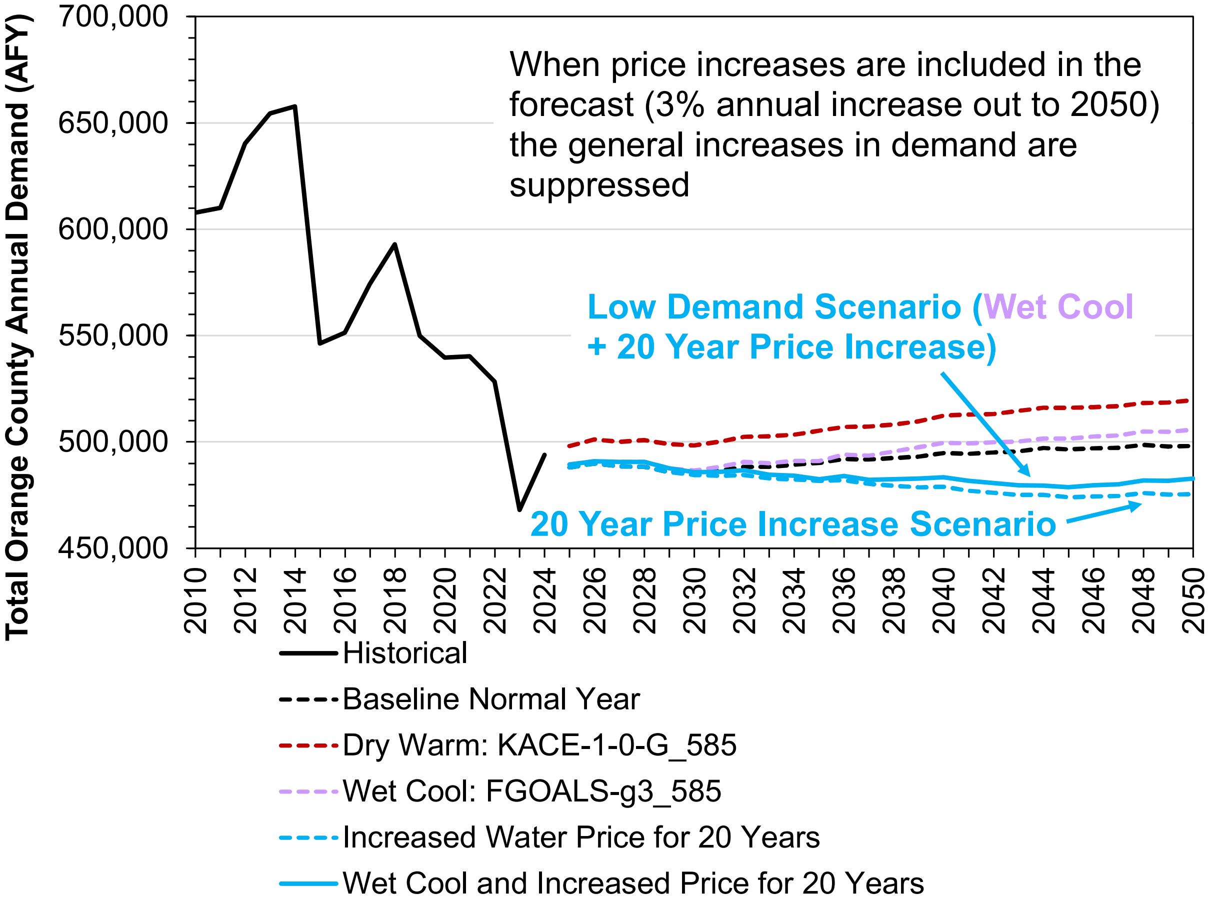

Figure 5-5: Alternative Demand Scenarios

The dry warm scenario with baseline water prices and the wet cool scenario with additional price increases constitute the two alternative forecasts.

6. UWMP Scenarios

The 2025 Urban Water Management Plan requires tabulation of the long-term projected water use over the next 20 years, in 5-year increments, for three types of hydrology:

- Normal Year: The demand a Supplier believes will occur during normal conditions. It could be a single year or an average range of years that most closely represent the average water demand. This is provided by the Baseline Forecast in Section 5.
- Single Dry Year: A year that represents higher water demand on the Supplier. Provided by finding the historical year most sensitive to all weather parameters (2010 – present)
- Five Consecutive Year Drought: The demand during the driest five-year historical sequence for the Supplier. Provided through a separate regression on total Orange County demand and historical weather (2004 – present)

6.1.1 Single Dry Year Scenario

The single dry year is the historical year in which weather factors have the largest combined impact as measured by a hot-dry index (HDI). The HDI was developed in four steps:

1) Calculate the HDI for each month in the historical weather series. This monthly hot-dry index (MHDI) is calculated for each member agency (a) and monthly observation (m) as the sum of the estimated weather effects for each sector model (j). The weather effects for each sectoral model are derived from the historical weather values (W) and weather model parameters (β) assigned to the weather variables in each model (i), which vary by member agency (**Equation 6-1**).

$$MHDI_{a,m,j} = exp\left(\sum_{i} \beta_{a,i,j} W_{a,i,m,j}\right)$$

Equation 6-1

2) Calculate the HDI for each calendar year in the historical weather series. The monthly index values are summed across the month of any given annual period to derive a set of annual index values (AHDI) for each member agency and sector (**Equation 6-2**).

$$AHDI_{a,j} = \sum_{m=1}^{12} MHDI_{a,m,j}$$

Equation 6-2

3) Weight the annual sector indices by the proportion of total annual water sales attributed to each sector (w) to define the final hot-dry index (HDI) values used to evaluate and select the hot-dry periods for scenario development (**Equation 6-3**). The weights are based on the estimated proportion of sales by sector for as many full annual records were available for each agency from 2010 to 2024.

$$HDI_{a} = \sum_{j=1}^{4} w_{j} \times AHDI_{a,j}$$

Equation 6-3

4) Determine the maximum value of HDI for each member agency across all years in the historical weather series. Retain weather data for the selected calendar year for each member agency.

Table 6-1 lists the calendar years containing the maximum of HDI by member agency. As shown, calendar year 2014 was selected more often than any other year in the historical weather series as the hot-dry year, and the weather data for 2014 were selected for all agencies to represent the hot-dry scenario.

Table 6-1: Selected Calendar Years for Hot/Dry Weather Scenario

Agency	Single Year Hot/Dry Periods	
	Calendar Year	HDI Value
Anaheim	2014	12.40
Brea	2018	12.26
Buena Park	2014	12.16
East Orange CWD	2014	13.14
El Toro WD	2014	12.72
Fountain Valley	2014	12.26
Fullerton	2014	12.65
Garden Grove	2014	12.28
GSWC Cowan	2014	13.27
GSWC Placentia	2014	12.61
GSWC West Orange	2014	12.42
Huntington Beach	2014	12.62
Irvine Ranch WD	2014	12.46
La Habra	2014	12.84
La Palma	No data available	
Laguna Beach WD	2014	12.62
Mesa WD	2014	12.61
Moulton Niguel	2014	13.35
Newport Beach	2014	12.52
Orange City	2014	12.70
San Clemente	2014	12.54
San Juan Capistrano	2014	12.38
Santa Ana	2014	12.32
Santa Margarita WD	2014	12.76
Seal Beach	2022	12.08
Serrano WD	2014	13.85
South Coast WD	2014	12.56
Trabuco Canyon WD	2017	11.82
Tustin	2014	12.53
Westminster	2014	12.43
Yorba Linda WD	2014	12.89

6.1.2 Multiple Dry Year Scenario

Trends in historical regional water use (supplied from all sources) were correlated with trends in observed weather conditions to develop a set of factors to describe the potential impact of consecutive dry years. The weather coefficients of the sectoral water demand equations can be used to generate weather scenarios for any given set of monthly weather data, for example, for a given hot/dry year. However, conceptually, the persistence of drier-than-normal weather could intensify water use rates in the absence of interventions, such as water-use restrictions. Because the sectoral forecasting equations, by construction, treat time periods independently, other statistical methods were derived to evaluate potential or "latent", or unconstrained, demands that could develop with the persistence of dry weather conditions.

Trends in historical total regional water use (supplied from all sources) were correlated with trends in observed Orange County weather conditions to develop a set of factors to describe the potential impact of consecutive dry years. Specifically, the running 12-month average of regional water use (USE12) was modeled as a function of the following variables:

- 12-month running average of the ratio of observed to normal average maximum daily temperature (MAXT12)
- 24-month running average of the ratio of observed to normal precipitation (PRCP24)
- 36-month running average of the ratio of observed to normal precipitation (PCRP36)
- 48-month running average of the ratio of observed to normal precipitation (PCRP48)
- 60-month running average of the ratio of observed to normal precipitation (PCRP60)
- Departure from long-term GDP trend
- Linear time trend counter (TREND)

Except for the linear time counter, all variables were transformed into natural log form prior to estimating the model using ordinary least squares regression. A binary water restriction variable was added to the regression to eliminate supply constraints (allow the regression to assume no curtailments instated during the hot dry spell). The estimated weather parameters (**Table 6-2**) are used to estimate the potential change in water use that would occur during the driest 24-month, 36-month, 48-month, and 60-month period over the historical record, assuming the warmest 12-month period estimated over the historical record.

Table 6-2: Regression Coefficients and Variable Values

	Coefficient	Historical Value
MAXT12	0.6279	1.0522
PRCP24	-0.0832	0.3783
PRCP36	-0.0076	0.4408
PRCP48	-0.0269	0.4977
PRCP60	-0.0296	0.5656

Consecutive dry-year scaling factors are derived using the historical minimums of the precipitation and historical maximum of the temperature variable from the historical weather data set.

Equation 6-4 shows the 2nd consecutive dry year scaling factor.

$$Factor = MAXT12^{0.6279} \times PRCP24^{-0.0832} = 1.1195$$ **Equation 6-4**

Equation 6-5 shows the 3rd consecutive dry year scaling factor.

$$Factor = MAXT12^{0.6279} \times PRCP24^{-0.0832} \times PRCP36^{-0.0076} = 1.1265$$ **Equation 6-5**

Equation 6-6 shows the 4th consecutive dry year scaling factor.

$$Factor = MAXT12^{0.6279} \times PRCP24^{-0.0832} \times PRCP36^{-0.0076} \times PRCP48^{-0.0269} = 1.1478$$ **Equation 6-6**

Equation 6-7 shows the 5th consecutive dry year scaling factor.

$$Factor = MAXT12^{0.6279} \times PRCP24^{-0.0832} \times PRCP36^{-0.0076} \times PRCP48^{-0.0269} \times PRCP60^{-0.0296} = 1.1673$$ **Equation 6-7**

These scaling factors are used to supplement the results of the single hot/dry year scenario. There is a 5-year sequence for any year in the forecast: single hot/dry year, followed by the second dry year, followed by the third consecutive dry year, and so on. Under these assumptions, the second consecutive dry year would result in water use that is about 12 percent higher than under normal precipitation conditions. The estimate of water use for the third consecutive dry year would be incrementally higher, or about 13 percent greater than normal. By the end of the fifth consecutive dry year, the estimated potential would grow to about 17 percent higher than the normal year baseline. The consecutive dry year scenarios are calculated based on the total baseline forecast and thus implicitly account for differences in growth occurring among Orange County's water use sectors and agencies. As indicated by the magnitudes of the scaling factors described above, this implies increasingly higher demands as conditions become drier. It is possible that demands would be restricted through demand management actions prior to reaching these levels if such conditions were to occur.

6.1.3 All UWMP Scenarios

All UWMP scenarios are shown in **Figure 6-1**, along with the baseline, high demand, and low demand scenarios discussed in the previous sections.

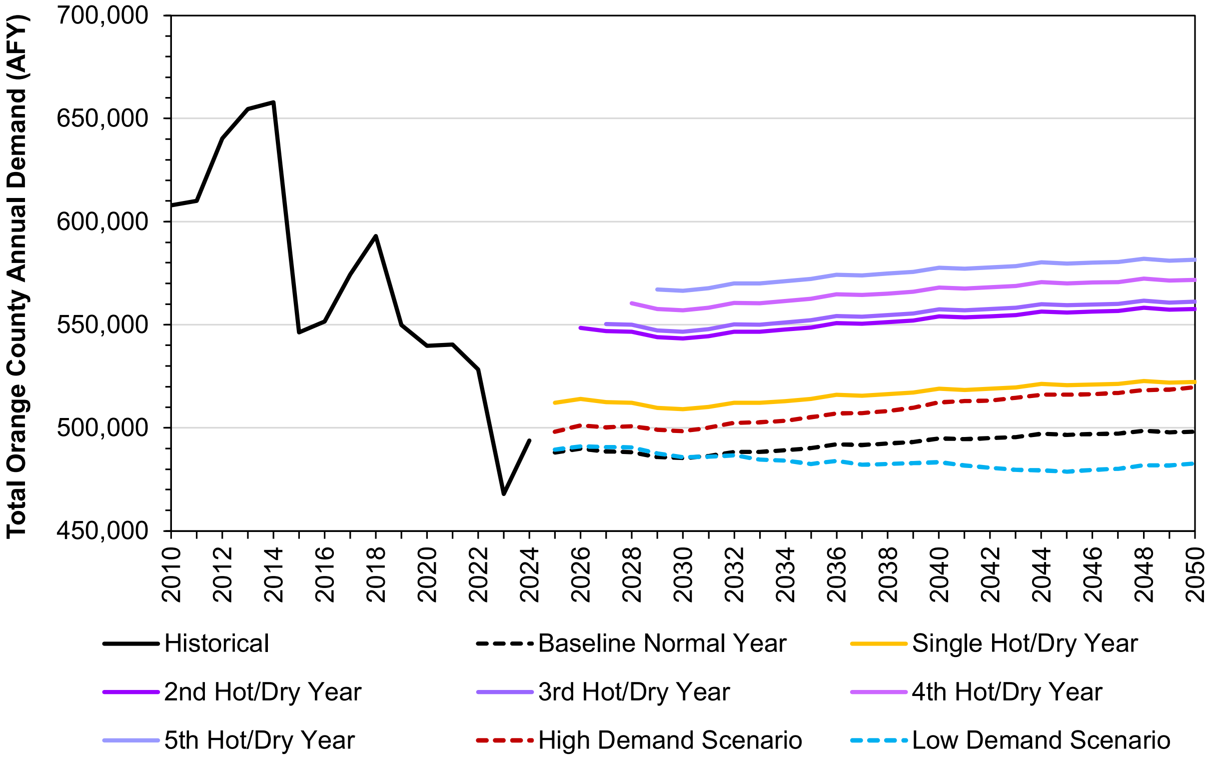

Figure 6-1: Total Orange County Historical Water Use vs Projected Water Demands for All UWMP Scenarios

The UWMP scenarios are tabulated for each agency in the Spreadsheet model.

Although Orange County demands are forecast to be relatively flat into the future, annual variations in weather could cause high fluctuations.

7. Urban Water Use Objectives (UWUO) Metrics

The Urban Water Use Objective (UWUO) requires residential indoor consumption to decrease from 47 GPCD in 2025 to 42 GPCD in 2030 and remain at 42 GPCD through 2050. Although **future active conservation is not included in the baseline forecast,** the UWUO target residential demand is calculated for each agency in this section, and active conservation may be assumed from these target values and subtracted from the baseline forecast.

While the indoor conservation target specified by the UWUO is fixed, the outdoor target depends on precipitation, evapotranspiration, landscape area, and a landscape efficiency factor (**Equation 7-1**).

$$Outdoor\ Budget\ \left(\frac{gal}{year}\right) = (ETo - Peff) \times Landcape\ Area\ \times LEF\ \times 0.62 \qquad \textbf{Equation 7-1}$$

ETo is local reference evapotranspiration, Peff is effective rainfall, and 0.62 represents a conversion factor from inches to square feet. The landscape efficiency factor (LEF) provides a way to reduce irrigation targets; water use increases as the LEF increases. The California State Water Board requires a LEF of 80% through September 2030, at which point the required LEF decreases to 63%. In October 2035, the LEF decreases to 55% for residential irrigation and 45% for CII irrigation. **When/If an agency can comply with the State UWUO outdoor conservation targets is a retail agency determination based on each agency's unique circumstances.**

Although the forecasts provided by Hazen do not include active conservation, each retail agency may compare the forecasted gallons per capita per day (GPCD) with their UWUO target to build or forecast an active conservation program.

8. Summary and Conclusions

The water demand forecasts presented in this technical memorandum provide a foundation for long-term planning across Orange County retail water agencies and aligns with needs for the 2025 Urban Water Management Plan. The model approach, which combined rigorous data collection and assessment and econometric model development, ensures that projections are grounded in historical trends and agency-approved demographic inputs.

Work with individual agencies to calibrate the forecasts revealed that the demand forecasts are highly sensitive to demographic projections. Future water use is driven primarily by changes in population, housing units, and jobs, all of which are subject to uncertainty and local planning decisions. The baseline scenario reflects CDR-OCP2022 growth rates and member agency feedback, and alternative demographic trajectories may be considered by individual agencies. Agencies may also use their calculated UWUO targets to incorporate active conservation plans, which are not included in the forecasts.

APPENDIX I

NOTIFICATION OF PUBLIC AND SERVICE AREA PROVIDERS

MesaWater
DISTRICT©

April 24, 2026

Alvaro Nuñez
City Manager
City of Santa Ana
20 Civic Center Plaza
Santa Ana, CA, 92701

Subject: Mesa Water District 2025 Urban Water Management Plan Update

Dear Alvaro Nuñez

Mesa Water District (Mesa Water) is in the process of preparing and updating its 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act. An update of the UWMP is required every five years.

Water Code Section 10621(b) requires an urban water supplier updating 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 Mesa Water's notice that it is preparing and updating its 2025 UWMP, to be adopted and submitted to the California Department of Water Resources (DWR) before the July 1, 2026 deadline. Mesa Water will also be re-adopting its 2025 Water Shortage Contingency Plan, as required by DWR, as part of the 2025 UWMP.

A copy of Mesa Water's draft 2025 UWMP will be available for review on www.MesaWater.org in Spring of 2026, and Mesa Water will subsequently hold noticed public hearings on the 2025 UWMP and 2025 WSCP. Mesa Water invites you to submit comments and consult with it regarding its 2025 UWMP and 2025 WSCP. Mesa Water anticipates holding a public comment period in late Spring 2026, with a public hearing planned during that time.

If you have any input for the matters contained in this notice letter, require additional information, or would like to set up a meeting to discuss Mesa Water's 2025 UWMP update, please contact me at (949) 631-1206 or by email at PaulS@MesaWater.org.

Sincerely,

Paul E.

Paul E. Shoenberger, P.E.
General Manager

MesaWater
DISTRICT©

April 24, 2026

Cecilia Gallardo-Daly
City Manager
City of Costa Mesa
P.O Box 1200
Costa Mesa, CA, 92628

Subject: Mesa Water District 2025 Urban Water Management Plan Update

Dear Cecilia Gallardo-Daly

Mesa Water District (Mesa Water) is in the process of preparing and updating its 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act. An update of the UWMP is required every five years.

Water Code Section 10621(b) requires an urban water supplier updating 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 Mesa Water's notice that it is preparing and updating its 2025 UWMP, to be adopted and submitted to the California Department of Water Resources (DWR) before the July 1, 2026 deadline. Mesa Water will also be re-adopting its 2025 Water Shortage Contingency Plan, as required by DWR, as part of the 2025 UWMP.

A copy of Mesa Water's draft 2025 UWMP will be available for review on www.MesaWater.org in Spring of 2026, and Mesa Water will subsequently hold noticed public hearings on the 2025 UWMP and 2025 WSCP. Mesa Water invites you to submit comments and consult with it regarding its 2025 UWMP and 2025 WSCP. Mesa Water anticipates holding a public comment period in late Spring 2026, with a public hearing planned during that time.

If you have any input for the matters contained in this notice letter, require additional information, or would like to set up a meeting to discuss Mesa Water's 2025 UWMP update, please contact me at (949) 631-1206 or by email at PaulS@MesaWater.org.

Sincerely,

Paul E. Shoenberger, P.E.
General Manager

MesaWater
DISTRICT©

April 24, 2026

Doug Chaffee
Board of Supervisors Chairman
County of Orange
10 Civic Center Plaza
Santa Ana, CA, 92701

Subject: Mesa Water District 2025 Urban Water Management Plan Update

Dear Doug Chaffee

Mesa Water District (Mesa Water) is in the process of preparing and updating its 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act. An update of the UWMP is required every five years.

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Sincerely,

Paul E. Shoenberger, P.E.
General Manager

Mesa Water
DISTRICT©

April 24, 2026

Harvey De La Torre
General Manager
Municipal Water District of Orange County
18700 Ward Street
Fountain Valley, CA, 92708

Subject: Mesa Water District 2025 Urban Water Management Plan Update

Dear Harvey De La Torre

Mesa Water District (Mesa Water) is in the process of preparing and updating its 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act. An update of the UWMP is required every five years.

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Sincerely,

Paul E. Shoenberger, P.E.
General Manager

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1965 Placentia Avenue Costa Mesa, CA 92627
MesaWater.org

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April 24, 2026

Seimone Jurjis
City Manager
City of Newport Beach
100 Civic Center Drive
Newport Beach, CA 92660

Subject: Mesa Water District 2025 Urban Water Management Plan Update

Dear Seimone Jurjis

Mesa Water District (Mesa Water) is in the process of preparing and updating its 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act. An update of the UWMP is required every five years.

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General Manager

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April 24, 2026

Kevin Onuma
Public Works Director
County of Orange
601 North Ross Street
Santa Ana, CA 92701

Subject: Mesa Water District 2025 Urban Water Management Plan Update

Dear Kevin Onuma

Mesa Water District (Mesa Water) is in the process of preparing and updating its 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act. An update of the UWMP is required every five years.

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Sincerely,

Paul E. Shoenberger, P.E.
General Manager

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APPENDIX J ADOPTED UWMP RESOLUTIONS