THREE VALLEYS
MUNICIPAL WATER DISTRICT

Regional Drought Contingency Plan

JANUARY 2025

GEI Consultants

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Acronyms and Abbreviations

1,2,3-TCP	1,2,3-Trichloropropane
AF	acre-feet
AF/year	acre-feet per year
CDEC	California Data Exchange Center
CRA	Colorado River Aqueduct
CWW	California Water Watch
DBCP	Hexavalent Chromium, Arsenic, 1,2-Dibromo-3-chloropropane
DCP	Drought Contingency Plan
DMF	Drought Monitoring Framework
DWR	California Department of Water Resources
ET	evapotranspiration
FERIX	Flood Emergency Information Exchange
GAMA	Groundwater Ambient Monitoring and Assessment
GEI	GEI Consultants, Inc.
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GSWC	Golden State Water Company
HUC	Hydrologic Unit Code
IRP	Metropolitan 2020 Integrated Water Resources Plan
Main Basin	Main San Gabriel Basin
Metropolitan	Metropolitan Water District of Southern California
MCL	Maximum Contaminant Level
PFA	polyfluoroalkyl substances
PCE	Trichloroethene
TAF	thousand acre-feet

TAF/year	thousand acre-feet per year
TCE	Trichloroethene
TDS	Total Dissolved Solids
Three Valleys	Three Valleys Municipal Water District
RACI	Responsible, Accountable, Consulted, Informed
Reclamation	United States Bureau of Reclamation
RWD	Rowland Water District
SGMA	Sustainable Groundwater Management Act
SWP	State Water Project
SWS	Suburban Water Systems
UWMP	2020 Urban Water Management Plan
VIC	Variable Infiltration Capacity
Watermasters	groundwater basin watermasters
WRMP	Water Resource Master Plan
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WVWD	Walnut Valley Water District

1 Introduction

Three Valleys Municipal Water District (Three Valleys) was formed in 1950 and provides water supply and water resource management to over 500,000 people through its member agencies in a 133 square mile area in eastern Los Angeles County. Three Valleys delivers wholesale water to its 13 member agencies, which includes Boy Scouts of America, California State Polytechnic University at Pomona, Cities of Covina, Glendora, La Verne, Pomona, Golden State Water Company (Claremont and San Dimas systems), Mount San Antonio College, Rowland Water District, Suburban Water Systems, Valencia Heights Water Company, and Walnut Valley Water District.

Three Valleys is one of 26 member agencies of the Metropolitan Water District of Southern California (Metropolitan), who sources around 35 percent of their water from the State Water Project (SWP), with another 25 percent sourced from the Colorado River Aqueduct (CRA). Both of these supply sources are impacted by hydrology. As a result of extreme drought conditions, the SWP allocation for 2021 was 5 percent of requested supplies. Furthermore, in August 2021 for the first time in recorded history, the federal government declared a water shortage at one of the Colorado River's main reservoirs, Lake Mead. This historic declaration came after years of severe climate change and long-term drought impacts. Consequently, the Governor of the State of California issued a statewide drought emergency in October 2021, urging Californians to advance their water conservation efforts. Thus, in November 2021, Three Valleys activated Stage 2 of their Water Shortage Contingency Plan (WSCP) for their entire service area, requiring up to a 20 percent reduction in water use. In June 2022, Metropolitan adopted the Emergency Water Conservation Program, implementing restrictions for member agencies reliant solely on SWP supplies, known as "SWP Dependent Areas." For Three Valleys, this includes the cities of Claremont and La Verne. In April of 2022, Three Valleys activated Stage 5 of their WSCP, urging up to a 50 percent reduction in water use, for their SWP Dependent Areas.

However, between late 2022 and early 2023, California experienced several atmospheric rivers that resulted in record snowfall and rainfall. Consequently, the California Department of Water Resources (DWR) announced a 100 percent SWP allocation for 2023. Despite this short-term improvement in SWP supply, the Colorado River watershed remains in a 23-year drought, the most severe in 1,200 years (https://www.theguardian.com/environment/2023/may /23/colorado-river-water-usage-deal-analysis). While Metropolitan lifted the emergency drought restrictions in March 2023, California remains under a statewide drought emergency, and ongoing climate change suggests that drought conditions will persist. As droughts become more frequent and climate change is expected to increase natural variability in the long term, coupled with increasing statewide demand, imported water may become increasingly scarce. A broader, more integrated Drought Contingency Plan (DCP) is needed to strengthen the region's water supply resilience to provide an adequate and reliable water supply into the future.

To increase water supply reliability and proactively address the region's concern with drought, in 2023 Three Valleys embarked on the preparation of a DCP, funded in part by the United States Bureau of Reclamation (Reclamation). The DCP has several elements in common with Three Valleys' Water Resource Master Plan (WRMP), such as the assessment of water shortage conditions based on current and future water supply needs and anticipated impacts to supplies from climate change and other risks, along with the identification and review of projects to enhance the region's water supply portfolio. Therefore, the WRMP and DCP were largely prepared in parallel as a joint project with a coordinated schedule and approach. The elements of the DCP are described below in Section 1.1.

As part of this joint project, Three Valleys performed outreach and engagement with various stakeholder groups which is described in Section 1.2. Part of this outreach and engagement involved establishing a Drought Task Force, which as described in Section 1.3, was comprised of Three Valleys member agencies and local stakeholder representing diverse water needs and planning expertise to inform the DCP and WRMP development. Together with the Drought Task Force, Three Valleys developed several overarching objectives and guiding principles to inform development of the DCP, which was prepared with input from the Drought Task Force via several workshops and project information requests in 2023 and 2024. These objectives and principles, along with details related to the DCP development process and its elements are summarized in Section 1.4 and 1.5. The DCP was formally adopted by Three Valleys on Month XX, 2025. Details related to this adoption and final submittal to Reclamation are provided in Section 1.6.

1.1 DCP Elements

The DCP is organized into the following eight chapters in alignment with Reclamation's Drought Response Program Framework:

- Chapter 1: Introduction – this section describes the elements of the DCP, outreach and engagement performed during the development of the DCP, and regional drought goals and guiding principles used to develop the DCP. This section also describes the DCP development process, and information related to plan adoption and submittal.
- Chapter 2: Background – this section briefly describes the regional water suppliers, along with key water resource supplies and regional water demand to provide a critical foundation for the DCP.
- Chapter 3: Regional Drought Monitoring Framework (DMF) – the regional DMF establishes a process for monitoring near- and long-term water availability and developing a framework for predicting the probability of future droughts or confirming an existing drought.
- Chapter 4: Vulnerability Assessment – the vulnerability assessment aims to improve the understanding of climate change impacts on future water demand in Three Valleys' wholesale service area and the sources of Three Valleys' water supplies during normal and drought periods.
- Chapter 5: Mitigation Actions – this section describes projects or programs that can be implemented ahead of a drought to lessen the future impacts of drought.
- Chapter 6: Response Actions – this section describes near-term actions to address the demand side of the water balance in periods where water supply cannot meet demand.
- Chapter 7: Operational and Administrative Framework – the operational and administrative framework identifies who is responsible for implementing each element of the DCP and the process and schedule for monitoring, evaluating, and updating the DCP.

1.2 Outreach and Engagement

Three Valleys actively engaged with diverse stakeholder groups throughout the development of the DCP. This was a collaborative effort among Three Valleys, its 13 member agencies and the cities they serve, and other regional stakeholders that may be impacted by drought. The various stakeholder groups involved in the DCP and their roles are summarized in Table 1-1 below, which includes a RACI (Responsible, Accountable, Consulted, Informed) chart indicating the level of participation for each stakeholder in developing the DCP. Each stakeholder group and the methods of outreach and engagement are described in the following sections.

Table 1-1. Regional Drought Contingency Plan Key Stakeholders and Roles

Group	Level of Participation			
	R	A	C	I
Planning Lead				
Three Valleys Municipal Water District	X[1]	X[2]		
Drought Planning Task Force Members				
Three Valleys Member Agencies			X	
City Representatives (planning, schools, fire, law)			X	
Metropolitan Water District of Southern California				X[3]
Watermasters				X[3]
Other Interested Stakeholders				X[3]
General Public				X
Drought Contingency Plan Consultant				
GEI Consultants, Inc. (GEI)	X			

[1] Chief Water Resources Officer

[2] General Manager

[3] The stakeholders are expected to participate in the planning process at an "informed" level. However, they will also be provided the opportunity to review and comment on the DCP at various stages throughout the planning process.

1.3 Drought Task Force

As previously noted, the DCP was developed in parallel with the WRMP. As part of this consolidated effort, Three Valleys recruited, convened, and engaged a Drought Task Force comprised of 27 organizations represented by knowledgeable community leaders who can offer diverse, informed perspectives to support effective drought contingency planning. The members of the Drought Task Force are presented in Table 1-2. All Three Valleys' member agencies are part of the Drought Task Force.

Table 1-2 List of Stakeholders by Category

Three Valleys Regional DCP Stakeholders by Category
Member Agencies
Boy Scouts of America: Firestone Reservation
California Polytechnic University, Pomona

Three Valleys Regional DCP Stakeholders by Category
City of Covina
City of Glendora
City of La Verne
City of Pomona
Golden State Water Company (Claremont and San Dimas systems)
Mount San Antonio College
Rowland Water District
Suburban Water Systems
Valencia Heights Water Company
Walnut Valley Water District
Local Government
City of Claremont
City of Industry
City of San Dimas
City of West Covina
Los Angeles County Chief Executive Office
Local Education Agency
Charter Oak Unified School District
Glendora Unified School District
Hacienda La Puente Unified School District
Rowland Unified School District
Local Fire and Law Enforcement
Los Angeles County Fire
Los Angeles County Fire Department Station 118
Los Angeles County Sheriff's Department
Watermasters
Main San Gabriel Watermaster
Nonprofit Organizations
Day One
San Gabriel Valley Economic Partnership

As of September 25, 2024

1.3.1 Three Valleys Board of Directors

Three Valleys' Board of Directors (Board) is the formal decision-making body that adopts the DCP (and WRMP) and recommends it for submittal to Reclamation. To keep the Board informed, Three Valleys staff provided periodic updates during regularly occurring quarterly Board meetings throughout the development of the DCP.

1.3.2 General Public

To reach all customers within Three Valleys' service area, Three Valleys used outreach activities that are not specific to the Drought Task Force. This included receiving Regional DCP updates during regular meetings such as the Three Valleys Board of Directors meetings and the Three Valleys Member Agency Managers meetings, which can be found at https://www.threevalleys.com/home. The public can also check the Three Valleys website at https://storymaps.arcgis.com/stories/6e03e0070af84d7f93aba75a13398d01. This webpage offers another opportunity for interested individuals to learn about the DCP and WRMP planning efforts, view workshop materials, and subscribe to project updates.

1.4 Regional Drought Planning Objectives and Priorities

Early in the planning process for the DCP, key objectives and regional drought priorities were identified to ensure a comprehensive approach. The planning effort was guided by several essential objectives:

- Task Force Collaboration: Facilitate consistent communication and execute the process transparently and collaboratively with stakeholders.
- Planning Consistency: Align the DCP/WRMP with Metropolitan's Water Shortage Allocation Plan, Dry Year Yield policies, and other planning documents from Three Valleys and member agencies.
- Environmental Stewardship and Sustainability: Ensure that the needs of the present are met without compromising the needs of future generations.

Regional drought priorities were identified to guide and inform the DCP's development. These priorities serve as the foundation for the plan's key focus areas and overall approach. During the initial workshops, members of the Drought Task Force were invited to rank these priorities based on their perceived importance. Figure 1-1 illustrates the outcomes of this ranking effort, highlighting the collective priorities identified by the Drought Task Force. These objectives and priorities form the overarching framework that guides the planning effort and development for the DCP.

Figure 1-1. Regional Priorities Ranked by the Drought Task Force

1.5 DCP Development Process

As previously indicated, the DCP was prepared concurrently with the WRMP; however, this section specifically focuses on the DCP, which was developed with consideration of the objectives and regional priorities detailed in Section 1.4. The DCP is organized into five key steps:

- Development of a drought monitoring framework for predicting the probability of future droughts or confirming an existing drought
- A vulnerability assessment to evaluate the risks within the planning area from drought and other factors
- Identification of potential mitigation actions to be implemented ahead of drought to address potential risks
- Identification of potential response actions to be implemented during drought
- An operational and administrative framework to identify the roles, responsibilities, and procedures necessary to implement the DCP.

A planning schedule for the preparation of the DCP is presented in Figure 1-2.

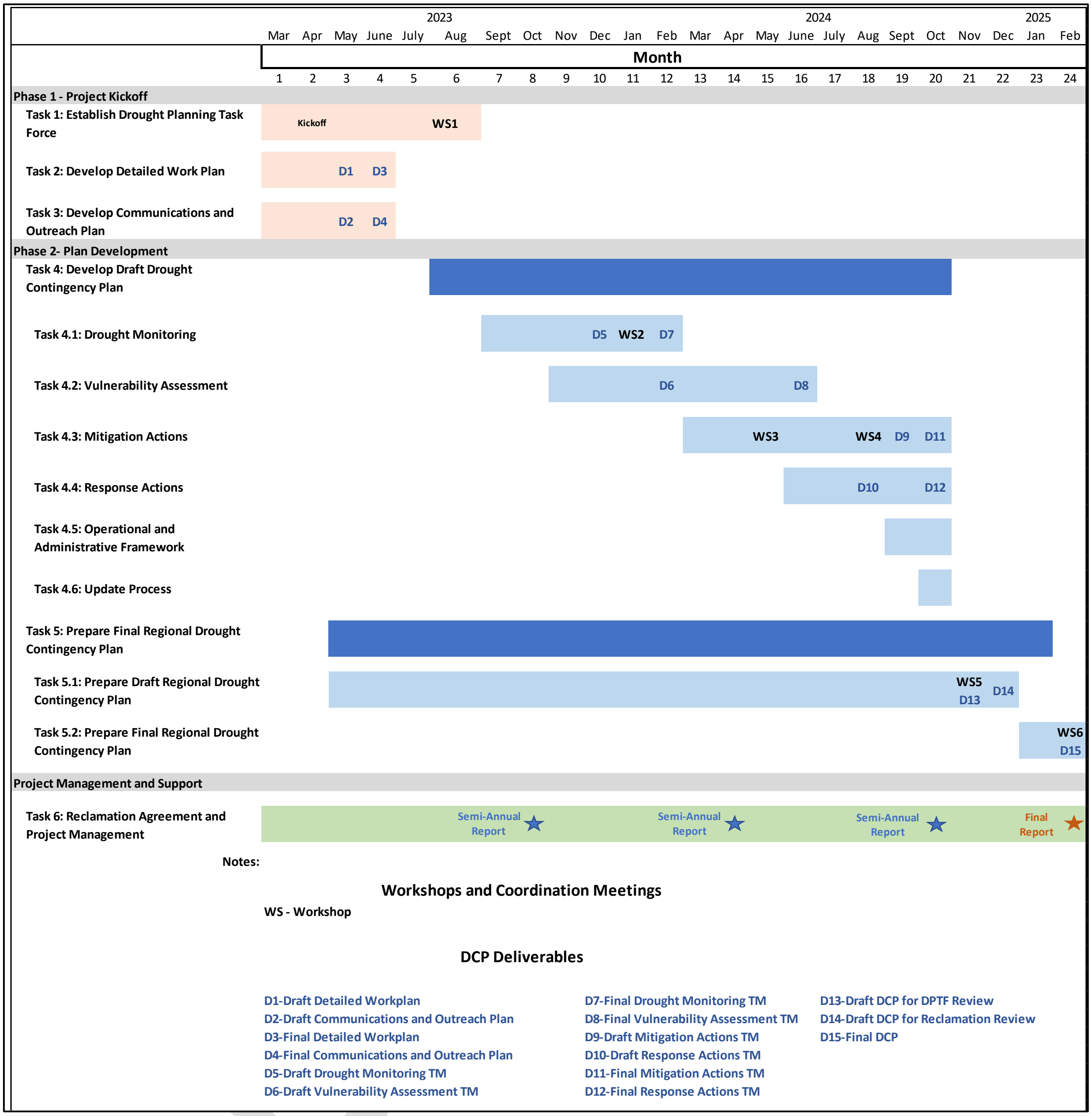


Figure 1-2. Three Valleys Municipal Water District Drought Contingency Plan Schedule

As previously mentioned, the development of DCP involved collaboration with the Drought Task Force and other interested parties. To facilitate participation, Three Valleys and the Drought Task Force members provided multiple opportunities for public input. Various communication channels were utilized, including the Three Valleys website, regular member agency meetings, and Drought Task Force workshops. A schedule of workshops is provided in Table 1-3. The timing of the workshops was strategically aligned with the DCP planning schedule, ensuring that input can be gathered during the most relevant phases of the planning process.

Table 1-3. Drought Planning Task Force Workshop Dates and Topics

Description	Anticipated Date
Drought Task Force Kickoff/Workshop #1	
• Provide DCP overview to Three Valleys Member Agency Managers Meeting (DCP Kickoff Meeting) • Email Workshop 1 invitation to full stakeholder list, along with a description of the DCP development process and opportunity to participate via the Drought Task Force • Review Plan schedule and milestones along with information requests that will be provided to the Drought Task Force over the course of the Plan development (Drought Task Force Workshop 1)	April 2023 (DCP Kickoff Meeting) August 2023 (Drought Task Force Workshop 1)
Drought Task Force Workshop #2	
• Review and develop a common understanding of the estimated water supply demands, water supplies conditions, and forecasted shortage conditions • Review the Drought Monitoring Technical Memorandum • Review the Vulnerability Assessment Technical Memorandum • Summarize project description request and review project evaluation criteria	January 2024
Drought Task Force Workshop #3	
• Present the summary of project descriptions received from Drought Task Force • Review the project screening and evaluation process and the draft findings from the screening and evaluation of the projects	May 2024
Drought Task Force Workshop #4	
• Review the Mitigation Actions Technical Memorandum • Review the Response Actions Technical Memorandum	August 2024
Drought Task Force Workshop #5	
• Review the draft Regional DCP	November 2024
Drought Task Force Workshop #6	
• Review the draft-final Regional DCP and discuss next steps	February 2025

1.6 Plan Adoption and Submittal

The final DCP was formally adopted by Three Valleys on Month Day, 2025. A copy of the Adoption Resolution is included in Appendix A . Three Valleys made a copy of the final DCP available on its website within 30 days after the adoption.

2 Background

To provide a critical foundation for the DCP, Chapter 2 defines the services areas for the member agencies within the region (see Section 1 for a list of the member agencies), along with regional water supplies and associated infrastructure and projected regional demands.

2.1 Water Supplier Service Area

Wholesale water within the region is supplied by Three Valleys by importing and distributing water obtained from Metropolitan to its 13 member agencies.

2.1.1 Three Valleys Municipal Water District

Three Valleys is a wholesale water agency that serves over 500,000 people in a 133 square mile area in eastern Los Angeles County via 13 member agencies. The estimated population within the Three Valleys wholesale service area in 2020, along with future population projections documented in Three Valleys' 2020 Urban Water Management Plan (UWMP), is presented in Table 2-1.

Table 2-1. Population projections for the Region

	2020	2025	2030	2035	2040	2045
Three Valleys	513,623	523,167	532,888	542,790	552,204	561,782

Three Valleys' member agencies retail the water directly to their customers, or wholesale it to other water systems for resale. Three Valleys' member agencies produce water from local sources; however, when water demands exceed these local supplies, the member agencies may rely on Three Valleys to supply their supplemental water needs. Three Valleys' service area includes the Cities of Claremont, Covina, Diamond Bar, Glendora, Industry, La Verne, Pomona, San Dimas, Walnut, West Covina, and unincorporated areas of Los Angeles County (including Charter Oak and Rowland Heights) (Figure 2-1).

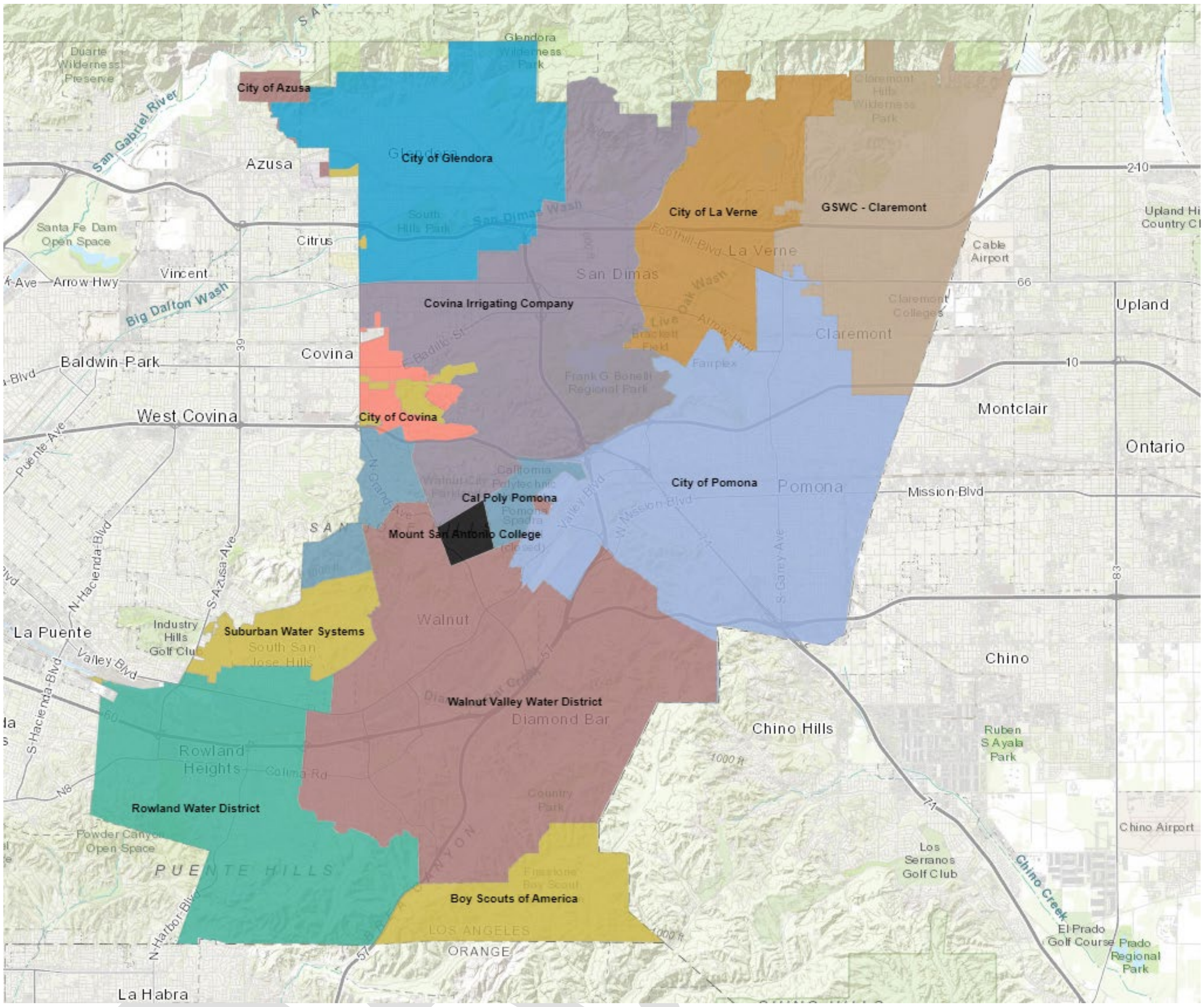


Figure 2-1. Three Valleys Municipal Water District Service Area

Three Valleys is one of 26 member agencies of Metropolitan. Three Valleys' water supply sources consist of untreated imported water purchased from Metropolitan, treated imported water purchased from Metropolitan, and groundwater from the Six Basins groundwater basin, with imported water from Metropolitan accounting for the majority of Three Valleys' supply. Water purchased from Metropolitan comes from the CRA and the SWP. The 13 member agencies use a combination of imported water, groundwater, recycled water, and surface water. Several of these agencies are in SWP dependent areas, meaning they cannot receive Colorado River supplies from Metropolitan, and are solely dependent on imported water from the SWP.

2.1.2 Boy Scouts of America

Boy Scouts of America is one of three institutions that receive imported water from Three Valleys. They own and operate the Firestone Scout Reservation, a campground and wilderness facility located in the southern part of the Three Valleys' service area.

2.1.3 California State Polytechnic University at Pomona

California State Polytechnic University is one of three institutions that receives imported water from Three Valleys, located within the City of Pomona.

2.1.4 City of Covina

The City of Covina has a service area of approximately 7 square miles, encompassing the majority of the City of Covina, a portion of the City of West Covina and an unincorporated portion of Los Angeles County. In 2020, the City of Covina served a population of approximately 29,287 through about 8,500 municipal connections.

2.1.5 City of Glendora

The City of Glendora's service area covers approximately 11 square miles encompassing the majority of the City of Glendora and a portion of the Cities of San Dimas, Azusa and an unincorporated portion of Los Angeles County. In 2020, the City of Glendora served a population of approximately 45,551 through about 13,468 municipal connections.

2.1.6 City of La Verne

The City of La Verne has a service area of approximately 8.56 square miles bounded on the west by the City of San Dimas, on the south by the Puddingstone Recreation area, on the east by Fulton Road and the prolongation of Williams Avenue, and on the north by the Los Angeles National Forest. In 2020, the City of La Verne served a population of approximately 31,321 through about 8,800 municipal connections.

2.1.7 City of Pomona

The City of Pomona's service area covers approximately 22.9 square miles encompassing the majority of the City of Pomona and portions of the Cities of La Verne, Claremont, and Chino Hills. In 2020, the City of Pomona served a population of approximately 153,988 through about 30,041 municipal connections.

2.1.8 Golden State Water Company (Claremont and San Dimas systems)

Golden State Water Company (Claremont system) provides water service to the City of Claremont, portions of the Cities of Montclair, Pomona, and Upland, and adjacent unincorporated areas of Los Angeles County, which encompasses approximately 9.2 square miles. The San Dimas system serves portions of the Cities of La Verne, Walnut, and Covina, and adjacent unincorporated areas of Los Angeles County, covering approximately 13.7 square miles. In 2020, Golden State Water Company served a population of approximately 36,713 through about 11,076 municipal connections in the Claremont system. In the San Dimas system, Golden State Water Company served a population of approximately 53,120 through about 16,033 municipal connections.

2.1.9 Mount San Antonio College

Mount San Antonio College is one of three institutions that receives imported water from Three Valleys, located within the City of Walnut.

2.1.10 Rowland Water District

Rowland Water District's water service area covers approximately 17.2 square miles encompassing portions of the Cities of Industry, La Puente, and West Covina, and unincorporated areas of Los Angeles County including Rowland Heights and Hacienda Heights. In 2020, Rowland Water District served a population of approximately 59,283 through about 13,202 municipal connections.

2.1.11 Suburban Water Systems

Suburban Water Systems has a service area of approximately 41.7 square miles encompassing the Cities of Glendora, Covina, West Covina, La Puente, Walnut, Whittier, La Mirada, La Habra, and Buena Park as well as sections of unincorporated Los Angeles County and Orange County. Suburban Water Systems' service area is currently divided into two main service areas: the San Jose Hills Service Area, and the Whittier/La Mirada Service Area. In 2020, Suburban Water Systems served a population of approximately 298,367 through about 42,512 municipal connections. This includes approximately 175,529 residents in the San Jose Hills service area and approximately 122,838 residents in the Whittier/La Mirada service area.

2.1.12 Valencia Heights Water Company

Valencia Heights Water Company is a mutual water company serving portions of the City of West Covina and unincorporated areas of Los Angeles County. Valencia Heights Water Company serves less than 3,000 customers and does not supply more than 3,000 acre-feet of water annually, and thus is not required to prepare a UWMP.

2.1.13 Walnut Valley Water District

Walnut Valley Water District's water service area covers approximately 29 square miles covering the City of Diamond Bar and portions of the Cities of Industry, Pomona, Walnut, and West Covina, as well as unincorporated areas of Los Angeles County including Rowland Heights. In 2020, Walnut Valley Water District served a population of approximately 99,956 through about 27,100 municipal connections.

2.2 Regional Water Supply

This section summarizes all the water supplies available to the region including imported water and a variety of local groundwater, surface water, and recycled water sources. Each source is described in Section 2.2.2.

2.2.1 Regional Supply Summary

An overview of the water sources used by each agency within Three Valleys' service area is shown in Table 2-2. This summary highlights the diversity of water supply portfolios among the water agencies in the region. As a result, each agency is impacted differently by drought, driving a need for regional solutions that are flexible and adaptable to different community needs.

Based on the historical water use, all of Three Valleys' member agencies rely on imported water as a major supply source. Imported water constitutes the largest portion of the region's supply, accounting for about 51 percent of the total from 2018 to 2022 (Figure 2-2).

Table 2-2. Current Water Sources by Agency

Agency	Groundwater	Imported Water	Surface Water	Recycled Water
Boy Scouts of America		X		
Cal Poly Pomona	X	X		X
City of Covina*		X	X	
City of Glendora*	X	X	X	
City of La Verne	X	X		
City of Pomona	X	X	X	X
Golden State Water Company (Claremont)	X	X		
Golden State Water Company (San Dimas)*	X	X	X	
Mount San Antonio College		X		
Rowland Water District	X	X		X
Suburban Water Systems*	X	X	X	X
Valencia Heights Water Company*	X	X	X	X
Walnut Valley Water District	X	X		X

*Purchases water from Covina Irrigating Company which produces water from local surface and groundwater sources and treats imported water from Three Valleys.

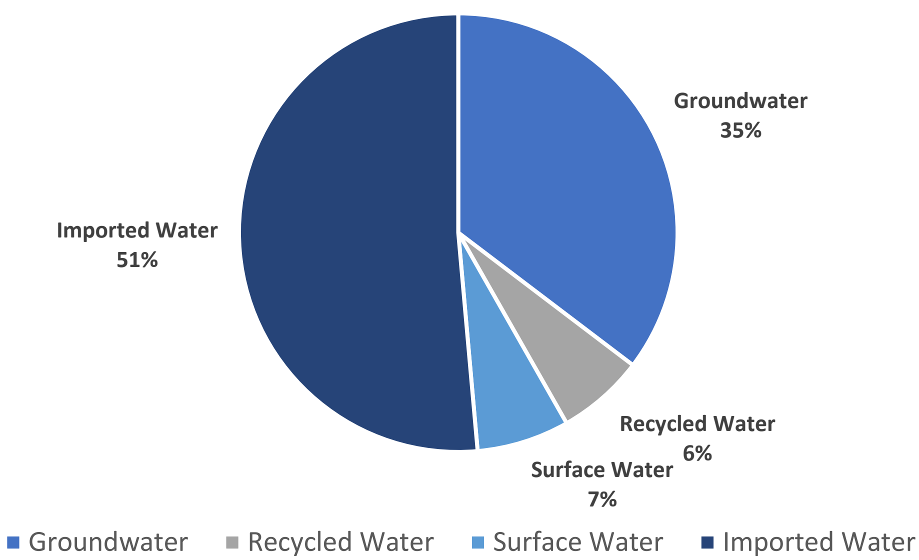


Figure 2-2. Percent Regional Water Use by Source

Based on water use data aggregated from Three Valleys' Local Supply Production Surveys (which are compiled form member agency data) and Three Valleys' Water Sales records, the total water supply within the region has ranged from approximately 104,000 acre-feet (AF) to more than 121,000 AF from 2018 to 2022 as shown in Figure 2-3.

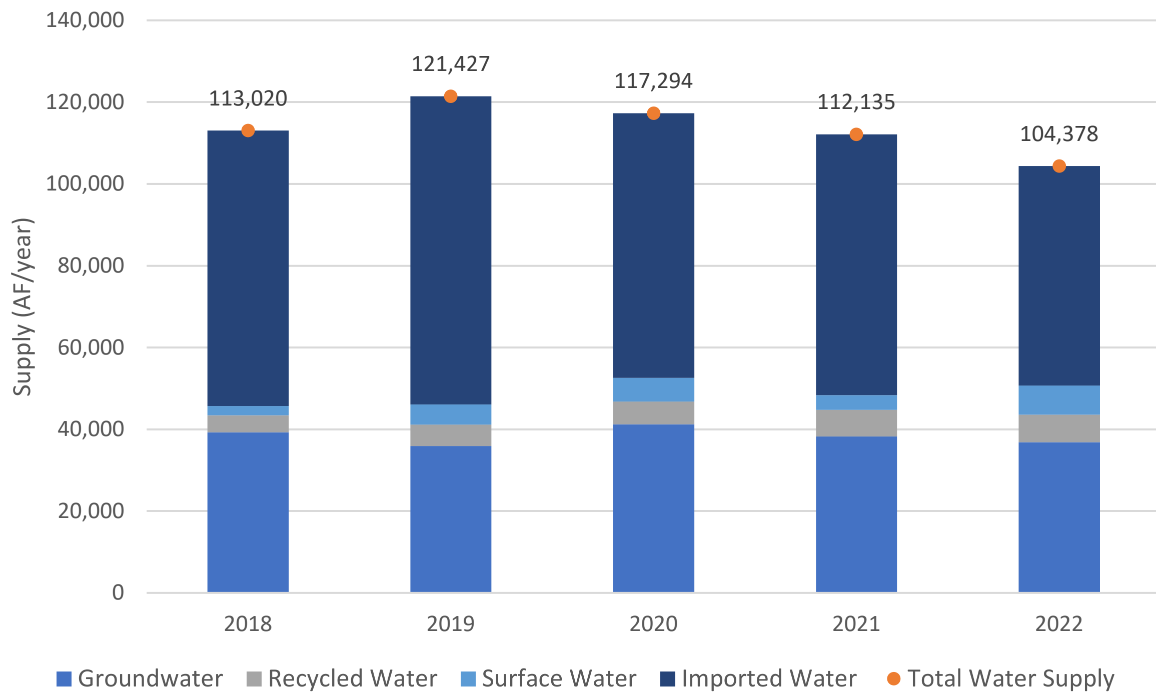


Figure 2-3. 2018-2022 Regional Water Supply by Source

2.2.2 Sources of Supply

This section describes each of the water supplies available to the region.

2.2.2.1 Imported Water

Three Valleys purchases both untreated and treated imported water from Metropolitan and wholesales it to its member agencies. Currently, Three Valleys receives a Tier 1 water supply allotment from Metropolitan of 80,688 acre-feet per year (AF/year). Metropolitan imports water from the SWP which is owned and operated by DWR and conveys water from the Bay-Delta to Southern California via the California Aqueduct, and from the Colorado River through the CRA which is owned and operated by Metropolitan. Generally, Metropolitan sources around 35 percent of its water from the SWP, 25 percent sourced from the CRA, and the remainder sourced from Metropolitan local supplies.

Three Valleys supplies treated imported water directly to its member agencies through service connections from the Metropolitan distribution system, but it does not provide water directly to retail customers. Untreated imported water is sent to Three Valleys' Miramar Water Treatment Plant for processing before being distributed to the member agencies. This untreated water is also used to replenish portions of the Six Basins and is delivered to the Main Basin to meet Replacement Water obligations specified in the Main Basin Judgment. Furthermore, Three Valleys obtains untreated imported water supplies from Metropolitan for delivery to the Covina Irrigating Company, which treats these deliveries at its William B. Temple Treatment Plant before supplying other member agencies within the Three Valleys' region.

Each year, Metropolitan member agencies communicate their anticipated water needs for the next five years, allowing Metropolitan to collaborate with them on forecasts for long-term future water supply. Imported water sources are described further in Section 3.2.1.

2.2.2.2 Groundwater

The region primarily uses local groundwater from six different groundwater basins: the Six Basins, Chino Basin, Main San Gabriel Basin (Main Basin), Spadra Basin, Central Basin, and Puente Basin. Five basins (Six Basins, Chino Basin, Main Basin, Central Basin, and Puente Basin) are adjudicated groundwater basins; therefore, they are exempt from the requirement to designate a Groundwater Sustainability Agency (GSA) as mandated by the Sustainable Groundwater Management Act (SGMA). These basins are managed by their respective Watermaster to manage the ownership of water rights and water use with goals similar to that of SGMA. The Spadra Basin is a small, non-adjudicated subbasin of the San Gabriel Valley Basin, designated as a 'very low-priority' basin by DWR. However, the Walnut Valley Water District and the City of Pomona collectively formed the Spadra Basin GSA to manage the basin. Groundwater basin management activities are described further in Section 3.2.2.

According to the State Water Resources Control Board's Groundwater Ambient Monitoring and Assessment (GAMA) Program, groundwater from these basins has exhibited Maximum Contaminant Level (MCL) exceedances for numerous constituents, including 1,2,3-Trichloropropane (1,2,3-TCP), Hexavalent Chromium, Arsenic, 1,2-Dibromo-3-chloropropane (DBCP), Perchlorate, Tetrachloroethene (PCE), Trichloroethene (TCE), Total Dissolved Solids (TDS), and Uranium. To remove these contaminants, agencies use a combination of blending and wellhead treatment, both of which are resulting in greater reliance on imported water.

2.2.2.3 Recycled Water

Several member agencies in the region also use recycled water to meet non-potable demands. Recycled water sources in the region are primarily from the Pomona Water Reclamation Plant and San Jose Creek Water Reclamation Plant, both owned and operated by the Los Angeles County Sanitation District.

2.2.2.4 Surface Water

Some member agencies in the region also use surface water to meet potable demands. The City of Pomona sources local surface water from San Antonio Creek, which is then purchased by Three Valleys to replenish the Six Basins. Additionally, some member agencies obtain surface water from the Covina Irrigating Company, which treats water from the San Gabriel River.

2.3 Regional Water Demand

In 2020, the wholesale demand from Three Valleys was nearly 77,000 AF. Over the past ten years, Three Valleys' total water demands have ranged from 57,472 AF/year to 76,723 AF/year, with an average of 67,327 AF/year. Retail water usage includes residential, commercial, industrial, agricultural, and institutional/governmental. Among those uses, residential generally accounts for 70 percent of total demand.

Based on aggregated water demand data from member agency UWMPs, the total water demand for 2020 was nearly 135,000 AF/year (see Table 2-3), with nearly 60 percent of that demand associated with from residential sources.

Table 2-3. 2020 Distribution of Water Demand (in Acre-Feet) for the Three Valleys Service Area

Use Type	Demand (AF/year)	Contribution to Demand (%)
Single-Family Residential	69,639	51.6%
Commercial	18,822	14.0%
Other	11,712	8.7%
Multi-Family Residential	10,233	7.6%
Losses	5,726	4.2%
Recycled Water Demand	6,463	4.8%
Institutional	6,026	4.5%
Landscape & Agriculture	4,789	3.6%
Industrial	1,434	1.1%
Total Demand from Member Agencies	134,844	100%

Source: Data aggregated from member agencies' 2020 UWMPs

Projections of future water demand due to growth, aggregated from the member agency 2020 UWMPs, are shown in Table 2-4. The cumulative annual growth rates are calculated based on the change in population from the baseline 2020 values. These growth rates, along with climate change factors, were used to develop new demand projections, which are discussed in Chapter 4.

Table 2-4. Three Valleys Service Area Water Demand Projections due to Growth

	FY 2020	FY 2025	FY 2030	FY 2035	FY 2040
Projected Demand from Member UWMPs (AF/year)	134,844	144,665	146,338	147,524	149,480
Implied Cumulative Annual Growth Rate (%)		100.95%	100.07%	100.15%	100.23%

Refer to Three Valleys' member agency UWMPs for additional details on water usage by sector within the region.

2.4 Land Uses within Service Area

Much of Three Valleys' service area is filled with urban development, leaving a relatively small balance of open space for future improvement and population growth. Still, the region is expected to experience some increase. As of 2023, residential (single-family and multi-family), commercial, and industrial uses account for the majority of land use, in Equivalent Dwelling Units, within Three Valleys' general service area, as shown in Figure 2-4.

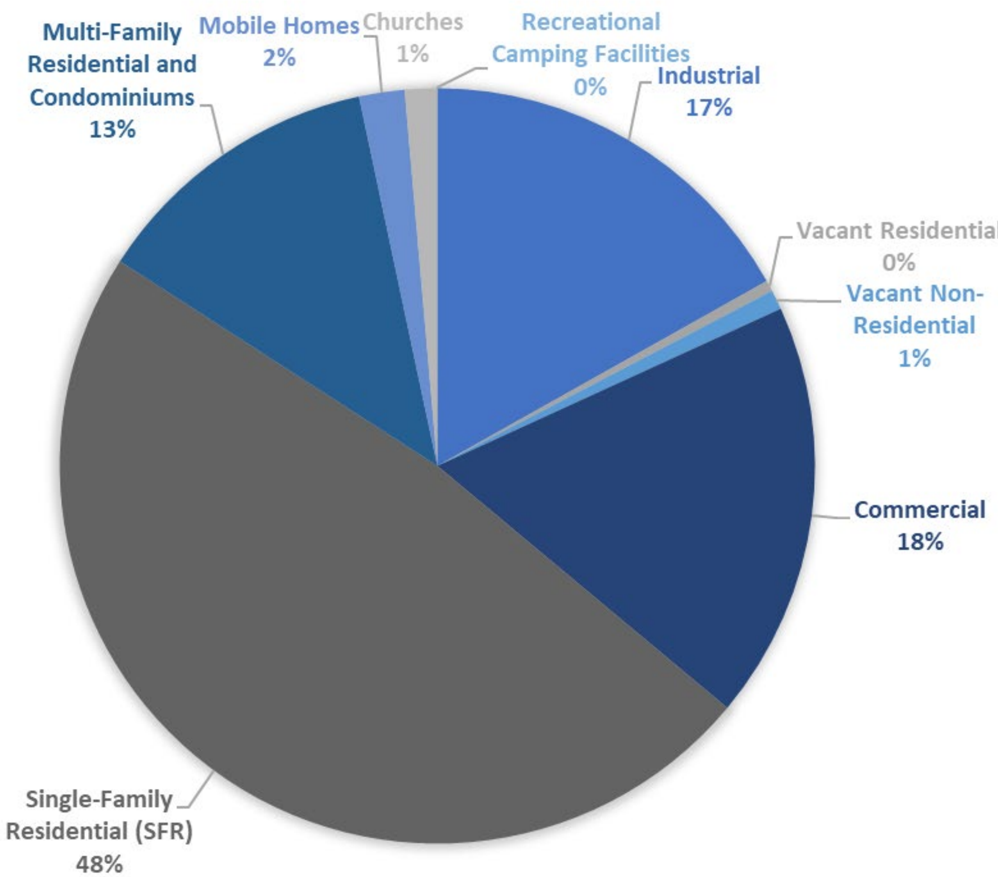


Figure 2-4. Three Valleys Land Use in Equivalent Dwelling Units

3 Drought Monitoring Framework (DMF)

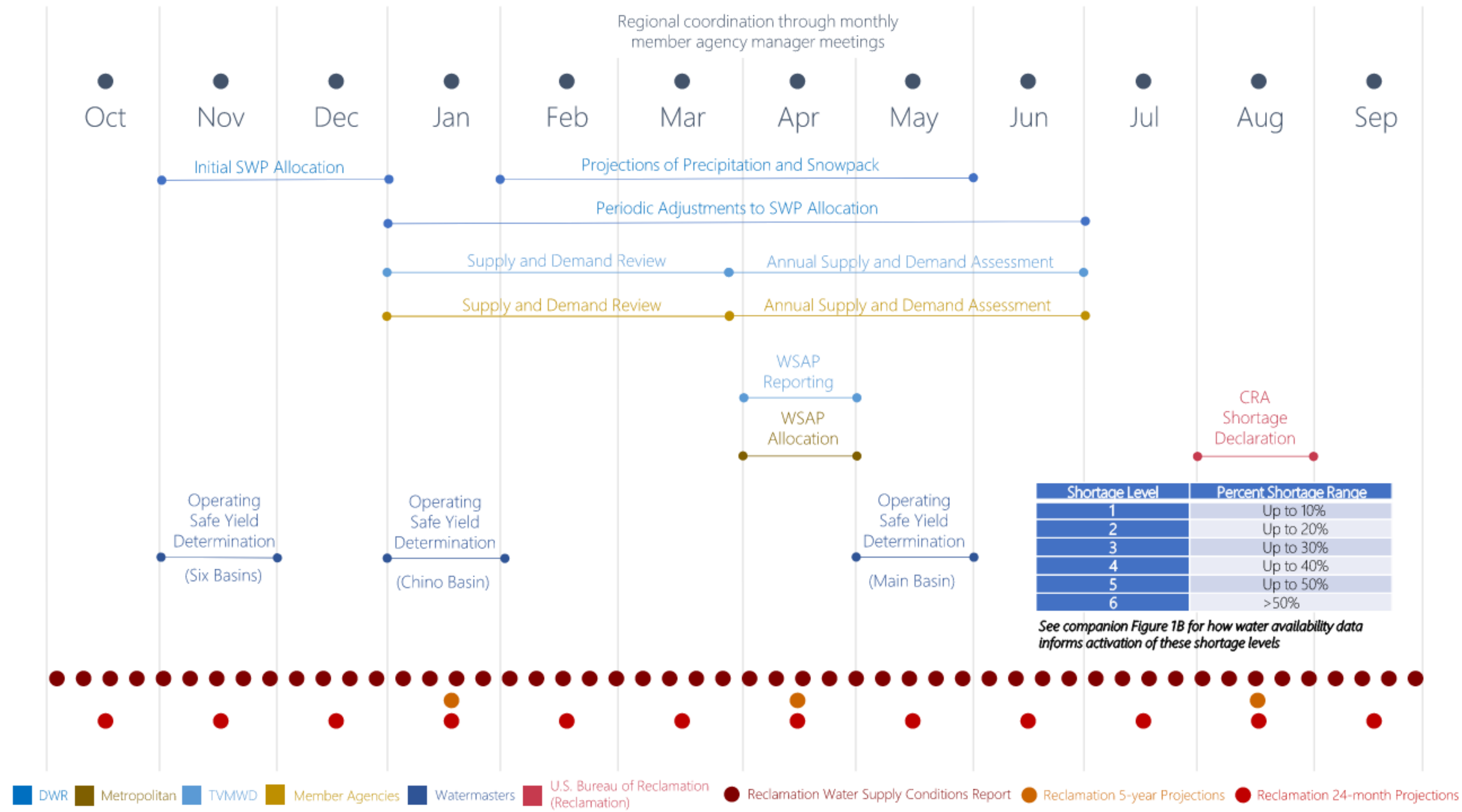
This chapter discusses the DMF, which establishes a process for monitoring near- and long-term water availability and develops a framework for predicting the probability of future droughts or confirming an existing drought. The DMF was informed through collaboration with the Drought Task Force.

3.1 DMF Primary Elements

The DMF includes three primary elements:

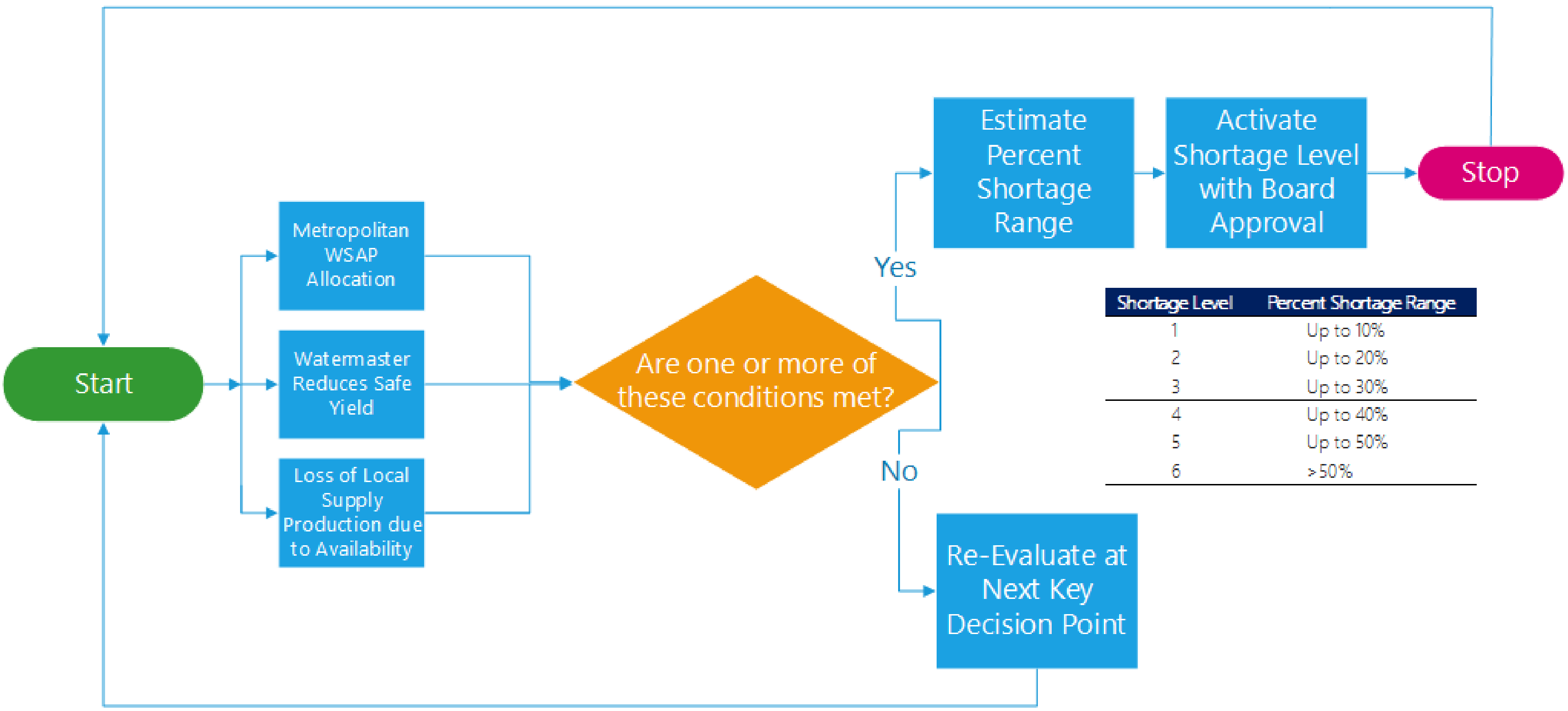
1. **Monitoring for near- and long-term water availability:** The region has access to considerable water availability data that is made available throughout the year by DWR, Metropolitan, Reclamation, and groundwater basin watermasters (watermasters). Key indicators for water availability include SWP allocations by DWR, CRA shortage declarations made by Reclamation, Water Supply Allocation Plan (WSAP) allocations by Metropolitan, and operating groundwater safe yield determinations made by watermasters in the region.
2. **A process for predicting future droughts or confirming an existing drought:** The region has existing processes and frameworks for predicting or confirming droughts. These processes and frameworks include Annual Supply and Demand Assessments (Annual Assessments) which are informed by water availability data and other factors, and a set of triggers that are used to initiate preparation for and response to water shortages.
3. **Regional coordination:** Regular and ongoing monthly meetings between Three Valleys and its member agencies are used to review and analyze water availability data, Annual Assessments, and to make decisions regarding declaring water supply shortages, instituting water restrictions, and pursuing additional supplies.

These elements are discussed in the following sections and the DMF is provided as Figure 3-1 and Figure 3-2.



Note: See companion

Figure 3-1. Drought Contingency Plan Regional Drought Monitoring Framework



Shortage Level	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%

Conditions:
Metropolitan activation of water supply allocation plan (Any Allocation)
Watermaster reduces safe yield
Loss of local supply production due to local issues

Figure 3-2. Drought Contingency Plan Regional Drought Monitoring Framework

3.2 Water Availability Data

As discussed in Section 3.1, imported water and groundwater data are key indicators for monitoring near- and long-term water availability in the region. This data is made available throughout the year by DWR, Metropolitan, Reclamation, regional watermasters, and others. This data directly informs the region's water supply projections and is used to develop Annual Assessments as described in Section 3.3.

3.2.1 Imported Water

The region's water supply portfolio consists of 50 to 60 percent imported water. Imported water supplied to the region through Three Valleys is purchased from Metropolitan, who can source these supplies from the Sacramento and San Joquin rivers via the SWP, and the Colorado River via the CRA.

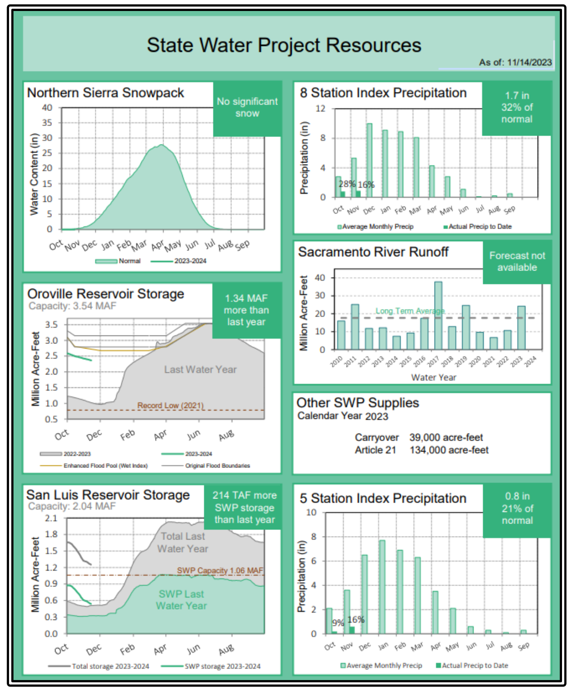
3.2.1.1 State Water Project

Roughly 30 percent of Metropolitan's water is imported from the SWP. The SWP is a water storage and delivery system of reservoirs, aqueducts, pumping plants, and power plants owned by the State of California. Water delivered by the SWP originates in the Sierra Nevada mountains in northern California and is pumped into the SWP from the Sacramento-San Joaquin River Delta near Stockton. Water from the SWP serves agencies within California's Central Valley, San Francisco Bay Area, central coast, and Southern California.

DWR administers long-term water supply contracts to 29 local agencies, including Metropolitan, for water service from the SWP. Each contract identifies the maximum volume of SWP water to be made available to each agency on an annual (calendar year) basis, also known as the "Maximum Table A amount." The available volume of SWP water to be delivered to each agency, or the "Table A Allocation," often differs each year, and is subject to refinement over the course of a water year as hydrologic conditions unfold and periodic adjustments to SWP allocations are made.

In determining available SWP supplies, DWR considers several factors including agency projected demands, existing storage in SWP facilities, estimates of future runoff, SWP operational and regulatory requirements, and water rights obligations. Estimates of future runoff are primarily based on DWR's forecasted projections of precipitation and snowpack. These forecasts are typically conducted using data collected by DWR's California Cooperative Snow Surveys program between February through May of each year. Consequently, initial SWP allocations, which are generally made around the November to December timeframe each year and are based on conservative dry hydrologic conditions, are subject to refinement between January to June based on forecasted and actual runoff conditions. These conditions start to become apparent generally around the February to March timeframe, with the outlook for imported water supplies from the SWP becoming more certain around April to May.

DWR's California Data Exchange Center (CDEC) provides access to historical and forecasted hydrologic and reservoir data used to inform water supply conditions. This data is collected through an exchange with various agencies including the National Weather Service, Reclamation, the U.S. Geological Survey, the U.S. Army Corps of Engineers, and other state and public agencies. Real-time water availability data is also provided by DWR via the California Water Watch (CWW) website, which consolidates precipitation, reservoir conditions, streamflow, groundwater, and snowpack data in a single location.



Select data from CDEC and CWW are also used by Metropolitan to produce a water supply conditions report. This report consolidates key information related to reservoir storage, snowpack and snowfall, precipitation, and runoff to provide an overview of SWP resources. The report is generally updated by Metropolitan as forecasts are updated and made available throughout the water year.

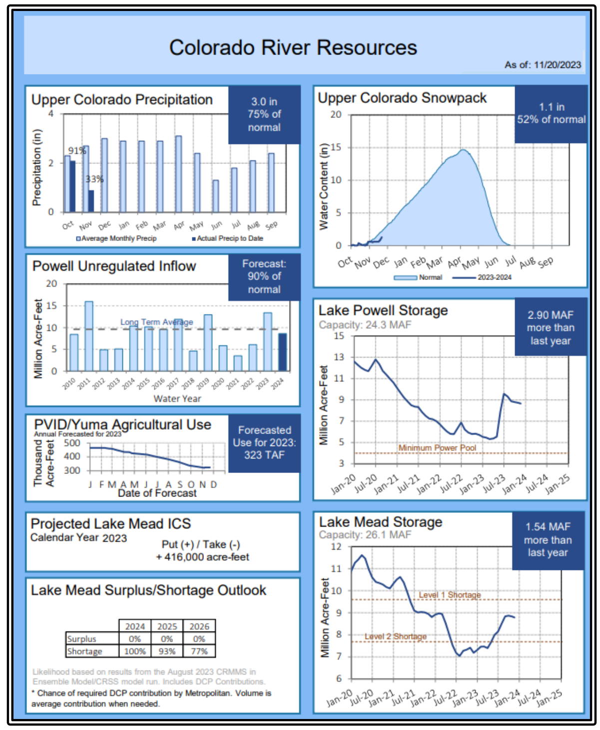
3.2.1.2 Colorado River Aqueduct

Roughly 25 percent of Metropolitan's water is sourced from the CRA. Built and operated by Metropolitan, the CRA carries water from the Colorado River system 242 miles across the desert to Southern California. Reclamation operates the Colorado River system, which provides water to users within seven western states – Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming. California's legal apportionment from the Colorado River is 4.4 million acre-feet on an annual basis. Roughly 70 percent of this allocation goes to the Imperial Irrigation District, with the remainder allocated to Metropolitan and the San Diego County Water Authority.

Similar to the SWP, hydrologic conditions have the potential to impact CRA diversions to California and users within the other six western states. CRA diversions to California are governed by the Lower Colorado River Basin DCP. The Lower Colorado River Basin DCP outlines five tiers and corresponding reductions to diversions for Arizona, California, Nevada, and Mexico. These tiers are triggered based on forecasts of reservoir levels in Lake Mead, the largest reservoir in the Colorado River Basin. These forecasts are reviewed, and shortage declarations are made for the following calendar year around August of each year.

Reclamation monitors levels in Lake Mead as an indicator of Colorado River Basin storage conditions. Monitoring is similarly done for Lake Powell, another significant reservoir for the Colorado River Basin. Projections of reservoir levels are made 24 months into the future and released on a monthly basis. These projections take into account forecasted hydrology, reservoir operations, and diversion and consumptive use schedules to model a single scenario of reservoir conditions. Reclamation also conducts five-year projections of future conditions in the Colorado River system which are typically updated every January, April, and August of each year.

Data that reflects water availability from the Colorado River Basin is also made available in Metropolitan's water supply conditions report. Conditions for the Colorado River Basin are generally reflected in this report through a reporting of actual and projected precipitation and snowpack in the Upper Colorado River, unregulated inflow into Lake Powell, and storage in Lake Powell and Lake Mead.



3.2.1.3 Metropolitan Water Supply Allocation Plan

As stated in Section 3.2.1.1 and 3.2.1.2, roughly 55 percent of Metropolitan's imported water supply comes from the SWP and the CRA. Metropolitan's WSAP is Metropolitan's policy and formula for equitably allocating available water supplies to member agencies during extreme water shortages when Metropolitan determines it is unable to meet all its demands. Metropolitan's WSAP identifies ten levels of shortage designed to reduce demands by up to 50 percent of the WSAP's calculated base demand. Based on the shortage level established by Metropolitan, the WSAP provides a reduction allocation to a member agency for its Municipal and Industrial (M&I) retail demand and replenishment demand. The WSAP considers historical local water production, full service treated water deliveries, agricultural deliveries and water conservation efforts when calculating each member agency's allocation.

Three Valleys has developed a WSAP to implement Metropolitan's WSAP within the Three Valleys service area in a manner that is fair and equitable to Three Valleys' member agencies. Three Valleys' WSAP was prepared in collaboration with its member agencies and adopted in 2009. Three Valleys' WSAP limits how much water can be purchased during the fiscal year without incurring a penalty. The limit varies depending on a number of factors, but mainly local groundwater extracted during the fiscal year. Three Valleys' WSAP mirrors the 10 stages of Metropolitan's WSAP.

Metropolitan's and Three Valleys' WSAPs do not require Three Valleys' member agencies to reduce demands during shortage, rather they incentivize demand reduction through fees for excessive use. Metropolitan charges penalties for use above an allocation established by implementing one of the ten stages of its WSAP and Three Valleys' WSAP passes any penalties charged through to the member agencies that contributed to accruing the penalties. Demand reductions are voluntary and supplies beyond the allocation can still be purchased at higher penalty rates.

Metropolitan is responsible for recommending a WSAP shortage level for each allocation year which is defined as the period between July 1 to June 30. To facilitate this recommendation, Metropolitan tracks and reports on storage reserve levels and projected supply and demand conditions between January and March of each year. In April, Three Valleys along with other Metropolitan member agencies report their projected supplies for the coming allocation year. This information is incorporated in Metropolitan staff analysis of storage reserves and projected supply and demand conditions in order to provide an allocation recommendation to the Board of Directors during their April meeting. The recommendation of a WSAP allocation directly informs Three Valleys and member agency Annual Assessments (*see* Section *3.3*).

3.2.2 Groundwater

Groundwater accounts for 35 to 45 percent of the region's water supply portfolio. Local groundwater supplies are provided from six different groundwater basins: Central Basin, Chino Basin, Main San Gabriel Basin (Main Basin), Puente Basin, Six Basins, and Spadra Basin, with the Chino Basin, Main Basin, and Six Basins providing the majority of the local groundwater supplies.

As previously mentioned, the Spadra Basin is managed by a GSA under SGMA. Under SGMA, groundwater basins are categorized into one of four priority categories: high-, medium-, low-, or very-low priority. SGMA requires medium- and high-priority basins to develop a Groundwater Sustainability Plan (GSP) with the goals of:

- Developing water budgets
- Assessing groundwater storage
- Developing sustainable management criteria, undesirable results to be avoided, and minimum thresholds to protect the basin for future supply.
- Identifying projects needed to ensure future sustainability of supplies and avoidance of undesirable results

While the Spadra Basin is designated as a very-low priority basin, a GSP was developed in early 2022 with the main objective of encouraging collaborative management of the Basin between all pumpers and maximizing beneficial use of the basin in a sustainable fashion under SGMA.

The remaining groundwater basins are adjudicated and managed by a watermaster. In general, each watermaster is responsible for managing and controlling the withdrawal and replenishment of water supplies into the basin; determining annually the operating safe yield (or the amount of groundwater that can be safely extracted); acquiring and spreading replenishment water as needed; and coordinating local involvement in efforts to preserve and restore the quality of groundwater in the basin. Annually, each adjudicated basin is generally required to report to DWR:

- Groundwater elevation data
- Groundwater extraction for the preceding year
- Surface water supply used for or available for use for groundwater recharge or in-lieu use
- Total water use
- Change in groundwater storage

To that end, each watermaster produces an annual report that identifies this information along with other information relevant to each basin, such as groundwater quality data.

The watermasters for those groundwater basins that provide the majority of the groundwater supplies for the region (Chino Basin, Main Basin, and Six Basins) reassess the operating safe yield of each basin on an annual basis. The Main Basin watermaster typically updates their 5-year outlook of the operating safe yield on a fiscal year basis around May of each year. The Six Basins watermaster typically makes the determination of the operating safe yield for the subsequent calendar year by November of each year. The operating safe yield for the Chino Basin is recalculated around January of each year.

These frameworks provide the mechanisms to monitor groundwater availability in the near- and long-term to ensure that the groundwater basins relied upon by the region are sustainably managed into the future.

3.3 Annual Supply and Demand Assessments

Three Valleys and its member agencies who are defined as urban water suppliers[1] are required to submit an Annual Assessment on or before July 1 of each year. The Annual Assessment is an evaluation of the near-term outlook for supplies and demands and is instrumental in providing guidance to Three Valleys and its member agencies for decisions regarding:

- Potential declarations of a water supply shortage and implementation of water shortage stages
- Instituting mandatory water restrictions
- Promoting water use efficiency and conservation programs
- Water rates and drought rate surcharges, and
- The necessity of pursuing alternative water supplies

The Annual Assessment is generally initiated between January and March of each year. During this timeframe, Three Valleys and its member agencies review demands from the previous July to December time period along with groundwater basin conditions (as applicable), local hydrology, and the imported water supply outlook as projected during the initial SWP allocation announced in the November to December timeframe. Following this review, Three Valleys and its member agencies initiate the Annual Assessment following Metropolitan's decision to recommend a WSAP allocation in April, since this recommendation directly impacts the imported water supplies that will be made available to the region. The methodology for the Annual Assessment includes the evaluation of supplies, demands, and other factors that might affect the availability of water supplies:

- Water Supplies: Available water supply sources within the region are quantified based on a review of current production capacities, historical production, and existing water supply planning documents.
- Unconstrained Water Demand: Unconstrained demands (i.e., demands prior to any projected response actions) are estimated for the current year and the upcoming year (which is assumed to be a dry year). This estimation will include factors such as weather, existing and projected land uses and populations, actual customer consumption and water use factors,

[1] Urban water supplier is defined as a supplier, either publicly or privately owned, that provides water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually.

monthly urban water supplier monitoring reports, existing water shortage levels, and existing water conservation ordinances.

- <u>Planned Water Use for Current Year Considering Dry Subsequent Year:</u> The water supplies available to meet demands during the current year and the upcoming single dry year will be identified. This evaluation will include factors such as estimated water demands, weather, groundwater basin operating safe yields, water quality results, existing available pumping capacities, imported water allocations, contractual obligations, regulatory issues, use of emergency interconnections, and the costs associated with producing each water supply source.
- <u>Infrastructure Considerations:</u> The capabilities of the water distribution system infrastructure to meet the water demands during the current year and the upcoming (single dry) year are considered. Available production capacities (e.g., groundwater well capacities) and distribution system water losses are reviewed. In addition, capital improvement and replacement projects, as well as potential projects which may increase water system and production capacities are considered.
- <u>Other Factors:</u> Additional local considerations which may affect the availability of water supplies are also described.

As stated above, the Annual Assessments by Three Valleys and its member agencies are required to be completed by July 1 of each year.

Information from each Annual Assessment is required by DWR to be summarized in an Annual Shortage Report, which also must be submitted to DWR by July 1 of each year. The Annual Shortage Report summarizes information from the Annual Assessment and includes information on anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions.

3.4 Triggers

In response to Three Valleys and member agency Annual Assessments along with water availability data which is made available throughout each year, Three Valleys and its member agencies may have a need to manage water supplies to minimize the impacts of potential shortages. To that end, Three Valleys and its member agencies that are considered urban water suppliers have each developed a WSCP. The WSCP serves as a framework for preparing for and responding to water shortages within each respective agency's service area boundary. Collectively as a region, Three Valleys and its member agencies that are defined as urban water suppliers identify six standard water shortage levels that correspond to a gap in supply compared to normal year availability. The six standard water shortage levels correspond to progressively increasing estimated shortage conditions (up to 10, 20, 30, 40, 50 percent, and greater than 50 percent shortage compared to the normal reliability condition) and align with the response actions that each water supplier will implement to meet the severity of the impending shortages. These six standard water shortage levels (Table 3-1) serve as the region's triggers for responding to supply shortages and initiating response actions to help manage available supplies.

Table 3-1. Regional Water Shortage Levels and Corresponding Shortage Ranges

Shortage Level	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%

As part of the development of this DCP, the region has developed a set of three key conditions that could suggest an imminent water shortage. If one or more of these conditions are met, Three Valleys and its member agencies will estimate the percent shortage range and activate the necessary shortage level as shown in Table 3-1. These conditions are as follows:

- Condition A: Metropolitan activates their WSAP (any allocation)
- Condition B: Reduced safe yield
- Condition C: Loss of local supply production

The region has also established triggers for initiating a surplus conditions stage. Currently, the region has existing mechanisms to purchase surplus water supplies for recharge into the local groundwater basins, where it can be held for use in future drought conditions. During the surplus conditions stage, Three Valleys and its member agencies will initiate coordination to ensure the region is maximizing its ability to recharge all available surplus waters for use during future dry years. The triggers that the region will use to activate the surplus conditions stage are provided in Table 3-2.

Table 3-2. Surplus Conditions Stage Triggers

Surplus Water Source	Entity Source is Available To	Stage Trigger
SWP – Table A (Metropolitan)	Three Valleys	+50% allocation
SWP – Article 21 (Metropolitan)	Three Valleys	Any allocation

3.5 Regional Coordination

Three Valleys and its member agencies have an existing mechanism in place to facilitate the coordination and information sharing associated with monitoring near- and long-term water availability. Each month, Three Valleys holds a member agency manager's meeting where each of its member agency general managers and support staff are invited to attend. The meetings serve as a forum to review water availability data, discuss the need for triggering water shortage levels, and coordinate drought responses and messaging.

The cities of Claremont and La Verne are known as "SWP Dependent Areas" – meaning that they are solely dependent on imported water from the SWP and cannot receive CRA supplies. Consequently, at the height of the last drought in 2022, Claremont and La Verne activated a Stage 5 shortage level, indicating a 50 percent shortage condition. During the timeframe that these agencies were in Stage 5, additional meetings outside of the regular member agency manager's meeting took place to facilitate increased coordination and information sharing. During the implementation phase of this DCP, Three Valleys will increase the frequency of meetings with any member agency or agencies that are in Stage 5 or above. These meetings will take place at least twice monthly.

4 Vulnerability Assessment

The study of climate change impacts on water resources continuously produces new models and updates to local and regional datasets. This continuous improvement necessitates a focused selection of data sources and analysis methods that are most applicable to local conditions. The scope of this vulnerability assessment is specifically geared towards enhancing the understanding of the impacts of climate change on future water demand in Three Valleys wholesale service area and the sources of Three Valleys water supplies during normal and drought periods.

This chapter describes the retrieval and analysis of climate data provided by DWR to project the impact of climate change on future water supplies and demands within the Three Valleys service area. The DWR climate data combines findings from 20 global climate models that closely represent California's climate processes. To account for biases in the climate model results, climate projections are presented as relative changes from historical conditions rather than absolute values. This adjustment is achieved by referencing historical hydrologic data in the state, covering the period from 1915 to 2011. The resulting ratio of a simulated future value to its corresponding simulated historical value is termed a "change factor." The change factors are applied to baseline water supply and demand to project changes in the water budget within the Three Valleys service area.

4.1 Summary of Vulnerability Assessment Results

Overall, the results of the vulnerability assessments indicate:

- Minor decreases projected in average annual water supplies from the San Gabriel River basin during drought (single year and multi-year) years relative to baseline conditions due to shifts in precipitation from winter to fall and projected increases in surface water evaporation caused by increasing temperatures, particularly under the extreme warming climate scenario.
- A shorter rainy season with potential for higher intensity precipitation events resulting in higher peak flows of shorter duration. The net impact on annual groundwater recharge will be minimal if flow diversion facilities and recharge basins maintain adequate capability to handle the increased flow rates.
- Projected increases in outdoor water uses under normal, single dry, and multi-year drought conditions, caused by projected temperature increases, which lead to higher evapotranspiration (ET) rates for landscaping, irrigated crops, and native vegetation. Average annual outdoor water use by customers within the Three Valleys service area could increase by up to six percent under the most severe (Dry Hot) climate change scenario.
- A comparison of Three Valleys and Metropolitan’s water budget projections under future climate conditions shows similar total demand projections, with Three Valleys showing increased reliance on imported surface water (supplied by Metropolitan) in its future projections. This increased reliance in Three Valleys projections occurs because local water supplies are projected to remain nearly constant while water demand increases due to future growth and increased climate-related water deficits. This highlights the need to develop mitigation actions to reduce future reliance on imported surface water.

These results are described in greater detail throughout Chapter 4 which provides:

- A description of the area that is the subject of the vulnerability assessment
- A description of the analysis approach and the data sources
- Narrative discussions regarding the climate change factors calculated for local supply and demand conditions in various scenarios
- Discussion of the water supply and demand projections resulting from the vulnerability assessment
- A comparison of Three Valleys water supply and demand projections resulting from the vulnerability assessment with the regional projections developed as part of the ongoing Metropolitan 2020 Integrated Water Resources Plan (IRP) process

4.2 Details of Vulnerability Assessment Results

4.2.1 DCP and Water Resources Master Plan Requirements for Climate Change Analysis

As part of the DCP, a vulnerability assessment is essential to understand the characteristics and potential risks associated with future droughts and to formulate appropriate mitigation and response actions. Since future droughts cannot be predicted solely based on observed past drought information, it becomes necessary to include a climate change analysis. This analysis incorporates historical and future climate projections to assess the hydrological impacts of climate change on drought conditions, ultimately leading to the development of a more effective plan. The DCP necessitates both qualitative and quantitative assessments of potential drought conditions derived from climate change information to evaluate potential risks to critical resources.

Imported water projections are also a crucial element for development of the Water Resources Master Plan and DCP. Projections for imported water in the Three Valleys service area were developed by Metropolitan as part of their 2020 UWMP Drought Risk Assessment and the Metropolitan 2020 IRP. Metropolitan's 2020 UWMP Drought Risk Assessment (dated June 2021) indicates that Metropolitan has adequate supplies to meet imported water demands in its State Water Project-dependent areas (including Three Valleys) during normal, single dry years, and 5-year drought periods before 2045 (Metropolitan 2020 UWMP, Table 2-4 and Table 2-5). However, the UWMP analysis was conducted assuming historical climate conditions.

The Metropolitan 2020 IRP considered a range of more extreme potential future scenarios, including: low demand with stable imported supplies, high demand with stable imported supplies, low demand with reduced imported supplies, and high demand with reduced imported supplies. The IRP analysis revealed that service reliability issues could occur more frequently and lead to increasingly severe deficits of imported supplies under the high future demand scenarios in the 2045 period. Options for managing these potential future imported water supply deficits will be explored more extensively as part of the analysis for the DCP. The climate change analysis developed for Three Valleys, as described herein, enhances knowledge of the relative vulnerability of different water supplies for the service area and supports the development of mitigation actions to reduce or eliminate future deficits.

4.2.2 Prior Climate Studies

Climate change is primarily caused by the increasing global concentrations of greenhouse gases, resulting in higher temperatures, disruptions in the hydrologic cycle, and increased precipitation variability. This section provides a summary of the regional impacts of climate change, which were analyzed in California's Fourth Climate Change Assessment (2018). California produces periodic assessments of the potential impacts of climate change in the state and reports on potential adaptation responses as required by Executive Order #S-03-05. California's Fourth Climate Change Assessment includes a Statewide Summary Report (Bedsworth et al., 2018), nine regional summary reports, a climate justice summary report, and over 40 technical reports that translate climate science into actionable adaptation and resilience policies and plans. The Los Angeles Regional Report (Hall et al., 2018) summarizes climate science, impacts, and adaptation information for Ventura, Los Angeles, Orange, San Bernardino, and Riverside counties. This study projects regional increases in average maximum temperatures of approximately 4 to 5 degrees Fahrenheit (°F) by the mid-21st century and 5 to 8°F by the late 21st century. The hottest days of the year could be up to 10°F warmer for many locations in the region by the late 21st century.

California's report also projects slight changes in average annual precipitation and the frequency of extreme dry and wet years. However, there could be intensified rainfall leading to more severe atmospheric river events and up to a 25 to 30 percent increase in rainfall on the wettest days of the year. While these assessments offer insights into the regional climate impacts' magnitude, they do not provide information at a scale directly applicable to local watersheds, water supplies, and demands.

4.2.3 Vulnerability Assessment Objectives

The objectives of this vulnerability assessment are to:

1. Identify the appropriate datasets for use in this analysis
2. Project the magnitude of climate-driven changes in water supply and demand for the Three Valleys service area
3. Estimate the projected future impacts by applying climate change factors to the water supply sources and water demands in the Three Valleys service area

Temperature increases and changes in precipitation patterns due to climate change are expected to alter the balance between local water supply and demand within the Three Valleys service area and other parts of the state. Rising temperatures will result in higher consumptive water use, both for irrigated agriculture and for maintaining landscaping in residential, commercial, and recreational areas. This increased consumptive water use will be compounded by greater evaporation from open spaces and water bodies, as well as by water consumption by native vegetation outside of urban zones. Furthermore, population growth in the planning area may further drive increased demand.

Annual precipitation in Southern California exhibits significant variability, with a substantial portion of regional rainfall occurring during the winter months from November to April. There are typically years characterized by significantly above-average precipitation as well as those with notably below-average precipitation. During wet years, seasonal precipitation serves to replenish aquifers, streams, rivers, and reservoirs, all of which constitute vital water supply sources. Conversely, during dry years, there is heightened reliance on groundwater reserves to compensate for the deficit. Climate change is expected to intensify year-to-year precipitation variability in the region, as well as in other areas of the state that serve as sources of imported water.

4.2.4 Baseline Water Budget

Estimates of baseline water supply are compiled from Three Valleys' Local Supply Production Surveys and Three Valleys' Water Sales records. The Local Supply Production Survey data are compiled from member agency data documents, annual groundwater production, recycled water use, and surface water use. Three Valleys' Water Sales records detail the amount of imported water delivered for direct consumptive use and water delivered for replenishment. The sum of consumptive use and replenishment water supply is the net demand on Metropolitan.

The 5-year period from 2018 to 2022 is adopted as the baseline period for the water budget analysis. This is the most recent 5-year period for which complete water supply data are available from member agencies. In addition, this 5-year period includes a severe drought period with low water availability from 2018 to 2019 as well as a period with high water availability from 2020 to 2021. The total average baseline water supply is shown in Table 4-1.

Table 4-1. Baseline Water Supply Sources in Acre-Feet

Supply (AF)	2018	2019	2020	2021	2022	Average
Groundwater	39,291	35,885	41,260	38,268	36,876	**38,316**
Recycled Water	4,134	5,246	5,518	6,473	6,722	**5,619**
Surface Water	2,252	4,981	5,825	3,622	7,119	**4,760**
Imported Water Consumed	51,342	57,435	59,569	63,377	53,450	**57,035**
Imported Water Replenished	16,001	17,880	5,122	395	211	**7,922**
Total Local Supply	45,676	46,112	52,603	48,362	50,717	**48,694**
Total Imported Water	67,343	75,315	64,691	63,772	53,661	**64,956**
Total Water Supply	113,019	121,427	117,294	112,135	104,378	**113,651**
Contribution of Imported Water to Total Water Supply	**59.6%**	**62.0%**	**55.2%**	**56.9%**	**51.4%**	**57.0%**

Note: AF = acre-feet.

Source: Data aggregated from Three Valleys' Local Supply Production Surveys and Three Valleys' Water Sales records.

The total water demand for 2020, aggregated from member agency UWMPs, is shown in Table 2-3. These demand estimates are much higher than the actual water use baseline. The combination of conservation measures and water use restrictions that has been imposed for most of the past 15 years due to recurring regional droughts has likely contributed to actual water use being lower than estimated water demand.

Projections of future water demand due to growth, aggregated from member agency 2020 UWMPs, are shown in Table 2-4. The cumulative annual growth rates are calculated based on the change in population from the baseline 2020 values. The aggregated demand and associated future projection are not directly used in the vulnerability assessment because these values exceed the actual baseline water use. Instead, the growth rates are used with the actual baseline water use of 113,651 AF/year and climate change factors to develop new demand projections in subsequent steps.

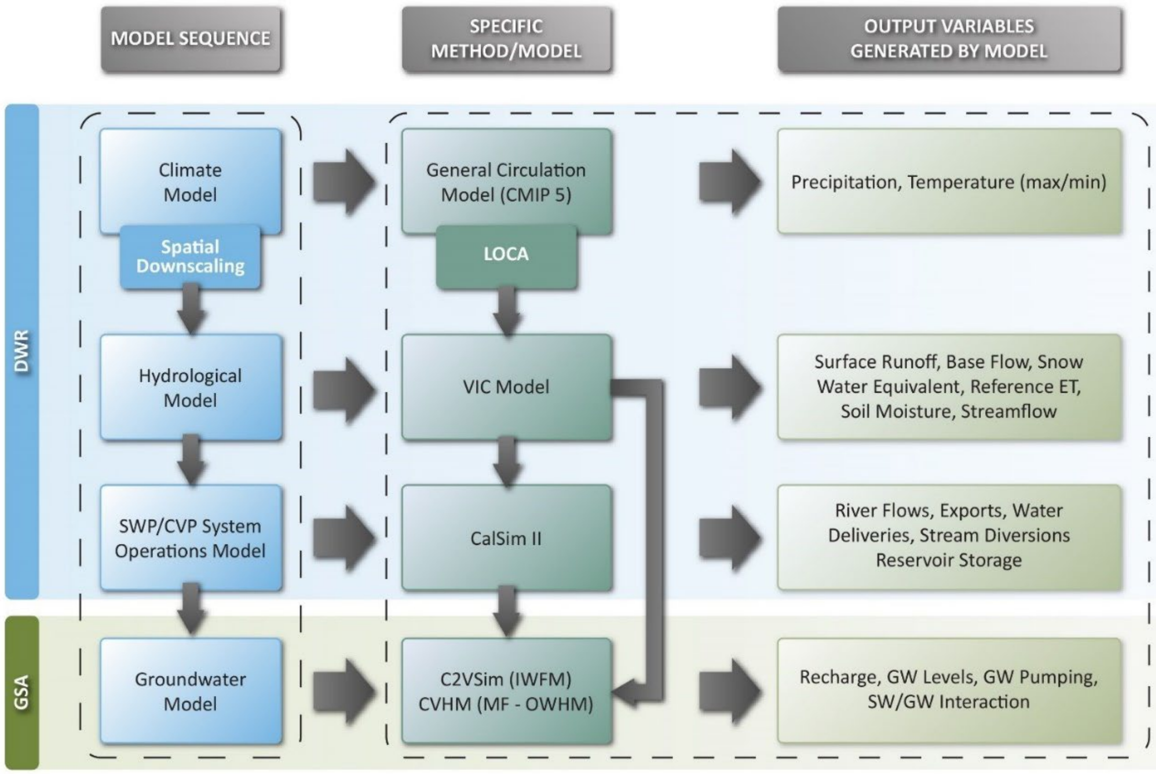
4.2.5 Description of Climate Data Sources

DWR has compiled statewide climate change datasets for utilization in water resource planning. Climate conditions in California under historical and future scenarios are presented in the following datasets:

- Year 2030 future conditions, reflecting projected climate and sea level conditions for a 30-year period centered around 2030
- Year 2070 future conditions, reflecting projected climate and sea level conditions for a 30-year period centered around 2070
- Year 1995 historical conditions, representing climate and sea level conditions for a 30-year period centered around 1995

The 2030 and 2070 climate projections rely on an ensemble of 20 global climate models selected by the DWR Climate Change Technical Advisory Group as the most suitable for assessing and planning California's water resources. This dataset contains data from 1915 through 2011 for the entire state of California at a spatial resolution of 1/16th degree (approximately 3.75-mile grid cells) and a monthly temporal resolution.

Figure 4-1 provides an overview of the modeling processes utilized by DWR, highlighted in blue background. The bottom row of the image highlighted in green, illustrates how individual groundwater sustainability agencies are expected to utilize the data in groundwater models to simulate groundwater conditions to achieve sustainability objectives.



DWR: Department of Water Resources; GSA: Groundwater Sustainability Agency; SWP: State Water Project; CVP: Central Valley Project; LOCA: Localized Constructed Analogs; VIC: Variable Infiltration Capacity; CalSim: SWP & CVP Operations Model; C2VSim: California Central Valley Groundwater - Surface Water Simulation Model; IWFM: Integrated Water Flow Model; CVHM: Central Valley Hydrologic Model; MF - OWHM: MODFLOW One Water Hydrologic Flow Model; ET: Evapotranspiration, SW: Surface Water; GW: Groundwater; CMIP 5: Coupled Model Intercomparison Project

Figure 4-1. Overview of Modeling Processes Used by DWR in Creating the Statewide Climate Datasets (Source: DWR, 2018)

DWR has also processed the climate datasets through a hydrologic model known as the Variable Infiltration Capacity (VIC) model. This model is used to simulate future hydrologic conditions and route runoff to the outlet of subbasins defined by each eight-digit Hydrologic Unit Code (HUC) in California. Streamflow change projections from the VIC model are provided as a monthly time series from 1915 through 2011. As depicted in Figure 4-2, the VIC model takes input climate variables, such as precipitation and temperature, and performs a series of hydrologic computations within each cell to produce variables like soil moisture, ET, and surface runoff within each cell. Subsequently, a streamflow routing algorithm known as RVIC is employed to direct runoff from each cell to its associated subbasin outlet.

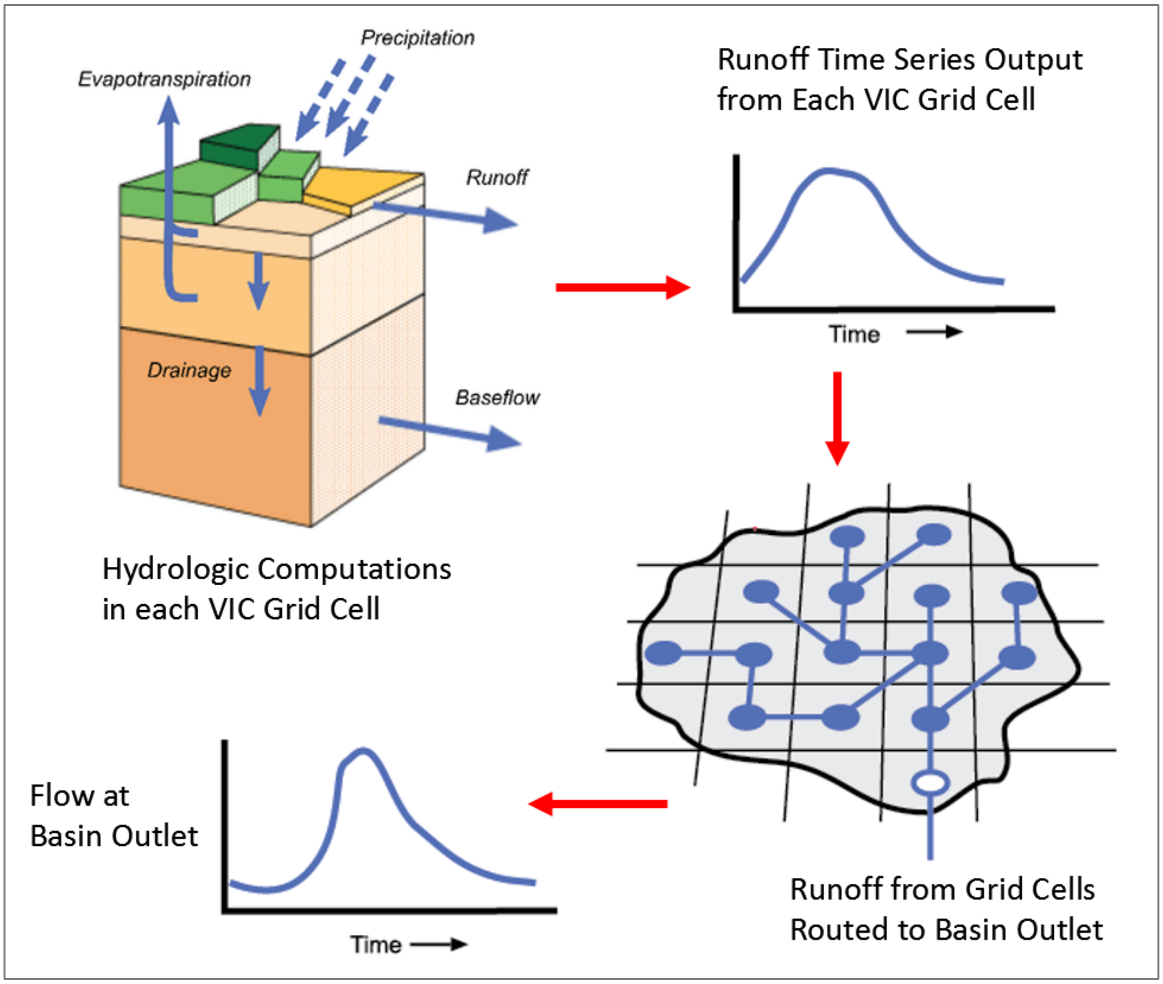


Figure 4-2. Schematic of the VIC Model Showing Hydrologic Computations Within Each Grid Cell and Runoff Routing (Source: University of Washington Computational Hydrology Group, 2016)

DWR has utilized the VIC model to conduct hydrologic simulations under both historical climate conditions and projected future climate conditions in 2030 and 2070 across more than 8,000 grid cells statewide. Runoff from these grid cells has also been directed to the outlet of each eight-digit HUC watershed in the state for incorporation into water resource planning. As depicted in Figure 1, climate assessments involve a sequence of models, each of which introduces certain biases into the modeling process and the derived products. To minimize the impacts of these biases on decision-making processes, DWR presents the simulated climate projections as relative changes from historical conditions rather than absolute values. For instance, each monthly precipitation value simulated under 2030 conditions is divided by the precipitation value simulated for the same month under historical conditions using the same sequence of models. As stated previously, this resulting ratio of a simulated future value to the corresponding simulated historical value is referred to as a "change factor." DWR has computed monthly time series of change factors for precipitation and ET in each VIC grid cell and for streamflow in each HUC-8 watershed. These change factor datasets can be retrieved from the publicly accessible Sustainable Groundwater Management Act Data Viewer (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer) for use in water resources planning. A more comprehensive description of the methods used to compute the climate datasets is provided in a publication titled "Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development" (DWR, 2018).

4.3 Climate Analysis Approach

4.3.1 Preprocessing Data for the Three Valleys Service Area

For the Three Valleys service area, the statewide climate datasets comprise 17 grid cells, each with a spatial resolution of 1/16th degree. Each grid cell contains 97 years of monthly time series (1915-2011) displaying projected precipitation and ET changes under 2030 and 2070 climate conditions relative to 1995 conditions. The portion of each grid cell within the Three Valleys service area is estimated by spatially intersecting feature layers of the climate grid with the Three Valleys service area boundary. Regional time series of projected precipitation and ET changes are computed from the cell time series by calculating an area-weighted average of data from grid cells that fall wholly or partially within the service area. Projections of future streamflow change were also obtained for the San Gabriel River (HUC-18070106) basin, which supplies surface water to portions of the service area as shown in Figure 4-3.

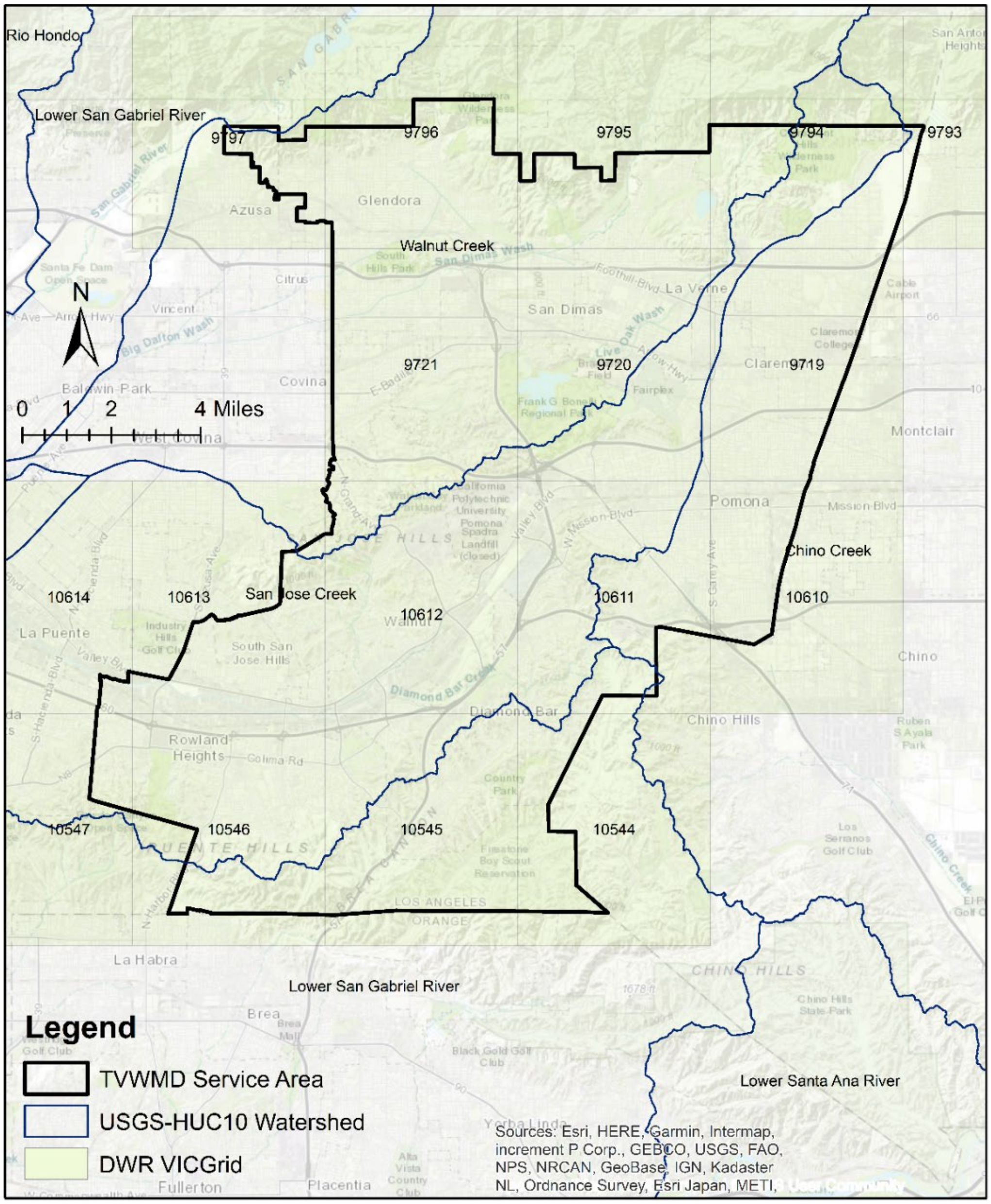


Figure 4-3. Climate Grid Cells and Watersheds Covering the Three Valleys Service Area

Three potential climate conditions were considered for this analysis:

- Drier future conditions with Extreme Warming (Dry Hot)
- Median future conditions (Median)
- Wetter future conditions with Moderate Warming (Wet Warm)

There are two extreme scenarios (Dry Hot and Wet Warm) that are derived from a set of ten global climate models. The first extreme scenario (Dry Hot) employs future projections from the ten global climate models with the least warming and least precipitation, while the second extreme scenario (Wet Warm) utilizes the ten global models with the most warming and highest precipitation.

4.3.2 Analysis of Normal, Single, and Multi-Year Dry and Wet Periods

Every urban water supplier is required to assess water service reliability in normal years, single-dry years, and multiple-dry years lasting 5 years. For imported water supplies, the normal, wet, and dry years used by Metropolitan, based on a historical analysis period of 1922 to 2004, are adopted for Three Valleys since it is the largest source of imported water. For local water supplies, year types are selected from the Glendora West Station gauge, which has extensive historical records from 1883 to 1998. The data are available online from the DWR Flood Emergency Information Exchange (FERIX) website at https://ferix.water.ca.gov/webapp/precipitation/. The analysis of year types for the Glendora West Station gauge and the State Water Project is presented in Table 4-2.

Table 4-2. Analysis Periods for Normal, Single, and Multi-Year Dry and Wet Periods

Year Type	Event Years for Three Valleys (Glendora West Station Gauge)	Event Years for State Water Project Imported Supplies
Normal	1922-1998	1922-2004
Single Dry-Year	1961	1977
5-Year Drought	1959-1963	1988-1992
Single Wet-Year	1978	1999
5-Year Wet	1978-1982	1995-1999

The results in Table 4-2 show that 1961 was the single driest year locally, with only 7.67 inches of rainfall. The driest 5-year period for local supplies spanned from 1959 to 1963. On the contrary, the single wettest year on record occurred in 1978, with 46.55 inches of rainfall. The wettest 5-year period was 1978 to 1982. Despite having similar periods of record, the extreme year types for imported supplies from the State Water Project occur during very different years. The results show that 1977 was the driest year for imported water supplies. The driest 5-year period for imported water supplies was from 1988 to 1992. The single wettest year for imported water supplies was 1999, and the wettest 5-year period was from 1995 to 1999.

These differences between when different year types occur for local and imported water sources have significant implications for managing droughts. Local entities may need to plan implementation of drought management strategies and water shortage operations that consider both local water supply conditions and imported water supply availability. Metropolitan has extensive storage facilities that can provide water supply to buffer short-term reductions in imported supplies from the State Water Project. However, water agencies in the Three Valleys service area must implement plans to enhance their resilience to local droughts and to capture excess water during exceptionally wet periods. The event years from the Glendora West Station gauge are used for assessing drought conditions and regional drought contingency planning.

Figure 4-4 shows the annual and 5-year rainfall from 1922 to 1998 for the Glendora West Station gauge with the wettest and driest 1-year and 5-year periods highlighted in blue and yellow, respectively.

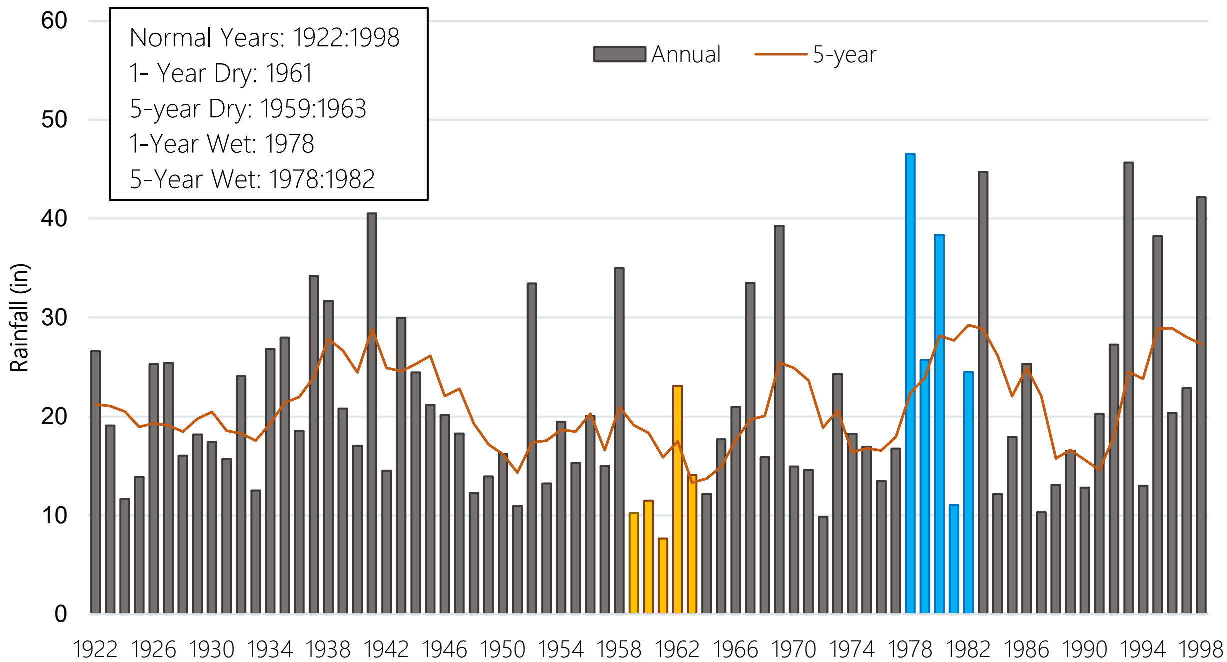


Figure 4-4. Annual Rainfall at Glendora West Station

4.3.3 Computing Water Supply Change Factors

Water sources used within the Three Valleys service area include imported water from Metropolitan, local groundwater from six different groundwater basins, recycled water, and surface water:

Imported water: Imported water accounts for roughly 50 to 60 percent of the region's water supply portfolio. Three Valleys receives imported water from Metropolitan and then distributes it to its member agencies. Treated imported water is directly provided to Three Valleys member agencies through the service connections linked to the Metropolitan distribution system. Untreated imported water is transported to the District's Miramar Water Treatment Plant, where it undergoes treatment before being distributed to member agencies. Untreated imported water may also be used to replenish local groundwater basins.

Groundwater: Groundwater accounts for roughly 35 to 45 percent of the region's water supply portfolio. The region has historically extracted groundwater from the Central Basin, Chino Basin, Main Basin, Puente Basin, Six Basins, and Spadra Basin. Groundwater systems are recharged through various water sources, including:

- Natural recharge: This constitutes the portion of precipitation that infiltrates into the underlying aquifer within the same grid cell where the precipitation occurs. Changes in natural recharge are directly linked to changes in precipitation within the grid cell.
- Artificial recharge (including injection systems): This involves diverting water from rivers and streams to replenish the underlying aquifer. As artificial recharge relies on surface water and other remotely sourced water supplies, it is influenced by cumulative flow changes in the source watersheds.

Recycled water and reclaimed water: Recycled and reclaimed water can also serve as a supply source for local use and groundwater recharge. Historically, recycled water has accounted for roughly 5 percent of the region's water supply portfolio. Supplies of recycled and reclaimed water, derived from indoor uses, are generally less susceptible to changes in climate.

Surface water: Surface water supplies from the San Gabriel River and San Antonio Creek account for roughly 5 percent of the region's water supply portfolio.

Precipitation change projections sourced from the climate change datasets provided by DWR are used to characterize future changes in natural recharge. Computations are based on a 97-year monthly time series of precipitation for the Three Valleys service area. These data are employed to calculate Water Supply Change Factors, which reveal the percentage changes in mean monthly and mean annual precipitation. These changes are assessed under future climate conditions for both 2030 and 2070 in relation to historical conditions under 1995 conditions. The Water Supply Change Factors for 2030 and 2070 are determined using various scenarios, encompassing normal years, single dry years, single wet years, and 5-year wet and dry periods.

Characterizing future changes in the San Gabriel River relies on streamflow projections generated by the VIC model under the climate conditions of 2030 and 2070. These streamflow projections serve as the basis for calculating Water Supply Change Factors, which indicate the percentage shifts in mean monthly and mean streamflow. These shifts are assessed in comparison to historical conditions set at 1995 conditions. Change factors are likewise computed for various scenarios, including normal years, single dry years, single wet years, and 5-year wet and dry periods. Each set of Water Supply Change Factors is interpolated at 5-year intervals from 2020 to 2045. To project climate change conditions up to 2030, data from 1995 to 2011 are utilized. Linear interpolation is applied to determine the climate change factors between 2020 and 2030. This interpolation is based on historical conditions from 2011 and projected conditions for 2030. Different climate change conditions are expected between 2030 and 2070 due to the implementation of policies and practices influencing the rate of climate change over this extended period. For the years between 2030 and 2070, linear interpolation is again employed in 5-year increments, using the difference in projected conditions between 2030 and 2070. Time series of Water Supply Change Factors are likewise interpolated at 5-year intervals for normal years, single dry years, single wet years, and 5-year wet and dry periods, applicable to local water sources from 2020 to 2045.

4.3.4 Computing Water Demand Change Factors

Climate impacts are calculated separately for indoor and outdoor water usage. Generally, outdoor water usage, particularly for landscape irrigation, is sensitive to climate change. Indoor water usage, however, is relatively insensitive to climate change. In warmer climates, plants require more water to support their growth, and people tend to increase landscape irrigation to ensure their health. This increased water demand is quantified in climate models using the ET rate, which accounts for the total water released from soil, plants, and water bodies into the atmosphere through evaporation and transpiration.

For the Three Valleys service area, the statewide climate datasets comprise 17 grid cells, each with a spatial resolution of 1/16th degree (approximately 3.75-mile grid cells). Each grid cell contains a 96-year monthly time series (1915 to 2011) displaying projected ET changes under 2030 and 2070 climate conditions. Initially, an area-weighted average of the ET data from these 17 cells is computed to create a single time series for the Three Valleys service area. This regional time series is then used to calculate Water Demand Change Factors, which indicate the percentage changes in mean monthly and mean annual ET under future 2030 and 2070 climate conditions compared to historical conditions in 1995. Similar values of 2030 and 2070 Water Demand Change Factors are determined for normal years, single dry years, single wet years, and 5-year wet and dry periods. The Water Demand Change Factors are computed for 5-year intervals from 2020 to 2045 through interpolation. Data from 1995 to 2011 are used as a baseline for projecting climate change conditions to 2030. Linear interpolation is employed to determine the climate change factors between 2020 and 2030, utilizing historical conditions from 2011 and projected conditions for 2030.

Several factors are likely to influence the rate of climate change between 2030 and 2070, including the implementation of policies and practices likely to impact the long-term rate of climate change. For the years between 2030 and 2070, linear interpolation is applied in 5-year increments, considering the differences in projected conditions for 2030 and 2070.

Similarly, the 5-year time series of Water Demand Change Factors is interpolated for normal years, single dry years, single wet years, and 5-year wet and dry periods. These factors are then applied to growth-adjusted indoor water use projections for the years 2020 to 2045.

4.4 Local Climate Change Results

4.4.1 Water Supply Change Factor Results

The projected precipitation under the Dry Hot, Median, and Wet Warm scenarios is presented in Figure 4-5 through Figure 4-7. Detailed projected changes in rainfall under all the climate change scenarios are presented in Appendix B (Table B1, Table B2, and Table B3).

All scenarios indicate that changes will become more extreme by 2045. The Dry Hot and Median scenarios predict a decline in annual precipitation, while the Wet Warm scenario projects higher annual precipitation. Specifically, annual rainfall is predicted to decrease by 6.5 and 2.7 percent by 2045 under the Dry Hot and Median scenarios, respectively. In contrast, the Wet Warm scenario predicts a 3.4 percent increase over the same period.

Under the Dry Hot scenario, monthly precipitation gradually declines during most months of the year, particularly during early fall (October through November) and winter to early spring (January to May) when significant amounts of precipitation occur. However, precipitation gradually increases in September, which is also a wet month.

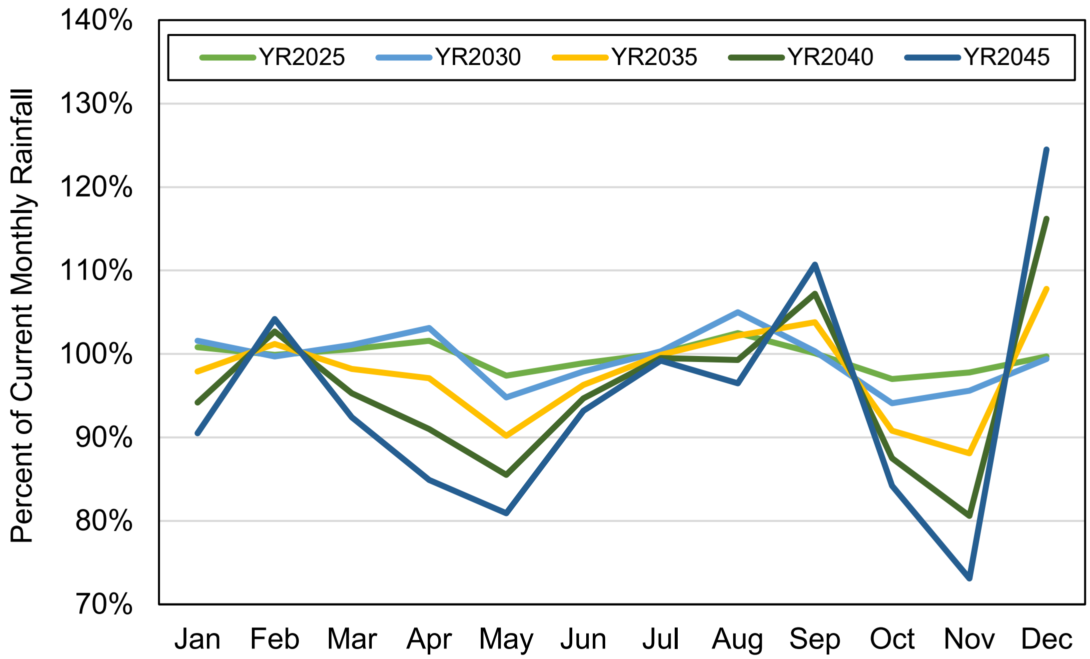


Figure 4-5. Projected Changes in Rainfall under Dry Hot Future Climate 2025 – 2045

The Median Future scenario would also result in decreases of up to 87 percent in May, October, and November, and increases of up to 106 percent during summer months from July to September.

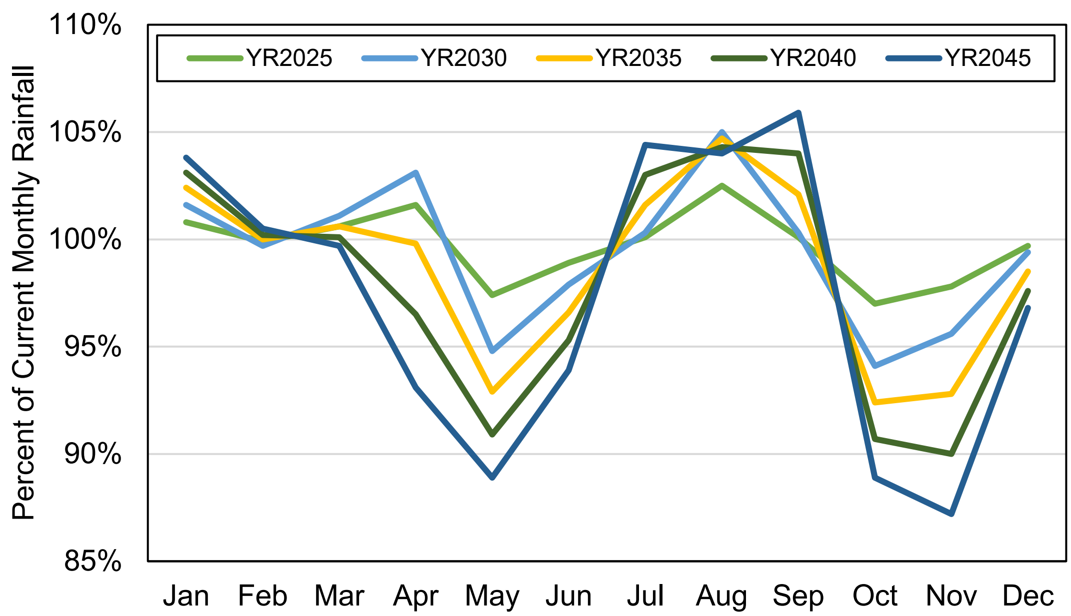


Figure 4-6. Projected Changes in Rainfall under Median Future Climate 2025 – 2045

The pattern of increasing September precipitation also occurs under the Wet Warm Future scenario (shown in Figure 4-7), with increases of up to 158 percent of current precipitation by 2045. The Wet Warm Future scenario would result in increases of up to 124 percent during February and March.

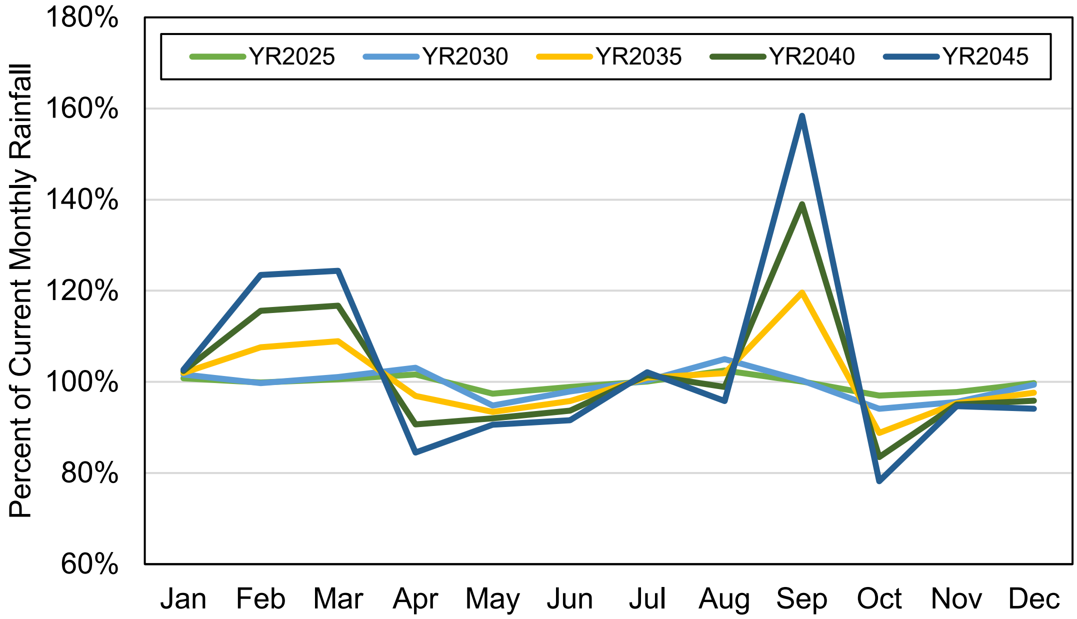


Figure 4-7. Projected Changes in Rainfall under Wet Warm Future Climate 2025 – 2045

Figure 4-8 shows the predicted changes in monthly absolute rainfall amounts under the various climate change scenarios for the year 2045. As shown in Figure 4-5 through Figure 4-7, the largest relative changes are projected to occur in April, May, and September. However, it is projected that the largest absolute changes will occur during the typically more humid months of February and March. Projections indicate an increase of up to 0.82 inches from the current climate during February under the Wet Warm Scenario by 2045.

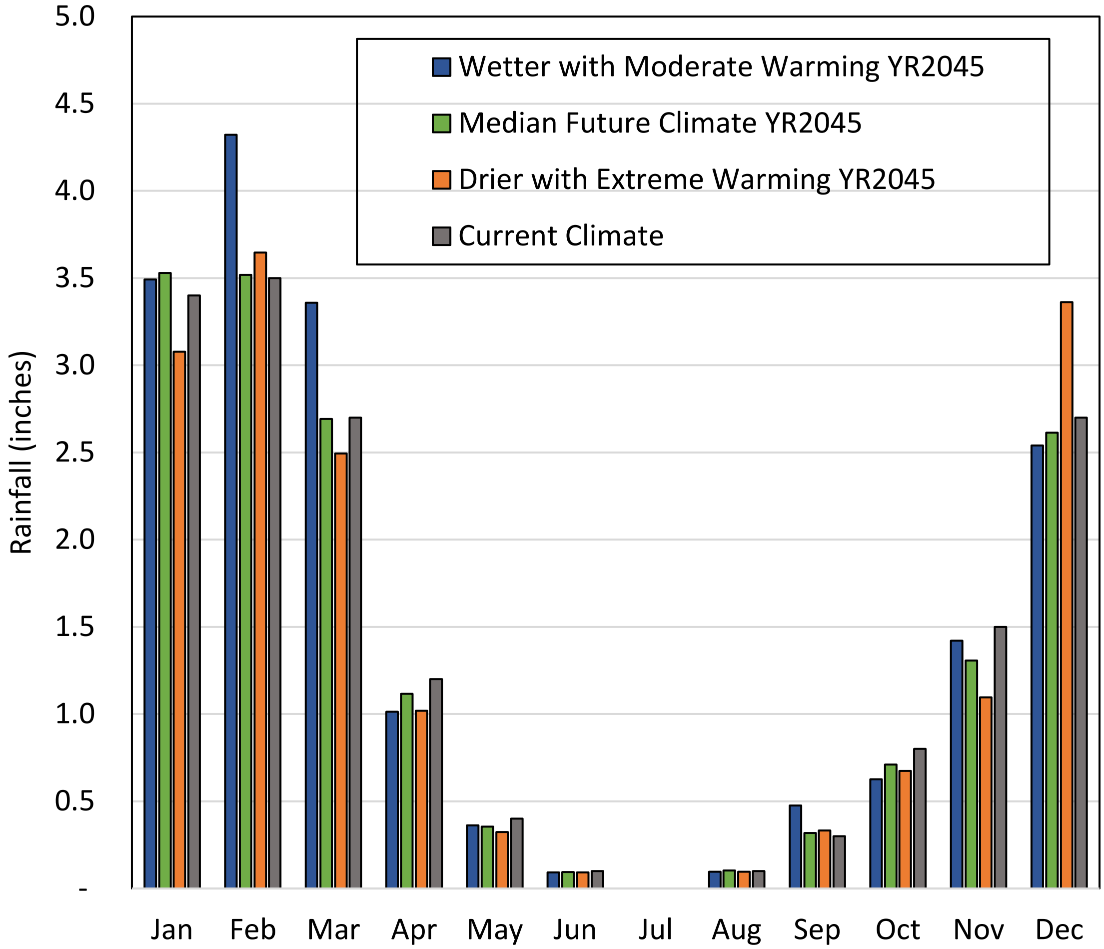


Figure 4-8. Projected Changes in Normal Year Rainfall – 2045

The pattern of change for natural groundwater supply is projected to be similar to rainfall. As shown in Figure 4-9, the most significant monthly increase in normal-year groundwater supply by 2045 is projected to occur during February and March under the Wet Warm scenario, and in December under the Dry Hot scenario. On an annual basis, the Dry Hot scenario predicts a net decrease of 1,110 AF/year in groundwater supply by 2045. The Median scenario would also result in a projected decrease of 780 AF/year of annual groundwater supply from the existing baseline supply of 38,316 AF/year. Under the Wet Warm scenario, groundwater supply is predicted to increase by 2,520 AF/year over baseline supply. These results indicate that there would be less water available from natural recharge under Median and Dry Hot Future scenarios while the Wet Warm scenario would increase natural yield above baseline conditions.

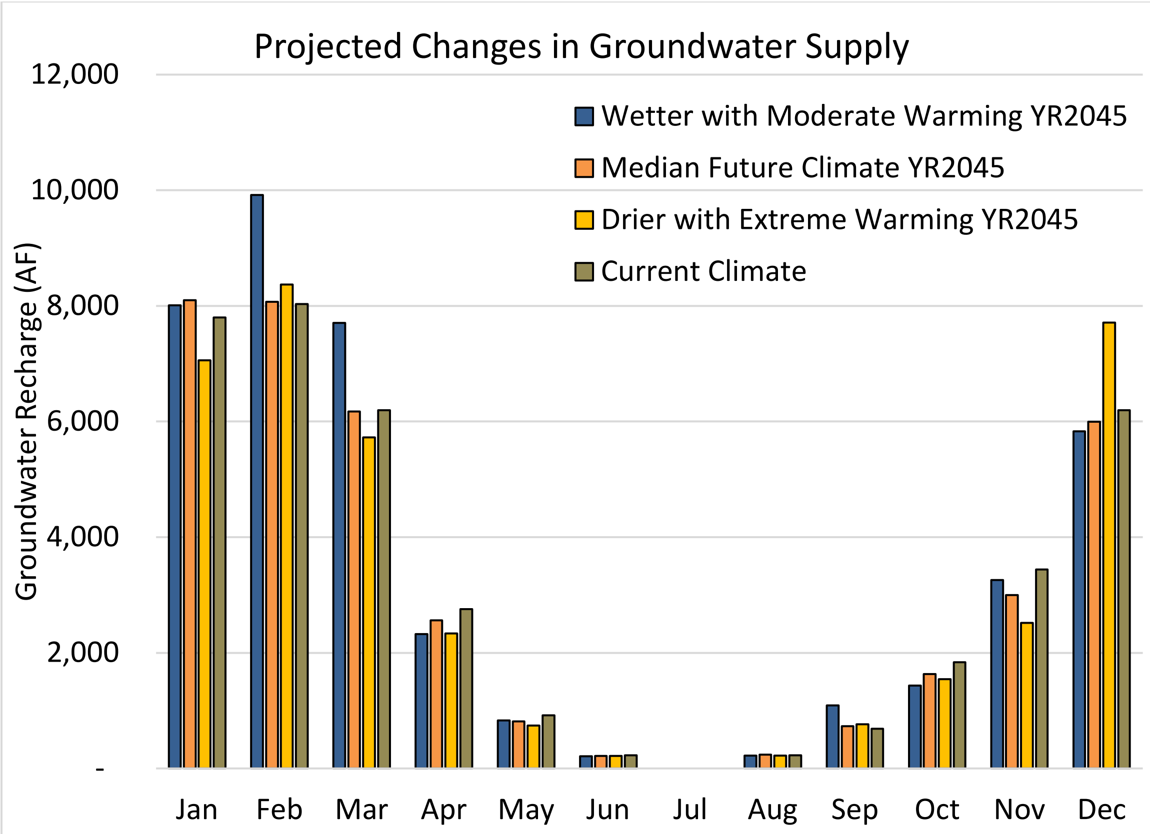


Figure 4-9. Projected Changes in Normal Year Groundwater Supply – 2045

Figure 4-10 displays the projected changes in normal-year flow for the San Gabriel River below Santa Fe Dam near Baldwin (USGS-11085000) by 2045. The Dry Hot and Median scenarios project a 10 percent and 2 percent decrease in annual flow by 2045 relative to the current climate, respectively, while the Wet Warm scenario projects an 18 percent higher annual flow by 2045.

Under the Dry Hot scenario, lower flow is projected during the high-flow months of February and March compared to the current conditions, with discharge decreasing by 20 cubic feet per second (cfs) in February and 21 cfs in March. Conversely, the Wet Warm scenario projects higher flows during the same period, with discharge increasing by 61 cfs in February and nearly 44 cfs in March. Projected flows under the Median scenario are generally consistent with flows projected under the current climate. No notable deviations in flow from the current climate are projected under any of the climate change scenarios between May to December. Detailed projected changes for San Gabriel River flow under all the climate change scenarios are presented in Appendix B (Table B4, Table B5, and Table B6).

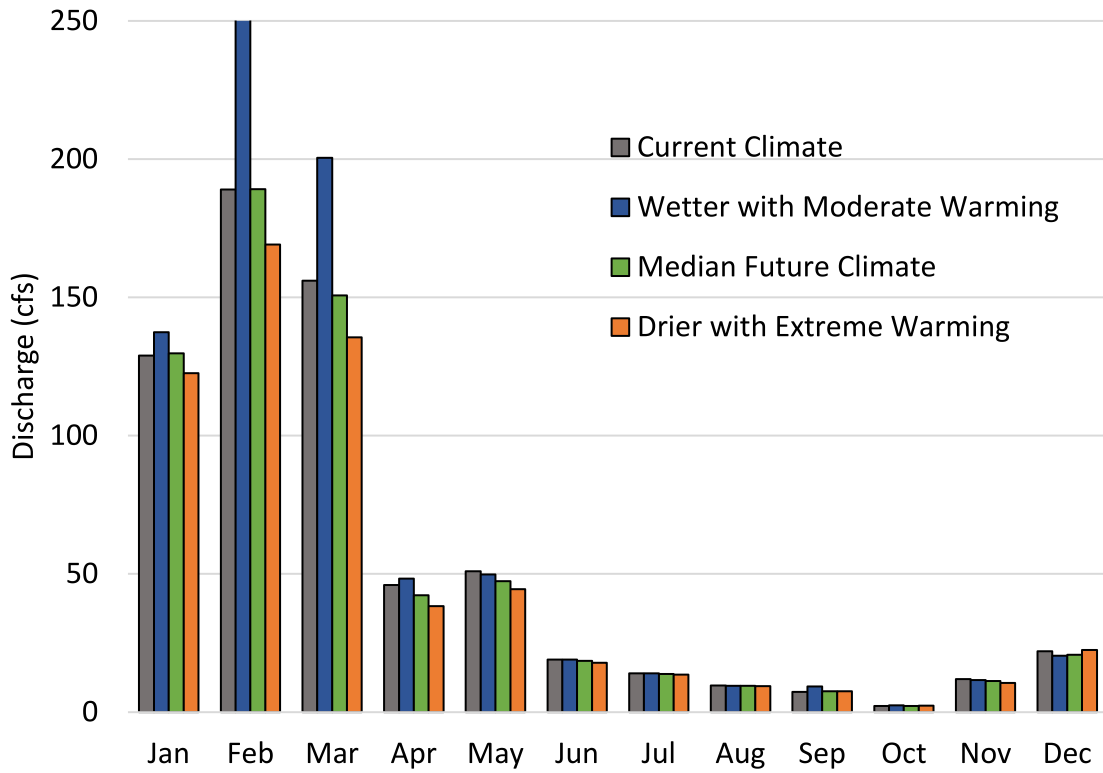


Figure 4-10. Projected Changes in Normal Year Flow by 2045: San Gabriel River Below Santa Fe Dam Near Baldwin (USGS-11085000).

Based on these results, river supplies, which are water sources for artificial recharge, are likely to become less reliable. Natural groundwater recharge will still occur in normal and dry years, but the timing of available water will change. Precipitation will increasingly fall during a shorter rainy season, with a longer dry season each year. Furthermore, the increase in temperatures over time will lead to greater evaporation from surface water bodies and land surfaces, reducing the volume of water available for diversion from rivers. This necessitates a greater understanding of the adequacy and operational constraints of natural and artificial recharge systems in the service area.

4.4.2 Water Demand Change Factors Results

Figure 4-11, Figure 4-12, and Figure 4-13 depict projected changes in outdoor demand from baseline conditions in 2020 under the various climate change scenarios. Water demand change factors are applied to outdoor water use, which has been adjusted for future population growth and conservation measures. Indoor water use is assumed to respond to future population growth and conservation measures as well, but it is not sensitive to climate change. All scenarios indicate an increase in annual outdoor water demand, with the average annual outdoor water demand projected to rise by 5.8 percent for the Dry Hot scenario, 3.4 percent for the Median scenario, and 1.5 percent for the Wet Warm scenario.

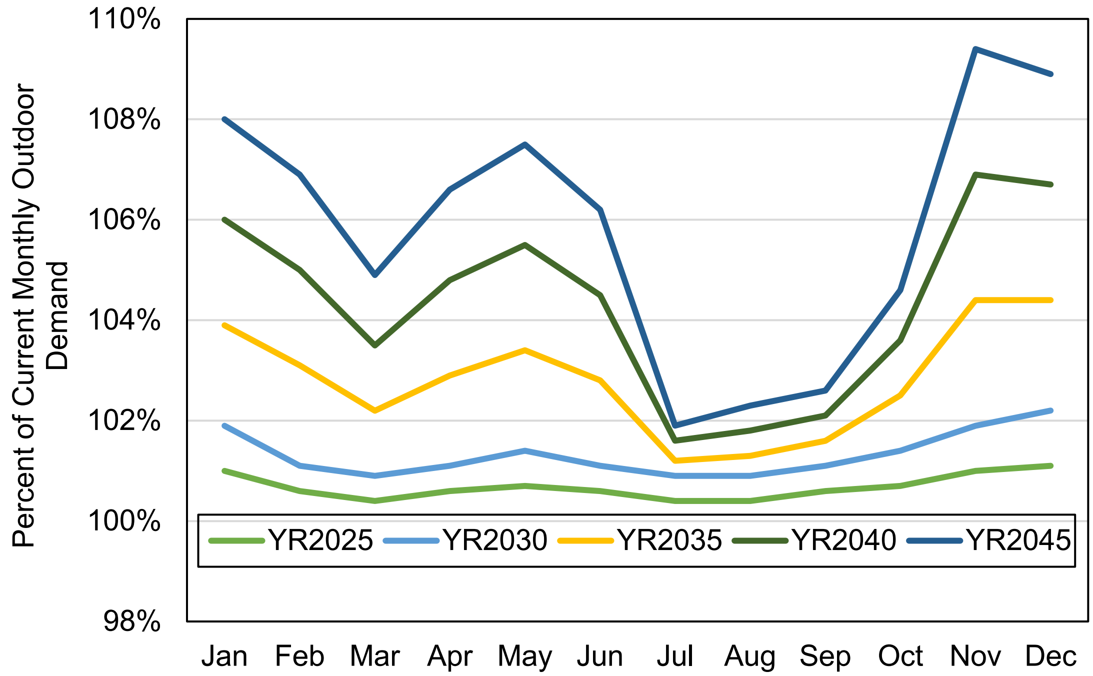


Figure 4-11. Changes in Outdoor Demand Under Dry Hot Future Climate 2025 - 2045

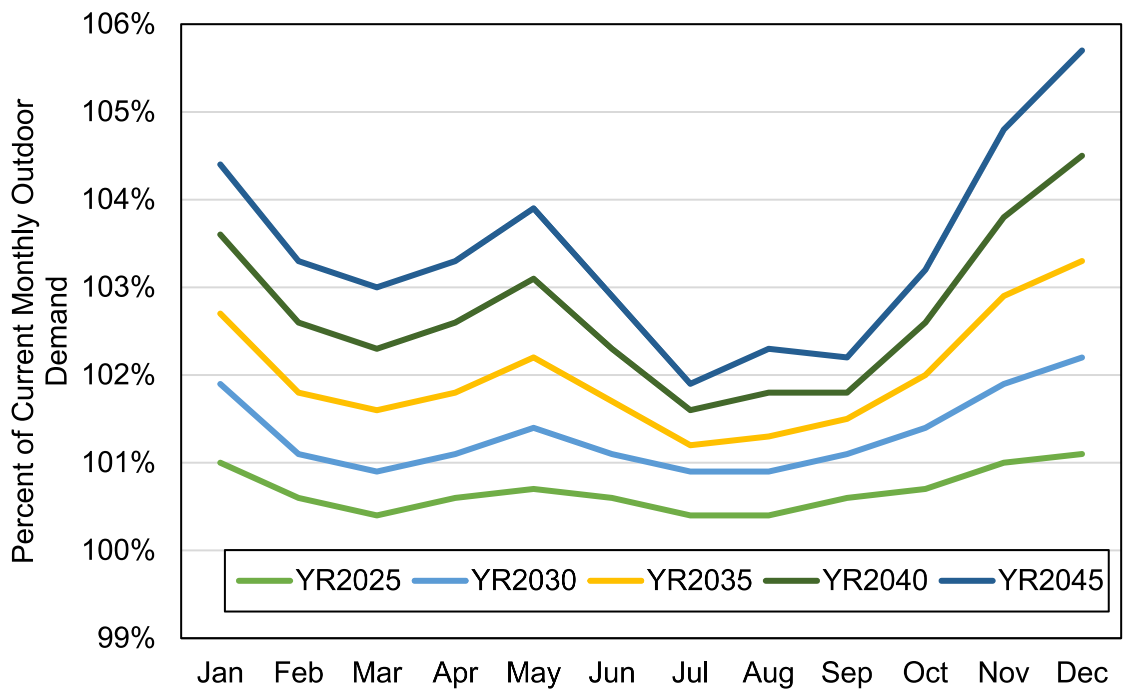


Figure 4-12. Changes in Normal Year Outdoor Demand Under Median Future Climate 2025 - 2045

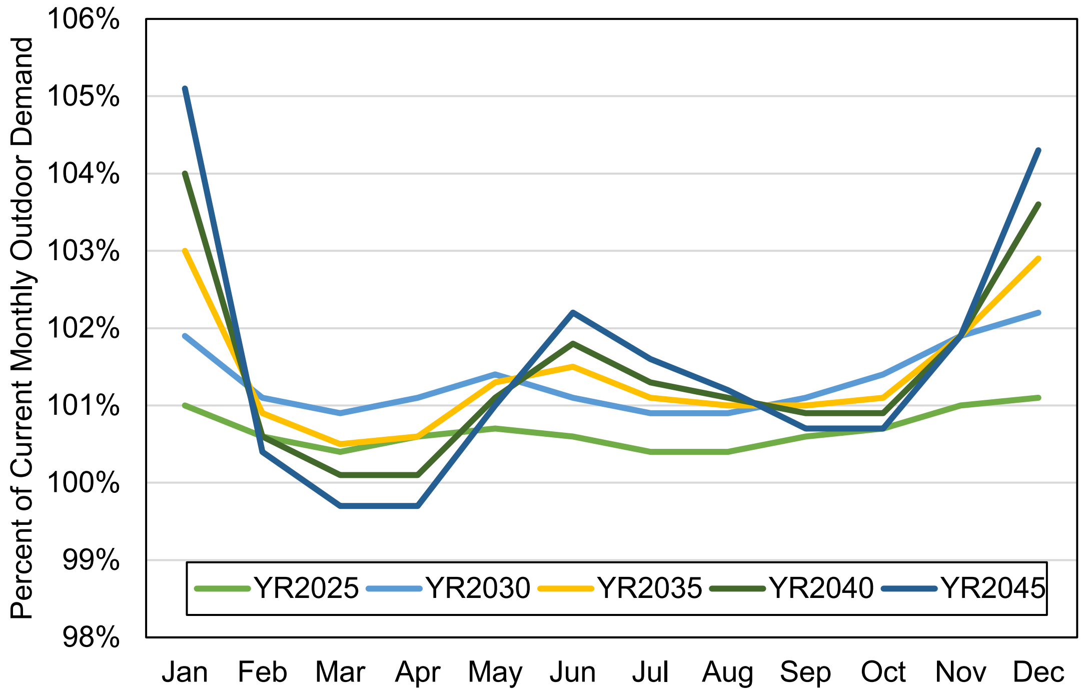


Figure 4-13. Changes in Outdoor Demand Under Wet Warm Future Climate 2025 – 2045

Figure 4-14 and Figure 4-15 illustrate the absolute value of outdoor water demand and total water demand under various climate change scenarios compared to current conditions and normal conditions in 2045. Over the next two decades, climate change is expected to have similar effects on outdoor water demand during both normal and drought years. This is because climate change data indicates that temperatures are expected to increase over time regardless of hydrological conditions. Considering these projected temperature increases, landscaping, irrigated agriculture, and native vegetation are expected to experience higher ET rates. While the relative changes may appear small, the absolute increase during the already high demand months of July and August is significant.

As compared to baseline conditions, the total annual demand is projected to increase by 15 percent by 2045 under the Dry Hot scenario; 13 percent under the Median scenario; and 11 percent under the Wet Warm scenario. The largest increases are projected to occur during the early summer months in June and July. Detailed projections of changes in outdoor water demand under all the climate change scenarios are presented in Appendix B (Tables B7, B8, and B9).

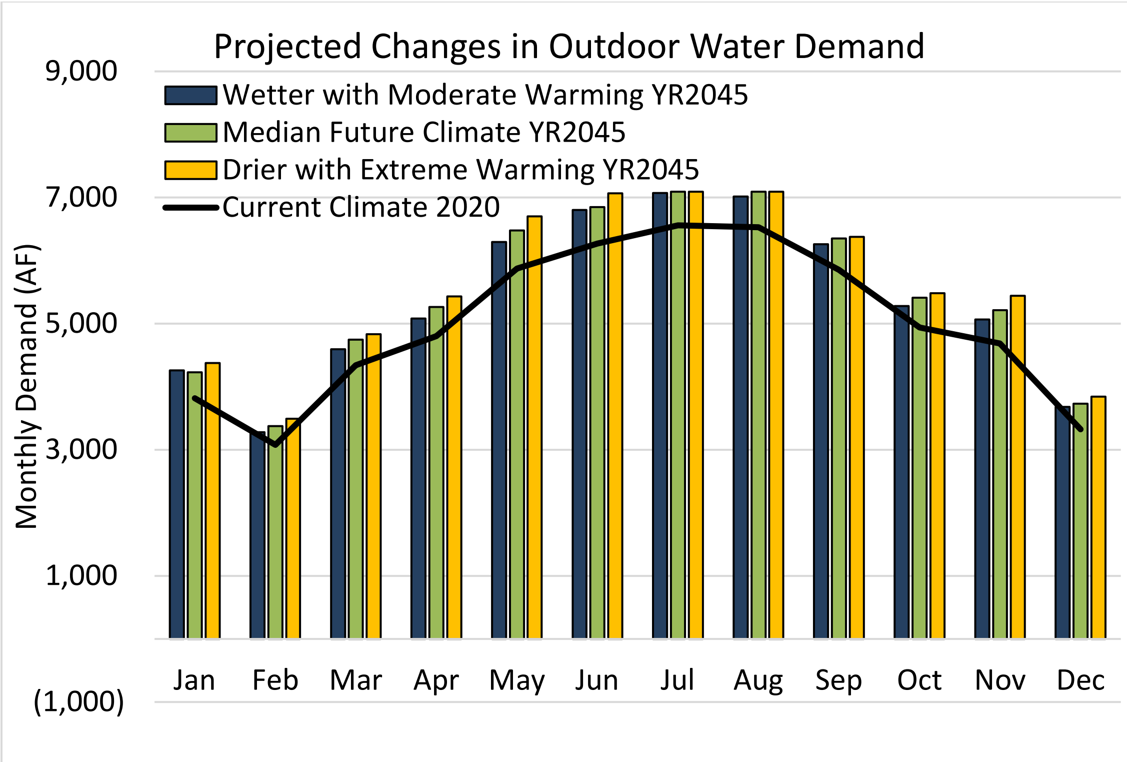


Figure 4-14. Projected Changes in Normal Year Water Demand 2045, Outdoor Water Demand

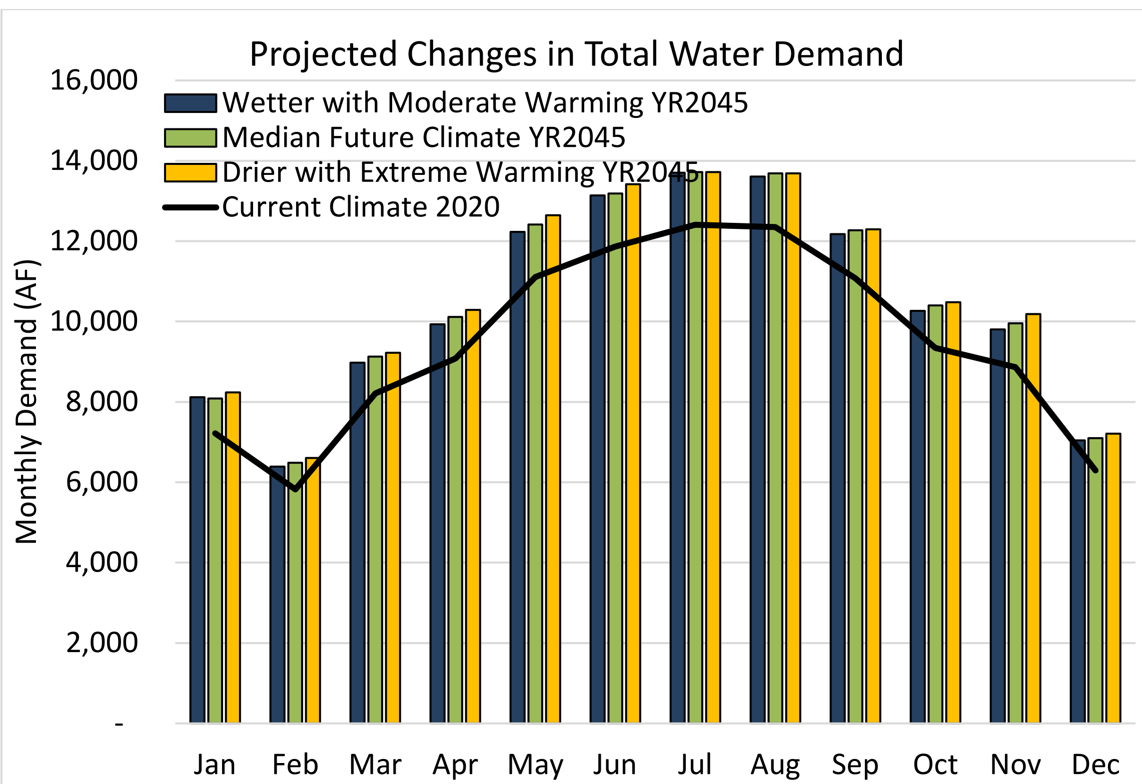


Figure 4-15. Projected Changes in Normal Year Water Demand 2045, Total Water Demand

4.5 Future Water Supply Budgets

The water budgets for the entire Three Valleys service area for each of the three climate change conditions are shown in Table 4-3 through Table 4-5. The water budgets developed for the Three Valleys service area include the following assumptions:

- Climate change factors are applied to local water supplies and demand.
- Projections for groundwater production are based on baseline groundwater supply and climate change factors.
- Recycled water projections are based on baseline data from the Three Valleys' Local Supply Production Surveys, growth rate projections from member agency UWMPs, and climate change factors.
- Surface water projections are based on baseline surface water supply and climate change factors.
- Demand projections are based on baseline water use, growth rate projections from member agency UWMPs, and climate change factors.
- Future requirements for imported water supplies are calculated as the difference between total projected demand and total local supplies.

Table 4-3. Three Valleys Service Area Water Budget – Drier Future Conditions with Extreme Warming

Source (TAF/year)*	2018-2022	2025	2030	2035	2040	2045
Total Demand	113,651	120,346	121,219	123,062	125,472	128,004
Groundwater	38,316	38,282	38,234	37,895	37,551	37,202
Surface Water	4,760	4,741	4,718	4,579	4,440	4,301
Recycled Water	5,619	5,929	5,953	6,000	6,073	6,151
Total Local Supply	48,694	48,952	48,905	48,473	48,063	47,655
Net Imported Water Supply Required	64,957	71,394	72,314	74,589	77,409	80,349

*TAF/year = thousand acre-feet per year

Table 4-4. Three Valleys Service Area Water Budget – Median Future Climate Conditions

Source (TAF/year)*	2018-2022	2025	2030	2035	2040	2045
Total Demand	113,651	120,346	121,219	122,590	124,513	126,557
Groundwater	38,316	38,282	38,234	38,007	37,763	37,535
Surface Water	4,760	4,741	4,718	4,698	4,678	4,658
Recycled Water	5,619	5,929	5,953	6,000	6,073	6,151
Total Local Supply	48,694	48,952	48,905	48,705	48,514	48,345
Net Imported Water Supply Required	64,957	71,394	72,314	73,885	75,999	78,212

*TAF/year = thousand acre-feet per year

Table 4-5. Three Valleys Service Area Water Budget – Wetter Future Conditions with Moderate Warming

Source (TAF/year)*	2018-2022	2025	2030	2035	2040	2045
Total Demand	113,651	120,346	121,219	122,220	123,723	125,376
Groundwater	38,316	38,282	38,234	39,101	39,983	40,837
Surface Water	4,760	4,741	4,718	5,012	5,304	5,598
Recycled Water	5,619	5,929	5,953	6,000	6,073	6,151
Total Local Supply	48,694	48,952	48,905	50,113	51,360	52,587
Net Imported Water Supply Required	64,957	71,394	72,314	72,107	72,362	72,790

*TAF/year = thousand acre-feet per year

The Metropolitan 2020 IRP also developed projected water supply budgets based on its four projected climate change conditions previously described. Table 4-6 shows the Metropolitan 2020 IRP projected total demand for the Three Valleys service area, Table 4-7 shows the Metropolitan 2020 IRP projected local water supply for Three Valleys, and Table 4-8 shows the Metropolitan 2020 IRP projected imported water supply demand for Three Valleys, supplied by Metropolitan, for each of Metropolitan's 2020 IRP climate change scenarios. These IRP projections have a 10-year baseline period of 2010 to 2019, which is different from the 5-year baseline (2018 – 2022) period used by Three Valleys in the projection presented earlier in this document.

Table 4-6. Metropolitan 2020 IRP Projection of Three Valleys Service Area Demand

Projected Three Valleys Demand (TAF/year)*	2020	2025	2030	2035	2040	2045
Scenario A	104,515	105,769	107,460	108,013	108,799	109,989
Scenario B	106,437	117,211	122,970	127,383	132,154	137,508
Scenario C	104,513	105,753	107,425	107,954	108,708	109,757
Scenario D	106,454	117,359	123,269	127,971	133,029	138,571

*TAF/year = thousand acre-feet per year

Table 4-7. Metropolitan 2020 IRP Projection of Three Valleys Local Water Supply

Projected Three Valleys Local Water Supply (TAF/year)*	2020	2025	2030	2035	2040	2045
Scenario A	51,514	52,322	52,584	52,836	53,081	53,345
Scenario B	52,209	54,962	55,863	56,724	57,534	58,090
Scenario C	46,659	46,368	45,729	45,080	44,424	43,686
Scenario D	47,311	48,993	49,035	49,036	48,954	48,394

*TAF/year = thousand acre-feet per year

Table 4-8. Metropolitan 2020 IRP Projection of Three Valleys Imported Water Supply Requirement

Projected Three Valleys Imported Water Supply Requirement (TAF/year)*	2020	2025	2030	2035	2040	2045
Scenario A	53,001	53,446	54,876	55,177	55,717	56,644
Scenario B	54,227	62,248	67,106	70,658	74,619	79,417
Scenario C	57,854	59,384	61,695	62,873	64,284	66,070
Scenario D	59,142	68,365	74,233	78,934	84,075	90,177

*TAF/year = thousand acre-feet per year

As shown in Figure 4-16, water demand calculated for Three Valleys in this climate change analysis is initially higher than the corresponding estimates for the Three Valleys service area in the Metropolitan 2020 IRP. However, the estimates converge by 2030, resulting in comparable long-term projections. Similarly, graphs of Three Valleys imported water supply requirements, in Figure 4-17, show that projections from this study are generally in agreement with projections for the service area in the Metropolitan 2020 IRP.

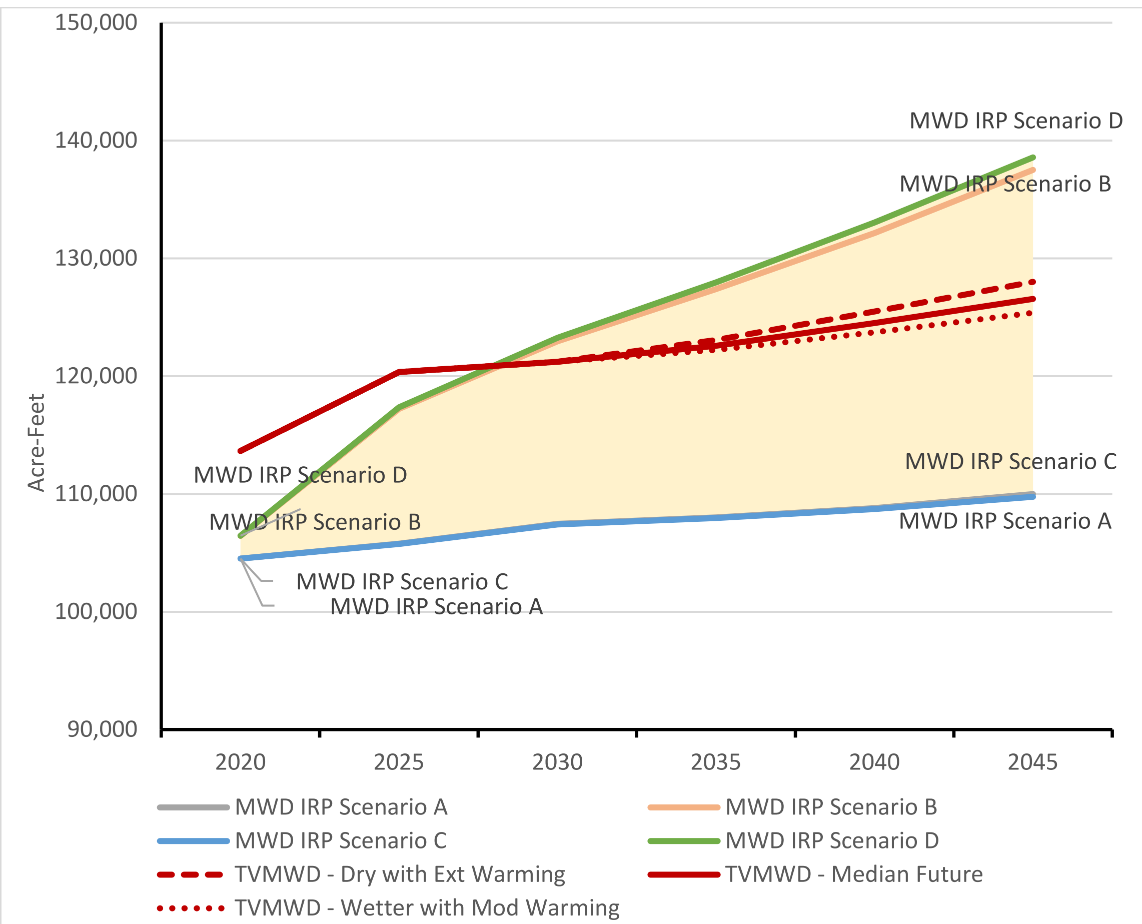


Figure 4-16. Comparison of Metropolitan 2020 IRP and Three Valleys Service Area Total Supply Requirements Under Future Climate Scenarios

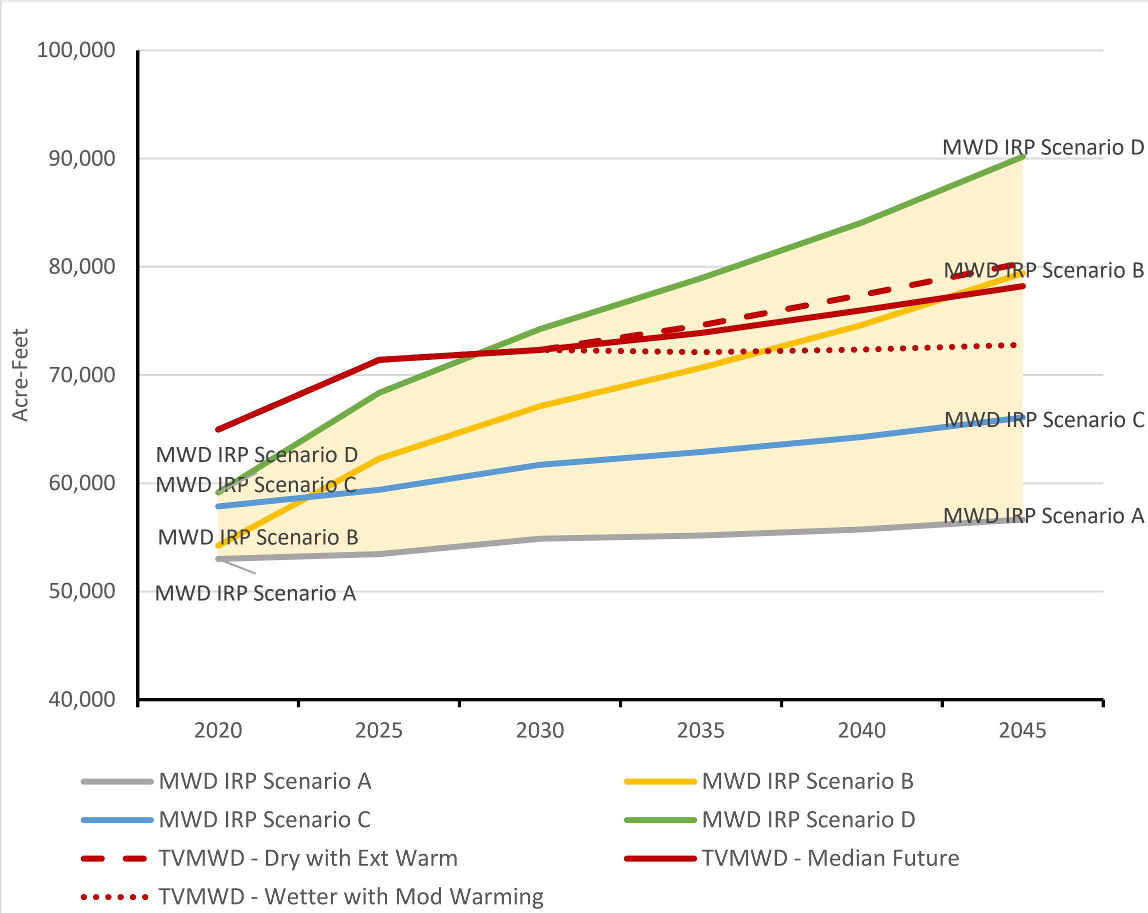


Figure 4-17. Comparison of Metropolitan 2020 IRP and Three Valleys Imported Water Supply Requirements Under Future Climate Scenarios

Based on the Metropolitan 2020 IRP data, Three Valleys will require additional imported water supplies of 3.6 TAF/year under Scenario A, 25.2 TAF/year under Scenario B, 8.2 TAF/year under Scenario C, or 31 TAF/year under Scenario D by 2045 relative to 2020 conditions. By comparison, the projections developed by Three Valleys indicate that between 2020 and 2045, annual imported water supplies requirements will increase by 15.4 TAF/year if future conditions are drier with extreme warming, 13.3 TAF/year under median future climate conditions, and 7.8 TAF/year if future conditions are wetter with moderate warming.

4.6 Applying Results to Local Water Analysis

4.6.1 Computing Future Water Supply and Demand

The monthly change factors developed as part of this analysis are useful for understanding how seasonal changes contribute to the annual changes (see Section 4.4). Additionally, monthly values are useful for planning management actions and mitigation actions in the DCP. The monthly water supply and demand change factors are presented in Appendix B, which comprises the following nine tables:

- Table B1: Monthly Rainfall Change Factors: Drier with Extreme Warming Scenario
- Table B2: Monthly Rainfall Change Factors: Median Scenario

- Table B3: Monthly Rainfall Change Factors: Wetter with Moderate Warming Scenario
- Table B4: Monthly San Gabriel River Flow Change Factors: Drier with Extreme Warming Scenario
- Table B5: Monthly San Gabriel River Flow Change Factors: Median Scenario
- Table A6: Monthly San Gabriel River Flow Change Factors: Wetter with Moderate Warming Scenario
- Table B7: Monthly Water Demand Change Factors: Drier with Extreme Warming Scenario
- Table B8: Monthly Water Demand Change Factors: Median Scenario
- Table B9: Monthly Water Demand Change Factors: Wetter with Moderate Warming Scenario

4.6.2 Constraints and Limitations

A planning-level climate impact analysis for the Three Valleys service area is presented in this chapter. This vulnerability assessment is intended to assist Three Valleys in preparing water supply and demand projections for the Water Resources Master Plan and DCP. These results should not be used in other applications, such as flood resilience planning, infrastructure design, or decision-making regarding the operation of any specific structure. Flood resilience planning requires the analysis of daily or finer temporal resolutions using statistical methods to determine how frequency distributions can best be fitted to extreme values. To design and operate infrastructures, there needs to be a deeper analysis and an additional ground-truthing of specific site characteristics, operational procedures, and regulations that are not included in this assessment.

The effects of climate change on water resources can also be indirect. The risks of wildfire in Southern California, for example, are predicted to increase as a result of climate change. As a result of wildfires, water resources may be affected by increased water usage for firefighting, altered surface vegetation and runoff patterns in burn areas, debris flows, and increased siltation of reservoirs and hydraulic structures. The vulnerability assessment does not capture these secondary impacts of climate change on water resources. It is also possible for future water supplies and demands to be affected by decisions made at the local, state, and federal levels. Policies and regulations that have not yet been implemented are difficult to anticipate and quantify. Thus, the purpose of this Vulnerability Assessment is not to anticipate the impact of future policy or regulatory decisions on future water supplies or demands.

4.6.3 Next Steps

The next step in the planning process is for Three Valleys to collaborate with member agencies to identify opportunities to enhance the region's resilience to projected future increases in imported water supply requirements. The region could develop a resilience portfolio including management actions such as conservation measures to reduce demand, water supply agreements and infrastructure, and augmented storage facilities and programs. The net climate resilience of the region's water budget could be measured in terms of the effectiveness of the portfolio of projects and management actions in reducing the projected future water supply deficit.

Member agencies could also undertake site-specific studies to assess the climate resilience of individual water systems. The climate change factors and analyses provided in Appendix B could be used to compute quantitative impacts of climate change on future supplies and demands during normal and drought years within each member agency's service area. Site-specific studies could identify opportunities to enhance the climate resilience of individual water systems through management actions, infrastructure improvements, and system interconnections to enhance operational flexibility.

5 Mitigation Actions

Mitigation Actions are projects, programs, and strategies that are implemented prior to the occurrence of a drought to address potential risks and impacts and reduce the need for response actions. These actions are generally beneficial in increasing regional flexibility and resiliency during times of drought.

Within the framework of a DCP, these actions are generally developed in response to vulnerabilities identified through a Climate Change Vulnerability Assessment. As part of this DCP, Three Valleys performed a vulnerability assessment, which is detailed in Chapter 4. Overall, the results of the vulnerability assessments indicate:

- Minor decreases projected in average annual water supplies from the Main San Gabriel River basin during drought (single year and multi-year) years relative to baseline conditions due to shifts in precipitation from winter to fall and projected increases in surface water evaporation caused by increasing temperatures, particularly under the extreme warming climate scenario.
- A shorter rainy season with potential for higher intensity precipitation events resulting in higher peak flows of shorter duration. The net impact on annual groundwater recharge will be minimal if flow diversion facilities and recharge basins maintain adequate capability to handle the increased flow rates.
- Projected increases in outdoor water uses under normal, single dry, and multi-year drought conditions, caused by projected temperature increases, which lead to higher ET rates for landscaping, irrigated crops, and native vegetation[2]. Average annual outdoor water use by customers within the Three Valleys service area could increase by up to six percent under the most severe (Dry Hot) climate change scenario.
- An increase in dependence on imported water if mitigation actions are not implemented. A comparison of Three Valleys and Metropolitan's water budget projections under future climate conditions shows similar total demand projections, with Three Valleys showing increased reliance on imported surface water (supplied by Metropolitan) in its future projections. This increased reliance in Three Valleys projections occurs because local water supplies are projected to remain nearly constant while water demand increases due to future growth and increased climate-related water deficits. This highlights the need to develop mitigation actions to reduce future reliance on imported surface water.

In response to these findings, Three Valleys and the Drought Task Force compiled a suite of mitigations for inclusion into the DCP. The full suite of mitigation actions is identified in Section 5.1, Figure 5-1, and summarized in Table C-1 in Appendix C.

This suite of mitigation actions, developed in collaboration with the Drought Task Force, includes projects that are in various stages of implementation, from pre-planning, planning, design, to construction, and the timelines projected for these projects are estimations. Many of these actions are

[2] The projections do not make assumptions about the outdoor and indoor water use regulations required by the new regulatory framework, *Making Conservation a California Way of Life*.

consistent with existing planning programs and processes of the various regional stakeholders, such as Three Valleys' Capital Improvement Plan. However, numerous factors have the potential to impact implementation of these actions, such as funding availability, regulatory requirements, implementation complexities, and strategic planning priorities that are unique to each regional stakeholder. As such, inclusion of these actions into this DCP does not imply any commitment or obligation for future implementation. Furthermore, the mitigation actions presented are not intended to be exhaustive; thus, this chapter also provides guidance for establishing consistency with this DCP for projects that may be implemented in the future but are not included in the potential suite of mitigation actions. This guidance, along with additional insights on the mitigation actions, is detailed in Appendix C.

Implementing these potential mitigation actions could yield numerous regional benefits, including increasing local water supplies, improving operational flexibility, and enhancing water supply reliability. Several criteria were developed with consideration of these benefits to perform a preliminary review of the potential mitigation actions, which is described further in Section 5.2. The results of the preliminary review are provided in Table C-1 in Appendix C.

5.1 Identification of Potential Mitigation Actions

In June 2024, the Drought Task Force was sent invitations to schedule meetings for discussing potential projects, including mitigation actions for inclusion in the DCP. Organizations that reserved a time and were able to meet received a project information sheet tailored to their agency. In July 2024, Three Valleys and GEI held a total of eight individual meetings with the agencies to review, confirm, and update the mitigation actions.

The project information sheet asked each organization to respond to the following question:

What projects or programs does your organization have in development that would potentially mitigate drought impacts in the future?

The respondents were asked to classify their responses into one of the five designated categories and, where applicable, provide a relevant metric:

- Water Supply Projects: Projects focused on enhancing water availability and accessibility. For example, by constructing or upgrading infrastructure such as pipelines or treatment plants, a region (or regions) within the Three Valleys service area have access to new, firm local supplies.
- Water Conservation Projects: Projects focused on reducing water usage and promoting efficient water management through measures such as implementing regulations, upgrading systems, or promoting public awareness.
- Groundwater Production Projects: Projects focused on extracting groundwater from underground sources to supplement water supplies, which may include drilling wells, installing pumps, and implementing sustainable groundwater management.
- Groundwater Storage Projects: Projects focused on storing excess water underground in natural aquifers for later use, particularly during times of drought, through recharge methods.

- Projects Increasing External Sources of Supply: Projects focused on enhancing water availability by sourcing water from external sources, which could involve constructing conveyance infrastructure or exploring alternative water transfers.

The project information form also asked each organization to assess whether the mitigation action has the potential to enhance regional water supply reliability. Relevant features that could contribute to improving water supply reliability include: infrastructure such as pipelines and pump stations; reduced reliance on imported water supplies; treatment of groundwater contaminants like polyfluoroalkyl substances (PFAs) or CECs; and system enhancements or repairs to storage facilities or other components.

Additionally, each organization was asked to provide as many key identifiers as possible for each mitigation action, including, but not limited to, the following:

- Project stage (conceptual, feasibility, design, construction)
- Implementation timeline/schedule (year)
- Estimated costs (capital and annual)
- Estimated annual water savings or estimation of the supplemental supplies created as a result of implementation

The data collected from the project information sheets submitted by participating agencies were analyzed to organized into six project types. The corresponding mitigation actions were categorized as follows:

1. System Interties: Create infrastructure to connect water systems and provide operational flexibility to respond to catastrophic supply interruption
2. New Extraction Wells: Develop new wells to increase supply reliability consistent with available supply and adjudicated rights
3. Enhanced Well Efficiency: Enhance the efficiency and reliability of existing wells through upgrades and modifications
4. Upgrade Aging Infrastructure: Upgrade aging urban infrastructure, including drinking water distribution systems, reservoirs, and conveyance
5. Groundwater Treatment Projects: Projects that protect and treat groundwater contamination
6. Conservation and Efficiency: Projects that promote water conservation and enhance water use efficiency

These findings were presented and discussed with the Drought Task Force during Workshop 4, held on August 27, 2024. The workshop aimed not only to address gaps in the data but also to gather additional feedback from other organizations. Though unrelated to the scope of this DCP, the project information forms served a similar purpose of identifying regional projects to address water supply reliability and resiliency. From the data collected and the input received during the workshop, a total of 54 projects, programs, and strategies were identified for the DCP (Figure 5-1). A summary of these mitigation actions and their key identifiers are provided in Table C-1 in Appendix C.

As previously discussed, implementation of the mitigation actions could be impacted by numerous factors including funding availability, regulatory requirements, implementation complexities, and planning priorities. The regular meetings of the Three Valleys member agencies, along with the Drought Task Force meetings, will be used to support implementation of the mitigation actions described in the DCP.

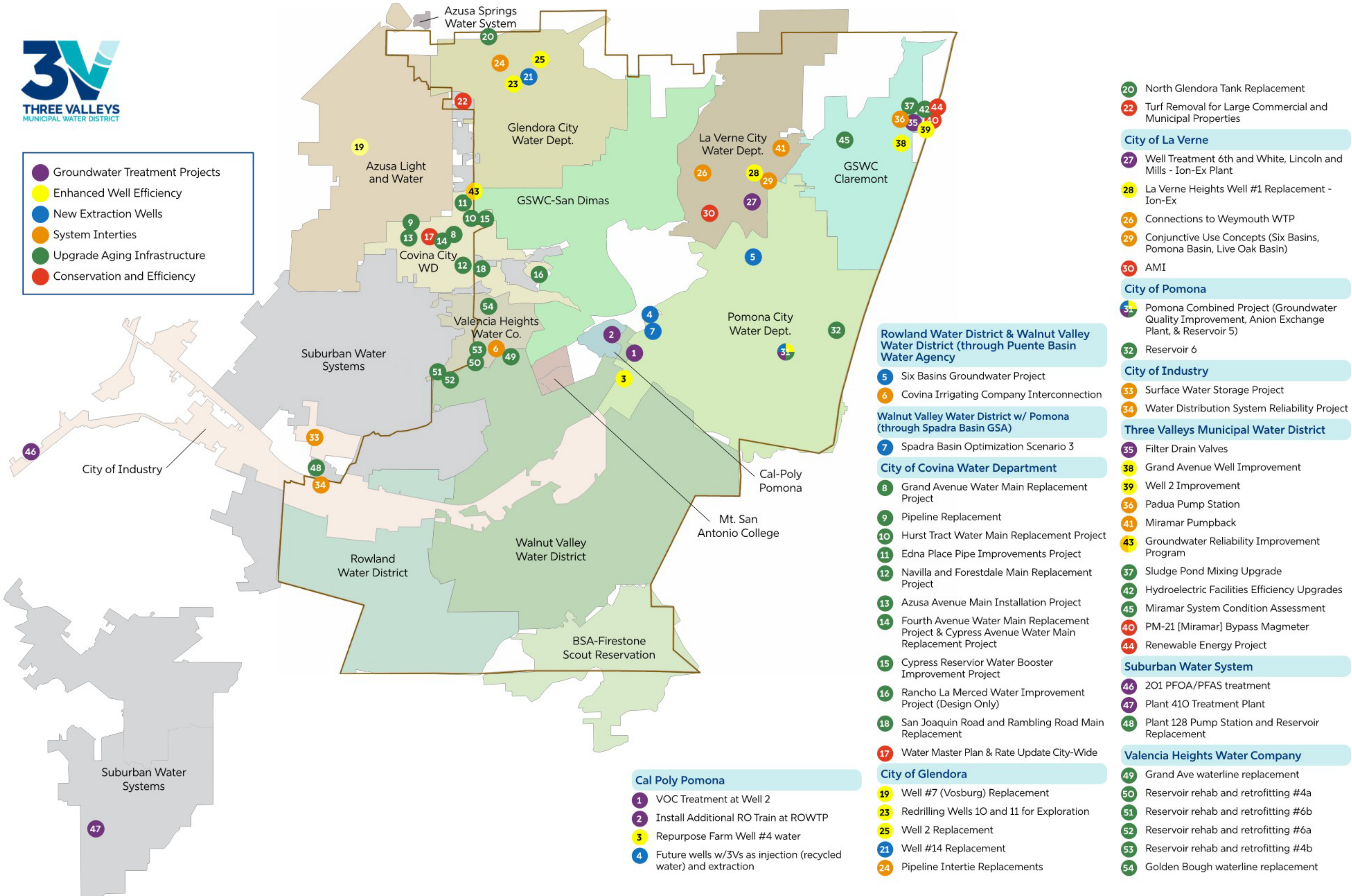


Figure 5-1. Potential Suite of Mitigation Actions for the DCP

Note:

1. GSWC = Golden State Water Company, BSA = Boy Scouts of America
2. Project #44 is included to account for all proposed mitigation actions. However, upon further review with Three Valleys, it was determined that Project #44 does not qualify as a drought mitigation action.

5.2 Preliminary Review of Potential Mitigation Actions

Each potential project was classified using the categorization for each criterion provided in Table 5-1. As a wholesaler, Three Valleys is not involved in the prioritization of agency projects. Prioritization of mitigation actions is agency driven and as part of the development of the DCP, Three Valleys provided each member of the Drought Task Force the opportunity to provide and prioritize their own projects. As such, this categorization does not represent a prioritization or ranking of the projects identified, nor is the provided criteria intended to be exhaustive. Rather, these criteria were developed to assist in the identification of the key aspects of each project for the purposes of this DCP. This preliminary review could be used in future planning efforts to further inform regional priorities. Long term, Three Valleys will continue to meet with retail agencies on a regular basis to support them in prioritizing resiliency projects to address agency-specific concerns and needs.

Table 5-1. Review Criteria and Ranking

Criteria	Categorization		
Timing/Schedule	Short-term action (1-2 years)	Mid-term action (2-4 years)	Long-term action (> 4 years)
Enhance Regional Water Supply Reliability and Resiliency	Meets 3 of the regional benefits	Meets 2 of the regional benefits	Meets 1 of the regional benefits
Regional Benefits	Regional action	Action involves multiple adjacent agencies	Single agency action

The preliminary review of the potential suite of mitigation actions with respect to the criteria and categorization identified above is provided in full in Table C-1 in Appendix C. Details with respect to timing/schedule and the potential benefits associated with these mitigation actions are described below.

The 54 potential projects were grouped into short-, mid-, and long-term actions (Figure 5-2). Note that the potential timelines for the projects that are included in the DCP are estimates and as noted previously, depend upon many factors, such as the ability to secure funding, procurement, implementation complexities and permitting challenges, regional priorities, and other factors. However, with the estimates provided, 21 of the potential projects (or 39 percent) identified are projected for implementation in the short-term (by the end of 2026). Implementation for 16 of the potential projects (or 30 percent) is projected in the mid-term (by the end of 2028), and 17 of the potential projects are projected for implementation in the long-term (2029 and beyond).

	Short-Term	Mid-Term	Long-Term
System Interties	34, 41	6, 24, 26	29, 33, 36, 43*
New Extraction Wells	4, 5		21, 31*
Enhanced Well Efficiency	3, 25, 40	39	19, 23, 28, 38
Upgrade Aging Infrastructure	10, 12, 14, 15, 16, 20, 45, 48, 51, 52	8, 11, 13, 18, 37, 49, 50	9, 32, 42, 53, 54
Groundwater Treatment Projects	1, 35	2, 46, 47	7, 27
Conservation and Efficiency	17, 22	30, 44	
TOTAL	**21**	**16**	**17**

Categorized under multiple project types

Figure 5-2. Potential Timeline for Mitigation Actions

Note:

2. Project #44 is included to account for all proposed mitigation actions. However, upon further review with Three Valleys, it was determined that Project #44 does not qualify as a drought mitigation action.

The identified regional benefits for enhancing regional water supply reliability and resiliency are listed below. To determine whether a mitigation action contributes to these benefits, categories were specified for each, also detailed below:

Regional Benefits:

1. Increasing Local Supplies
2. Enhancing Operational Flexibility
3. Enhancing Water Supply Reliability

Categories:

1. Increasing Local Supplies:
    a. New Extraction Wells
    b. Enhanced Well Efficiency
    c. Groundwater Treatment Projects
2. Enhancing Operational Flexibility:
    a. System Interties
    b. Upgrading Aging Infrastructure
    c. Conservation and Efficiency Measures

3. Enhancing Water Supply Reliability:
    a. Overall supply increase
    b. Reduction in drought imported water dependency
    c. Decrease in overall imported water dependency

Of the 54 projects, programs, and strategies identified, 69 percent of the projects have the potential to enhance operational flexibility, 35 percent have the potential to increase local supplies, and 26 percent have the potential to enhance water supply reliability (Figure 5-3). Additionally, 74 percent of the projects meet one of the regional benefits, 22 percent meet two of the regional benefits, and only 4 percent meet all regional benefits. Many of the projects identified have multiple benefits and thus the percentages identified in Figure 5-3 do not sum to 100 percent.

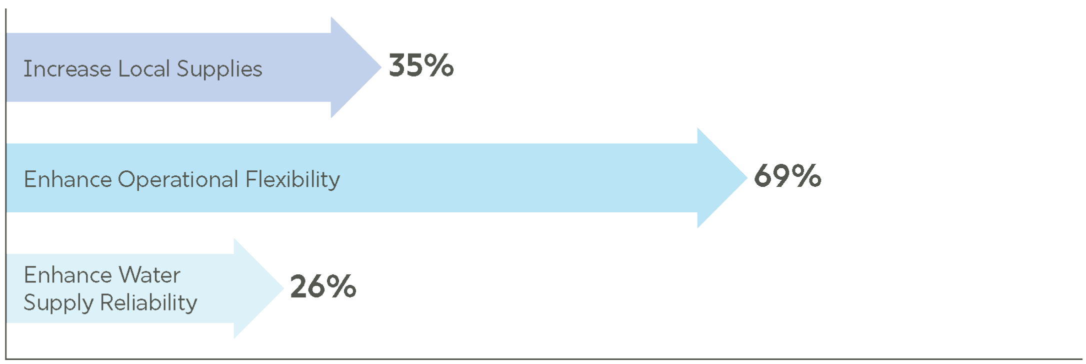
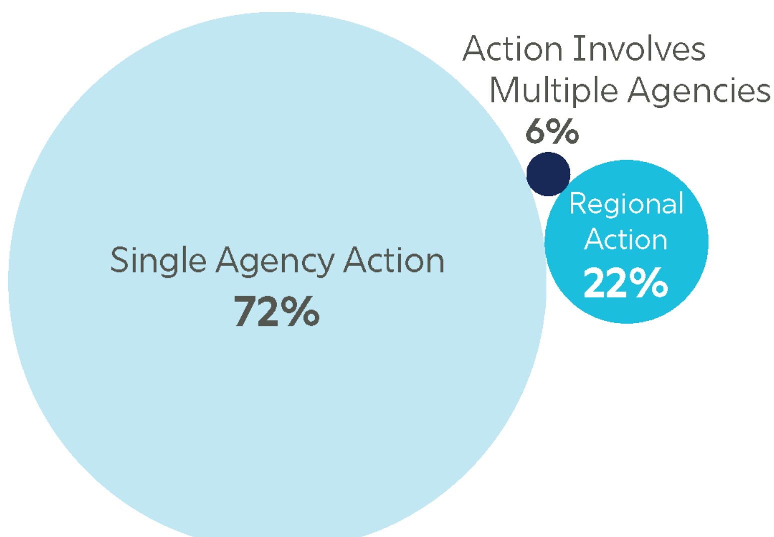


Figure 5-3. Potential Benefits of the DCP Mitigation Actions

Of the 54 identified projects, programs, and strategies, 72 percent are single-agency actions, 6 percent involve multiple agencies, and 22 percent are regional initiatives.

The suite of actions included in the DCP is based upon input provided by the Drought Task Force members. Future projects that meet the goals and objectives of the DCP may be considered in future updates of the DCP.



6 Response Actions

Response Actions refer to the measures taken during a drought to manage the limited water supply and mitigate immediate impacts. These actions are triggered by water shortage stages and can be quickly implemented to provide expeditious benefits.

Three Valleys and its member agencies that are considered urban water suppliers have each developed an UWMP WSCP. The WSCP serves as a framework for preparing for and responding to water shortages within each respective agency's service area boundary. Each agency's WSCP specifies drought response actions corresponding to different water shortage stages. Urban water suppliers adhere to six standard levels, which categorize increasing water shortage conditions—ranging from up to 10 percent to greater than 50 percent shortage compared to normal reliability (see Table 3-1)—and align with the response actions that a water supplier would implement to meet the severity of the impending shortages.

6.1 Development of Agency Drought Response Actions

The drought response actions of each agency reflect their individual water supply portfolios and the related water shortage conditions. As a result, water shortage conditions and corresponding response actions may differ across the region during drought periods. To promote a DCP that is flexible and responsive to each of the agencies within the region, Three Valleys and its retail water agencies will rely on the drought response actions provided in each agency's WSCP should a water shortage occur.

Additionally, throughout July, Three Valleys and GEI held individual meetings with each member agency to review and confirm the response actions detailed in their WSCPs and to explore any additional actions they had incorporated. These meetings also allowed agencies lacking UWMP WSCPs to contribute insights into their response actions.

Through their respective WSCPs and the additional insights and references provided during these meetings, Three Valleys and its member agencies have categorized drought response actions into four main types:

1. **Demand Reduction Actions:** Strategies aimed at mitigating supply shortages, such as public education campaigns, outdoor water use restrictions, and changes in rate structures.
2. **Supply Augmentation Actions:** Strategies designed to increase available water supplies, including transfers, exchanges, or purchases of additional supplies.
3. **Operational Changes:** Short-term operational adjustments to address water shortages, such as enhanced monitoring of customer usage rates or operational changes related to demand reduction and supply augmentation.
4. **Additional Mandatory Restrictions:** Mandatory restrictions corresponding to various water shortage levels and are generally associated with enforcement actions and penalties, which may include limits on outdoor water use in terms of volume, timing, and location.

These response actions are crucial in managing water resources effectively during drought conditions, and ensuring sustainable water use across the region. Demand reduction and supply augmentation actions will help to enhance water availability, while operational changes and mandatory restrictions will further support conservation efforts. Each category is further discussed in the following sections.

Table 6-1 presents a comprehensive list of response actions used by each agency.

Table 6-1. Summary of Agency WSCPs Drought Response Actions

		City of Covina	City of Glendora*	City of La Verne	City of Pomona*	GSWC Claremont	GSWC San Dimas	RWD*	SWS	WVWD*	Cal Poly Pomona**	Three Valleys
Demand Reduction Actions	CII - Commercial kitchens required to use pre-rinse spray valves			x	x							x
	CII - Lodging establishment must offer opt out of linen service	x	x		x			x	x	x		x
	CII - Other CII restriction or prohibition	x			x	x	x		x			
	CII - Restaurants may only serve water upon request	x	x	x		x	x	x	x	x		x
	Distribution of water-saving items such as efficient toilets and urinals		x	x								
	Implement or Modify Drought Rate Structure or Surcharge		x		x	x	x	x				
	Increase Frequency of Meter Reading				x							
	Landscape - Limit landscape irrigation to specific days	x	x	x	x	x	x	x	x	x	x	x
	Landscape - Limit landscape irrigation to specific times	x	x	x	x	x	x	x	x	x	x	x
	Landscape - Other landscape restriction or prohibition	x	x		x							
	Landscape - Prohibit all landscape irrigation	x			x			x			x	

		City of Covina	City of Glendora*	City of La Verne	City of Pomona*	GSWC Claremont	GSWC San Dimas	RWD*	SWS	WVWD*	Cal Poly Pomona**	Three Valleys
	Landscape - Prohibit certain types of landscape irrigation		x	x	x	x	x			x	x	
	Landscape - Restrict or prohibit runoff from landscape irrigation	x	x	x	x	x	x	x	x	x		x
	Landscape training for waterwise gardening		x	x	x			x		x		
	Moratorium or Net Zero Demand Increase on New Connections				x			x				
	No irrigation within 48 hours after measurable rainfall		x			x	x				x	
	Other - Prohibit use of potable water for construction and dust control			x		x	x	x	x			
	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	x	x	x	x	x	x	x	x	x	x	x
	Other - Prohibit use of potable water for washing hard surfaces	x	x	x	x	x	x		x	x	x	x
	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	x		x	x			x	x	x		x
	Other - Require automatic shut-off hoses		x			x	x	x	x			x

		City of Covina	City of Glendora*	City of La Verne	City of Pomona*	GSWC Claremont	GSWC San Dimas	RWD*	SWS	WVWD*	Cal Poly Pomona**	Three Valleys
	Other water feature or swimming pool restriction	x		x	x			x		x		x
	Public education and outreach campaigns		x	x	x			x			x	x
	Water Features - Restrict water use for decorative water features, such as fountains	x	x	x	x	x	x	x	x	x		x
	Watering and other outdoor use restrictions		x	x	x							
	Other	x		x	x	x	x	x	x	x	x	x
Supply Augmentation Actions	Transfers	x	x		x	x	x	x		x		x
	Other			x								
Operational Changes		x	x	x	x	x	x	x	x			x
Additional Mandatory Restrictions					x					x		

Notes:

GSWC: Golden State Water District RWD: Rowland Water District WVWD: Walnut Valley Water District SWS: Suburban Water Systems

* Provided additional response actions during one-on-one agency meetings, along with supplementary references such as the Water Shortage Ordinances.

**Does not have a UWMP WSCP but provided their WSCP prepared in March 2024, outlining demand reduction actions for their shortage stage level

6.2 Demand Reduction Actions

The most common demand reduction actions are shown in Figure 6-1. Three Valleys and its member agencies, listed in Table 6-1, have all specified limitations on landscape irrigation to specific days and specific times, and they require customers to promptly repair leaks, breaks, and malfunctions in a timely manner. The timing of these restrictions varies among agencies.

Additionally, 91 percent of these agencies prohibit the use of potable water for washing hard surfaces, restrict water use for decorative features like fountains, and prohibit runoff from landscape irrigation. Furthermore, 82 percent of agencies require restaurants to serve water only upon request. Sixty-four percent enforce additional measures, such as requiring lodging establishments to offer an opt-out option for linen service, prohibiting certain types of landscape irrigation, and restricting vehicle washing except at facilities using recycled or recirculated water.

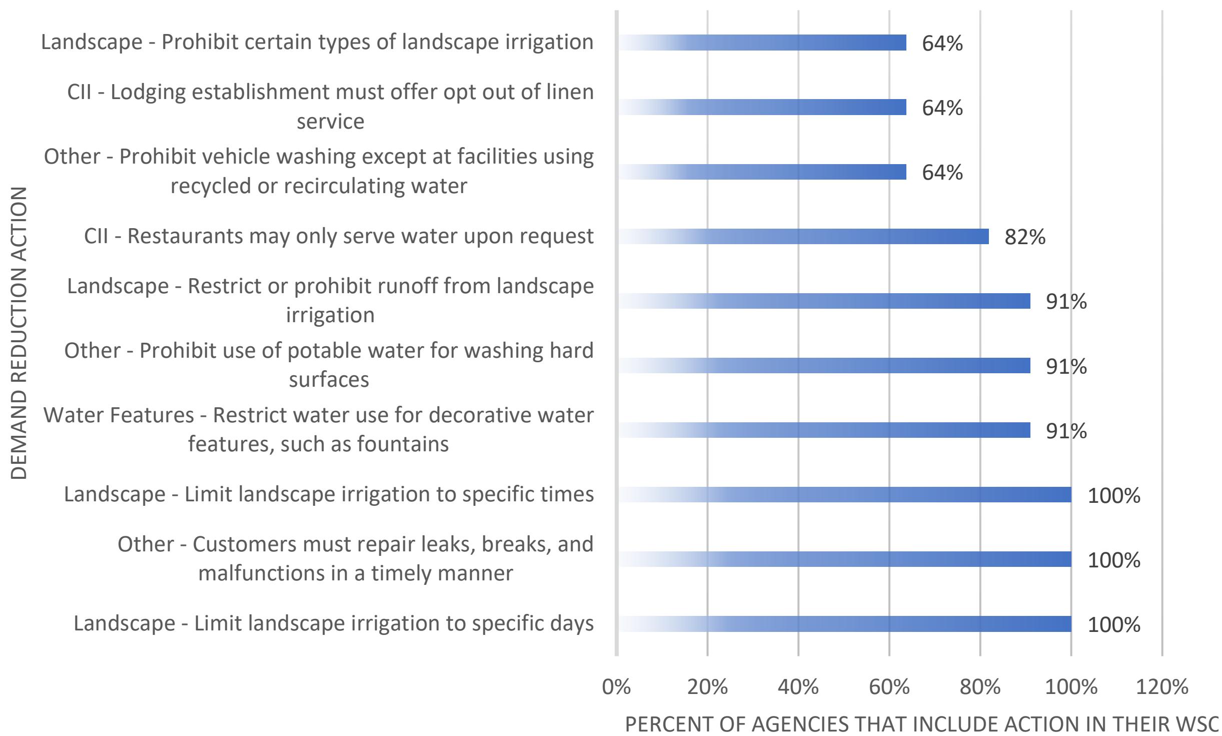


Figure 6-1. Most Commonly Included Demand Reduction Actions in Agency WSCPs

The quantitative estimates of how these demand reduction actions could reduce the shortage gap, based on the agencies water demands prior to 2015 (unconstrained demands), vary by agency and water shortage level; however, for those agencies that provide such estimates in their WSCPs, Table 6-2 illustrates these variations.

Table 6-2. Quantitative Estimates of Demand Reduction Volumes by Agency

		Shortage Level 1 (Up to 10%)	Shortage Level 2 (Up to 20%)	Shortage Level 3 (Up to 30%)	Shortage Level 4 (Up to 40%)	Shortage Level 5 (Up to 50%)	Shortage Level 6 (Up to >50%)
Demand Reduction Volume (AF)	City of Covina	527	1,055	1,582	2,110	2,637	>2,637
	City of Glendora	1,323	2,646	3,968	5,291	6,614	>6,614
	City of La Verne*	N/A	N/A	N/A	N/A	N/A	N/A
	City of Pomona	1,814	3,627	5,441	7,254	9,068	>9,068
	GSWC Claremont	1,163	2,327	3,490	4,654	5,817	>5,817
	GSWC San Dimas	984	1,968	2,952	3,936	4,920	>4,920
	Rowland Water District	797	1,595	2,392	3,190	3,987	>3,987
	Suburban Water Systems*	N/A	N/A	N/A	N/A	N/A	N/A
	Walnut Valley Water District	2,041	4,082	6,124	8,165	10,206	>10,206
	Three Valleys	5,240	10,479	15,719	20,959	26,198	>26,198
Total		13,889	27,779	41,668	55,559	69,447	>69,447

*Do not provided estimate of AF reduction in their WSCP.

6.3 Supply Augmentation Actions

About 90 percent of agencies, including Three Valleys and its member agencies classified as urban water suppliers, have outlined specific supply augmentation actions in their WSCPs, such as transfers and other methods. None of the agencies plan to add new sources of water supply in the event existing sources of supply are not sufficient to meet customer demands; instead, these actions focus on increasing supplies from existing sources:

- *City of Covina* – City of Covina will consider increased purchases from Covina Irrigating Company using existing facilities to address customer demands. However, Covina plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.

- *City of Glendora* – City of Glendora will consider increased production from the Main Basin to address customer demands. However, Glendora plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet these demands.
- City of Pomona – City of Pomona will consider increased production from the Six Basins and the Chino Basin to address customer demands. However, Pomona plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.
- *GSWC Claremont* – GSWC Claremont will consider increased production from the Six Basins and the Chino Basin to address customer demands. However, GSWC Claremont plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.
- *GSWC San Dimas* – GSWC San Dimas will consider increased production from the Main Basin to address customer demands. However, GSWC San Dimas plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.
- *Rowland Water District (RWD)* – RWD will consider increased production from the Main Basin, Central Basin, and Puente Basin to address customer demands. However, RWD plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.
- *Walnut Valley Water District (WVWD)* – WVWD will consider increased purchased water from the Main Basin, through California Domestic Water Company, to address customer demands. However, WVWD plans to implement demand reduction measures in the event water supplies from existing sources are not sufficient to meet anticipated demands.
- *City of La Verne* – City of La Verne's water system is equipped to handle both single and multiple dry years. In case of increased water demand, La Verne can manage short-term shutdowns of up to 3 days and likely up to 7 days through enhanced conservation efforts and customer communication. The city has established connections with adjacent water agencies for additional supply and maintains access to MWD import water through a city-owned emergency supply pump station. La Verne also keeps a contact list of nearby water bottlers as potential alternative water sources.
- *Suburban Water Systems (SWS)* – SWS did not identify any supply augmentation actions.
- *Three Valleys* – Three Valleys does not anticipate augmenting water supplies. However, Three Valleys' member agencies will consider increased production from the Main Basin, Chino Basin, and/or Six Basins (through potential transfer of water rights) using existing facilities to address customer demands.

6.4 Operational Changes

Many of the demand reduction actions specified in the agencies WSCPs qualify as operational changes. With the exception of SWS, all of Three Valleys' member agencies, classified as urban water suppliers, identified stand-alone operational changes outside of the demand reduction actions that may be further used to reduce the gap between demand and available supplies.

Three Valleys, City of Covina, City of Glendora, City of Pomona, GSWC Claremont, GSWC San Dimas, RWD, and WVWD have all identified several operational changes, including:

- Improved monitoring, analysis, and tracking of customer water usage to enforce demand reduction measures.
- Optimization of production from existing available water supply sources.
- Potential use of emergency supply sources, including emergency interconnections.
- Potential blending of water supply resources.
- Improved monitoring, maintenance, and repairs to reduce water distribution system losses.

Additionally, the City of La Verne plans to implement improved monitoring and tracking of water usage rates for customers.

6.5 Additional Mandatory Restrictions

As part of their WSCP, the City of La Verne and SWS have all identified a series of restrictions to be implemented at various water shortage levels. The remaining retail member agencies have indicated there are currently no additional mandatory restrictions planned.

The City of La Verne's additional restrictions primarily focus on:

- Prohibited Uses of Water
- Water Consumption Reduction
- Water Conservation
- Construction Water Usage
- Cooling System Restrictions
- Landscape Watering Hours
- Strict Landscape Watering Regulations
- New Swimming Pool Permits
- Outdoor Irrigation Prohibitions
- New Water Service Connections

For SWS, the additional restrictions include:

- Expanding Public Information Campaigns
- Offering Water Use Surveys
- Providing Rebates on Plumbing Fixtures and Devices
- Providing Rebates for Landscape Irrigation Efficiency

6.6 Agency Drought Response Actions Summary

The most common drought response actions included in the WSCPs for the region are shown below in Figure 6-2. This data excludes drought response actions categorized under the 'other' category, as it includes a wide variety of measures.

The most prevalent drought response actions across all agency WSCPs involve limiting landscape irrigation to specific times and days, and requiring customers to promptly repair leaks, breaks, and malfunctions in a timely manner. Prohibiting the use of potable water for washing hard surfaces, restricting water use for decorative features like fountains, and prohibiting runoff from landscape irrigation are also significant, appearing in 91 percent of agency WSCPs. Additionally, common measures featured in 82 percent of agency WSCPs are operational changes and requiring restaurants to serve water only upon request. Seventy-three percent also consider implementing water transfers.

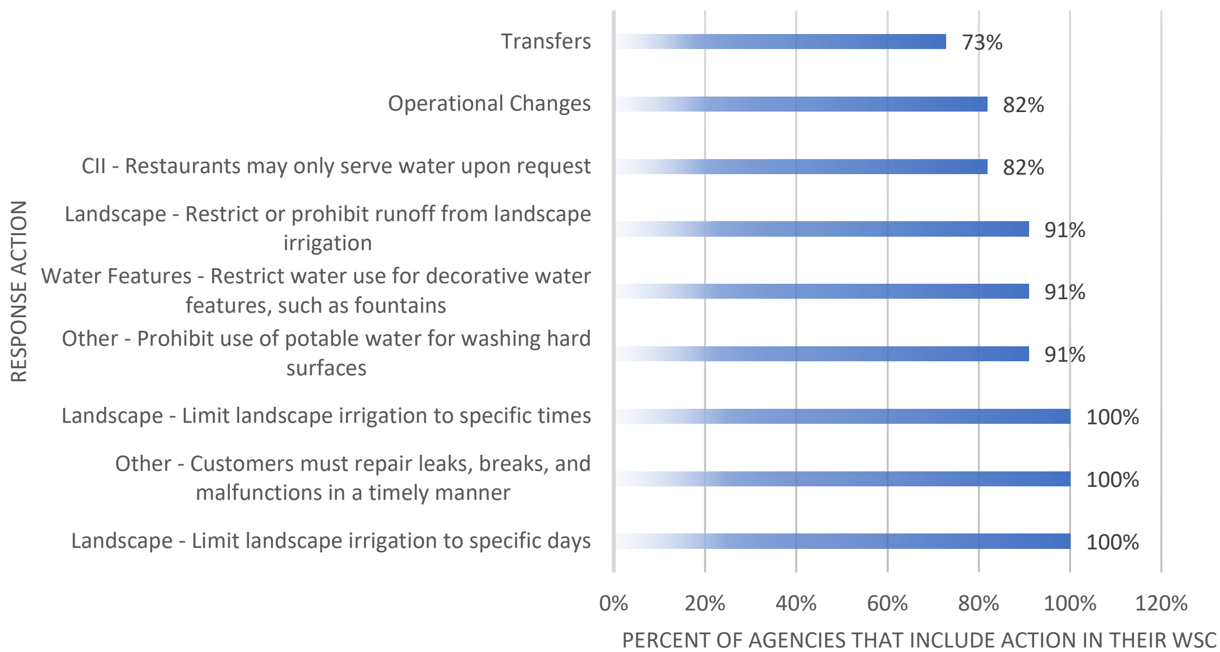


Figure 6-2. Most Commonly Included Drought Response Actions in Agency WSCPs

The drought response actions included in the fewest WSCPs for the region are shown below in Figure 6-3. The following drought response actions are only implemented by 9 percent of agencies:

- Increasing frequency of meter reading
- Other (Supply Augmentation Action)

The following drought response actions are only implemented by 18 percent of agencies:

- Distribution of water-saving items such as efficient toilets and urinals
- Moratorium or Net Zero Demand Increase on New Connections
- Additional Mandatory Restrictions

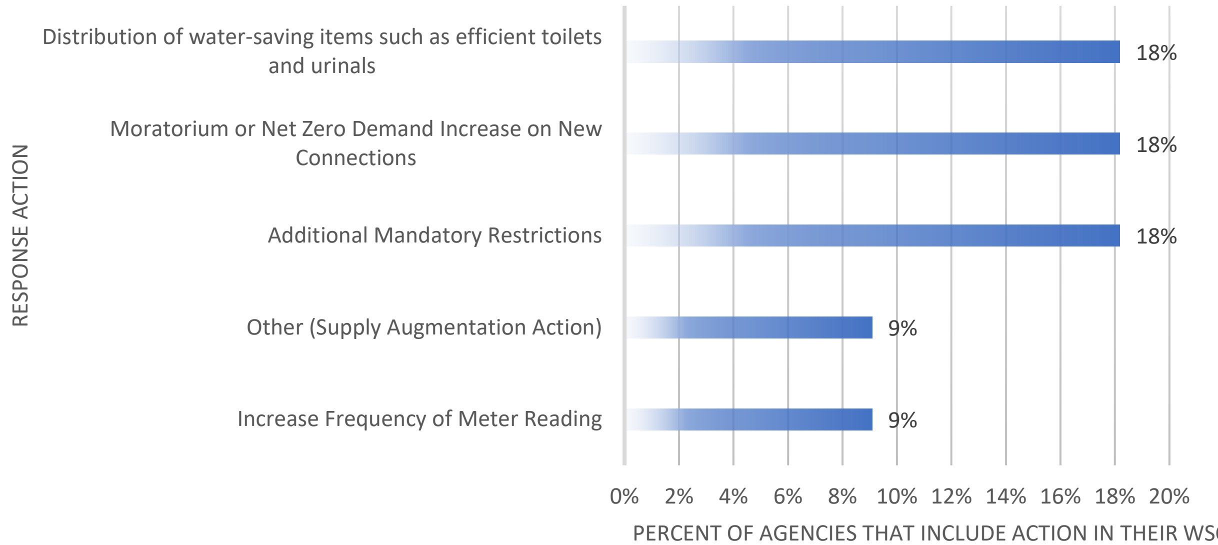


Figure 6-3. Least Commonly Included Drought Response Actions in Agency WSCPs

As previously stated, Three Valleys and its member agencies that are considered urban water suppliers will rely on the drought response actions provided in each agency's WSCP to promote a DCP that is flexible and responsive to each of the agencies. Similar to the mitigation actions, Three Valleys is not involved in the prioritization of agency response actions. Prioritization of response actions is generally performed by each respective agency's Board of Directors. Additionally, implementation and enforcement of the response actions is also the responsibility of each of Three Valleys' member agencies. Three Valleys' role is to understand when an agency is entering different shortage stages, and how they can support and assist with supply augmentation with the goal of unified drought response and messaging. This is facilitated through:

- A review of each agency's Annual Assessment which incorporates planned response actions for the next fiscal year and timing of the accompanying response actions.
- The planned member agency meetings included as part of Three Valleys' Drought Monitoring Framework which will provide the opportunity to discuss response actions being planned by each of the agencies along with potential implementation challenges.
- Communication of shortage stages.

6.7 Potential Enhancement of Drought Response Actions

The DCP will incorporate the potential drought response actions identified by each agency as part of their WSCP. However, the development of the DCP provided an opportunity to discuss their potential implementation and how Three Valleys and its member agencies can more effectively respond to drought at a regional level.

At a high level, Three Valleys, its member agencies, and other interested organizations can enhance their drought response actions by focusing on three main categories:

1. **Physical changes:** This category includes the installation or use of new equipment and infrastructure aimed at expanding water conservation efforts and enhancing interagency collaboration. Potential actions could include low-flow fixtures, smart irrigation systems, and developing interconnections with neighboring agencies for shared water resources.
2. **Behavioral changes:** This category focuses on voluntary actions taken by end-users that contribute to overall water conservation. This may include reducing landscape irrigation times and participating in community education programs that advocate water-saving practices.
3. **Mandated changes:** This category involves enforced actions to reduce water use. Possible measures could include mandated landscape watering days and restrictions on the use of potable water for non-essential purposes, both enforced by fines.

During Workshop 5 held in December 2024, these categories were presented, and the following question was discussed among the Drought Task Force:

- *Of these types of actions, which have been most effective during previous droughts, and which have been the most difficult to implement, and why?*

The poll results indicate that a combination of physical, behavioral, and mandated actions is considered the most effective strategies for managing droughts. Among the responses, behavioral changes were frequently highlighted as the most effective response, particularly when driven by education, outreach, and community engagement. Many participants emphasized that these changes are most successful when paired with mandated actions, such as water use restrictions and unified messaging. Physical actions, such as the use of smart meters, tiered rates, and changes to irrigation systems, were also indicated as tools for managing water consumption. Participants noted that smart meters, for example, help customers track their usage and adjust their behaviors accordingly, especially in conjunction with mandatory reductions. Some respondents also expressed that a combination of these actions yields the most effective results.

However, the discussion also revealed that behavioral actions are generally the most difficult to implement, with many respondents noting that people are often resistant to change. Several mentioned that individuals simply find it challenging to adopt new habits, particularly when it comes to changing water usage patterns or adjusting long-standing practices such as landscape irrigation. When it comes to physical changes, respondents highlighted challenges related to funding availability. Yet, despite efforts to offer such changes, many people have not taken full advantage of the opportunities available. Mandated actions also face significant resistance, particularly when it comes to gaining public buy-in. Respondents noted that mandates can be difficult to enforce or receive acceptance if the community does not fully understand the importance or reasons behind them. Finding agreement among the stakeholders about what can be implemented is also a challenge, especially when it comes to determining what mandates are both feasible and effective. In summary, the main challenges of the three action types stem from public resistance, lack of understanding, and resource constraints.

Table 6-3 below shows a compiled summary of the key points raised under each action type by the member agencies.

Table 6-3. Summary of Effective and Challenging Actions from Workshop 5

Action Type	Most Effective Actions	Most Difficult to Implement
Behavioral	Behavioral changes through education, community outreach, and open communication.	Some people are not easily swayed or are set in their ways.
	Engagement is focused on changed behavior and shaping future decisions.	Behavioral change is tough for many.
	Behavioral changes have been most effective through education and outreach.	People tend to stick with what they know; learning and accepting new trends can be tough.
	Behavioral changes based on mandates, along with physical actions, contribute to effective drought management.	Getting the public involved in conserving is challenging.
Physical	Smart meter usage helps customers understand their water usage and tailor it accordingly.	Physical changes are difficult because of funding availability.
	Physical actions show the best way to take action on droughts over the years.	Many people have not taken advantage of available physical changes.
	Conservation, tiered rates, and landscaping irrigation changes are effective.	
Mandated	Mandated reductions in water use and unified messaging are key for ensuring compliance.	Mandated actions are difficult to get public buy-in.
	Mandated actions help the city put restrictions on paper for the public to adhere to.	Educating the public on the reasons behind mandates is challenging.
	Mandated actions are crucial for formalizing behavior changes.	Finding agreement among stakeholders on what can be done has been difficult.

6.8 Recommendations

The key takeaways highlighted in Section 6.7 are generally consistent with the drought response actions identified in individual agency WSCPs. This DCP has been developed to promote the flexibility needed for Three Valleys and its member agencies to implement response actions based on local conditions and, along with the takeaways summarized in Table 6-3, could provide a framework for:

- Guiding the development of new response actions during subsequent updates of agency WSCPs
- Coordinating regional response actions in collaboration with the Drought Task Force

7 Operational and Administrative Framework

The operational and administrative framework identifies the roles, responsibilities, and related procedures necessary to implement the primary elements of the DCP:

1. Conduct drought monitoring – as described in Chapter 3

2. Coordinate response actions in connection with each agency's WSCP – as described in Chapter 6

3. Coordinate mitigation actions in connection with each agencies local planning and Three Valleys regional planning – as described in Chapter 5

Updating the DCP is also part of the operational and administrative framework.

This chapter provides a summary of the responsibilities associated with the primary elements of the DCP and the roles that will carry forward with these responsibilities. Additionally, it includes a discussion of the DCP update process, which includes monitoring, evaluating, and updating the plan.

7.1 Roles and Responsibilities

Three Valleys, its member agencies, and the Drought Task Force all retain responsibilities associated with the key elements of this plan.

Three Valleys: Three Valleys is responsible for estimating regional demand and supply projections, identifying infrastructure constraints that may impact supply delivery, comparing supply and demand estimates considering any infrastructure constraints and determining which Three Valleys shortage response stage and actions are recommended, carrying out strategic communication of response actions (as needed), participating in and assembling the Drought Task Force, coordinating mitigation actions as part of ongoing planning efforts, and updating the DCP. These responsibilities are generally carried out through the following roles:

a) Three Valleys General Manager
b) Three Valleys Chief Water Resources Officer
c) Three Valleys Senior Engineer
d) Three Valleys Chief Administrative Officer
e) Three Valleys Water Resources Analyst/Communication Assistant

Table 7-1 provides the level of responsibility for each of these roles relative to the primary tasks described above.

Table 7-1. Level of Responsibility for the Key Roles at Three Valleys Relative to the Primary DCP Responsibilities

	Three Valleys General Manager	Three Valleys Chief Water Resources Officer	Three Valleys Senior Engineer	Three Valleys Chief Administrative Officer	Three Valleys Water Resources Analyst/ Communication Assistant
Demand projections	I	A	R	I	R
Supply projections	I	A	R	I	R
Identify infrastructure constraints	I	A	R	I	I
Strategic communication of response actions	A	C	I	R	R
Assembly of the Drought Task Force	I	A	I	C	R
Coordinate mitigation actions as part of ongoing planning efforts	A	R	C	I	I
Update the DCP	C	A	I	I	R

R	Responsible	Assigned to complete the task
A	Accountable	Has final decision-making authority and accountability for completion
C	Consulted	An advisor or subject matter expert who is consulted before a decision or action
I	Informed	Updated on decisions or actions

Three Valleys Member Agencies: Three Valleys member agencies are responsible for providing demand and supply projections to Three Valleys for their respective service areas, participation in the Drought Task Force, initiating strategic communication of response actions, and implementing mitigation actions as part of ongoing planning efforts.

Drought Task Force: The Drought Task Force is responsible for collectively evaluating regional conditions, identifying, and planning for response actions, seeking approval for said response actions through appropriate Board approval (as needed), and communicating with customers once response actions have been initiated.

7.2 Drought Response Task Force Process

The Drought Task Force is comprised of 27 organizations and currently there is a roster of 73 members spanning various stakeholder segments within the region. As part of the Drought Monitoring Framework, regional coordination is facilitated through regular monthly meetings between Three Valleys and its member agencies. These meetings are used to review and analyze water availability data and Annual Assessments, as well as to make decisions regarding the declaration of water supply shortages, the implementation of water restrictions, and the pursuit of additional supplies. As outlined in the DMF, during the implementation phase of this DCP, Three Valleys will increase the frequency of meetings with any member agency or agencies that are in Stage 5 or above, holding these meetings at least twice monthly.

Additionally, the Drought Task Force may be convened based on a declaration from the state, Metropolitan, or if any member agency raises concerns about their supplies or infrastructure. Three Valleys can conduct an annual check-in meeting with the Drought Task Force during one of the regular Member Agency Meetings.

Once the Drought Task Force is convened, the group will meet to:

1. **Evaluate** regional conditions and **identify** which agencies/organizations are experiencing water shortage conditions
2. **Discuss** the need for a coordinated response and **identify** potential response actions

Drought Task Force members may experience shortages and impacts of drought at varying times and degrees of severity due to nuances in supply and demand portfolios. It is important to enable and support each agency as they enact shortage levels and response actions that are relevant and actionable in their service area. As a result, agencies are provided the flexibility to decide the degree to which they wish to participate, whether response actions are warranted consistent with their individual WSCPs, and communication protocols.

Once the Drought Task Force has met and identified potential response actions, Three Valleys and its member agencies will individually plan for implementation of said response actions, which includes Board approval and strategic communication to customers as to what will be required and how to achieve the intended results.

7.3 Drought Contingency Plan Update

The DCP is a living document that is intended to be evaluated on an ongoing basis and subsequently updated as needed. Three Valleys will regularly review the DCP and make adjustments accordingly. This includes a post-drought evaluation to assess the effectiveness of the DCP after its implementation. This evaluation could include an analysis of the climatic and environmental aspects of the drought; its economic and social consequences; the extent to which pre-drought planning was useful in mitigating the impacts, in facilitating relief or assistance to stricken areas, and in post-recovery; and any other weaknesses or problems caused by or not covered by the DCP. Three Valleys will also update the DCP consistent with the five-year UWMP report cycle to incorporate any significant changes to WSCPs, demand and supply projections, and additional mitigation actions.

7.4 Operational and Administrative Framework Summary

Table 7-2 summarizes the roles, responsibilities, and procedures associated with the operation and administration of the DCP.

Table 7-2. Operational and Administrative Framework Summary

DCP Element	Roles	Responsibilities	Procedures
Conduct Drought Monitoring	Three Valleys Member Agencies	Evaluate water supply reliability as part of the Annual Assessment	Compare supplies and demands. Determine which shortage response stage is recommended. Provide demand estimates to Three Valleys annually.
	Three Valleys	Develop annual supply and demand projections	Estimate unconstrained demands and available supplies for the coming year.
	Three Valleys	Identify infrastructure constraints	Identify any known MWD or Three Valleys infrastructure issues that may pertain to near-term water supply reliability.
	Three Valleys	Convene member agencies to conduct Wholesale Annual Assessment	Compare supplies and demands and discuss any infrastructure constraints that may impact supply delivery. Determine which Three Valleys shortage response stage is recommended.
	Three Valleys	Initiate Drought Task Force	Initiate the Drought Task Force based on a declaration from the state, Metropolitan, or if any member agency raises concerns about their supplies or infrastructure.
Coordinate Response Actions	Three Valleys Three Valleys Member Agencies	Identify response actions	Based on the water shortage response stage identified during the Annual Assessment, determine which response actions are recommended.
	Drought Task Force	Evaluate regional conditions	Identify which agencies are experiencing water shortage conditions once the Drought Task Force has been initiated. Discuss the need for a regional response.
	Three Valleys Three Valleys Member Agencies	Plan for response actions	Develop scope, schedule, and budget for implementation of response actions.
	Three Valleys Three Valleys Member Agencies	Approval and implementation of response actions	By Three Valleys Board and member agency Boards as needed.
	Three Valleys Three Valleys Member Agencies Drought Task Force	Communicate response actions	Communicate with customers as to what will be required and how to achieve the required results.
Coordinate Mitigation Actions	Three Valleys Three Valleys Member Agencies	Ongoing evaluation and prioritization of mitigation actions	Continuation of regional planning efforts.

DCP Element	Roles	Responsibilities	Procedures
	Three Valleys Three Valleys Member Agencies	Identify opportunities for funding and potential cost-sharing	Pursue funding opportunities, initiate agreements for cost-sharing.
	Three Valleys Three Valleys Member Agencies	Coordination of mitigation actions	As needed, initiate design, environmental documentation, permitting, and construction.
Update DCP	Three Valleys	DCP evaluation	Conduct a post-drought evaluation.
	Three Valleys Three Valleys Member Agencies	DCP update(s)	Comprehensive review of DCP and updates to the framework as needed.

8 References

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9 Appendices

9.1 Appendix A

Adoption Resolution

9.2 Appendix B

Detailed Projected Changes in Rainfall, Outdoor Demand, San Gabriel River Flow Under All Scenarios

Table B1: Projected Changes in Rainfall Under Drier with Extreme Warming Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	100.8%	99.9%	100.6%	101.6%	97.4%	98.9%	100.1%	102.5%	100.1%	97.0%	97.8%	99.7%
Normal	YR2030	101.6%	99.7%	101.1%	103.1%	94.8%	97.9%	100.3%	105.0%	100.3%	94.1%	95.6%	99.4%
Normal	YR2035	97.9%	101.2%	98.2%	97.1%	90.2%	96.3%	99.9%	102.2%	103.8%	90.8%	88.1%	107.8%
Normal	YR2040	94.2%	102.7%	95.3%	91.0%	85.5%	94.7%	99.5%	99.3%	107.2%	87.5%	80.6%	116.2%
Normal	YR2045	90.5%	104.2%	92.4%	84.9%	80.9%	93.2%	99.2%	96.5%	110.7%	84.2%	73.1%	124.5%
Dry_1Yr	YR2025	101.1%	99.1%	101.8%	103.8%	98.3%	100.0%	100.0%	101.3%	100.0%	97.4%	96.7%	98.9%
Dry_1Yr	YR2030	102.2%	98.2%	103.6%	107.6%	96.6%	100.0%	100.0%	102.7%	100.0%	94.8%	93.3%	97.9%
Dry_1Yr	YR2035	100.2%	102.5%	100.2%	104.4%	95.5%	98.9%	100.0%	90.7%	100.0%	92.4%	84.0%	97.5%
Dry_1Yr	YR2040	98.1%	106.8%	96.8%	101.2%	94.4%	97.8%	100.0%	78.6%	100.0%	90.0%	74.7%	97.1%
Dry_1Yr	YR2045	96.1%	111.1%	93.4%	97.9%	93.3%	96.6%	100.0%	66.6%	100.0%	87.6%	65.3%	96.7%
Dry_5Yr	YR2025	101.1%	100.0%	100.6%	102.3%	97.0%	99.9%	99.4%	104.7%	100.3%	98.6%	98.1%	101.3%
Dry_5Yr	YR2030	102.2%	100.0%	101.1%	104.5%	94.1%	99.7%	98.9%	109.4%	100.6%	97.2%	96.3%	102.7%
Dry_5Yr	YR2035	97.2%	98.6%	97.8%	98.7%	91.2%	99.0%	98.3%	105.5%	105.2%	94.7%	89.7%	129.2%
Dry_5Yr	YR2040	92.2%	97.3%	94.5%	92.8%	88.4%	98.2%	97.8%	101.6%	109.9%	92.2%	83.1%	155.6%
Dry_5Yr	YR2045	87.3%	95.9%	91.3%	86.9%	85.5%	97.4%	97.3%	97.6%	114.6%	89.6%	76.6%	182.1%
Wet_1Yr	YR2025	102.3%	99.3%	102.2%	99.9%	96.9%	97.2%	99.7%	100.0%	100.0%	100.0%	95.7%	100.0%
Wet_1Yr	YR2030	104.5%	98.5%	104.4%	99.7%	93.8%	94.4%	99.4%	100.0%	100.0%	100.0%	91.4%	100.0%
Wet_1Yr	YR2035	98.5%	99.4%	98.0%	92.5%	85.9%	85.1%	99.8%	100.0%	100.0%	100.0%	82.2%	100.0%
Wet_1Yr	YR2040	92.4%	100.3%	91.6%	85.4%	78.1%	75.7%	100.2%	100.0%	100.0%	100.0%	73.0%	100.0%
Wet_1Yr	YR2045	86.3%	101.2%	85.3%	78.2%	70.3%	66.3%	100.6%	100.0%	100.0%	100.0%	63.9%	100.0%
Wet_5Yr	YR2025	101.2%	99.4%	99.9%	101.3%	98.5%	97.2%	100.6%	100.1%	99.4%	98.8%	97.2%	98.9%
Wet_5Yr	YR2030	102.4%	98.9%	99.7%	102.7%	96.9%	94.4%	101.1%	100.3%	98.9%	97.6%	94.4%	97.9%
Wet_5Yr	YR2035	100.4%	100.4%	98.3%	96.3%	94.0%	89.9%	100.9%	100.2%	102.2%	96.3%	85.8%	100.8%
Wet_5Yr	YR2040	98.4%	101.9%	96.9%	89.8%	91.0%	85.4%	100.6%	100.0%	105.5%	94.9%	77.1%	103.7%
Wet_5Yr	YR2045	96.4%	103.5%	95.6%	83.4%	88.0%	80.8%	100.4%	99.9%	108.9%	93.6%	68.4%	106.6%

Table B2: Projected Changes in Rainfall Under Median Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	100.8%	99.9%	100.6%	101.6%	97.4%	98.9%	100.1%	102.5%	100.1%	97.0%	97.8%	99.7%
Normal	YR2030	101.6%	99.7%	101.1%	103.1%	94.8%	97.9%	100.3%	105.0%	100.3%	94.1%	95.6%	99.4%
Normal	YR2035	102.4%	100.0%	100.6%	99.8%	92.9%	96.6%	101.6%	104.7%	102.1%	92.4%	92.8%	98.5%
Normal	YR2040	103.1%	100.2%	100.1%	96.5%	90.9%	95.3%	103.0%	104.3%	104.0%	90.7%	90.0%	97.6%
Normal	YR2045	103.8%	100.5%	99.7%	93.1%	88.9%	93.9%	104.4%	104.0%	105.9%	88.9%	87.2%	96.8%
Dry_1Yr	YR2025	101.1%	99.1%	101.8%	103.8%	98.3%	100.0%	100.0%	101.3%	100.0%	97.4%	96.7%	98.9%
Dry_1Yr	YR2030	102.2%	98.2%	103.6%	107.6%	96.6%	100.0%	100.0%	102.7%	100.0%	94.8%	93.3%	97.9%
Dry_1Yr	YR2035	103.5%	97.6%	103.4%	105.2%	97.1%	96.4%	100.0%	100.3%	100.0%	93.7%	89.2%	96.6%
Dry_1Yr	YR2040	104.8%	96.9%	103.2%	102.8%	97.7%	92.7%	100.0%	98.0%	100.0%	92.6%	85.2%	95.3%
Dry_1Yr	YR2045	106.1%	96.3%	103.0%	100.3%	98.2%	89.1%	100.0%	95.7%	100.0%	91.5%	81.1%	93.9%
Dry_5Yr	YR2025	101.1%	100.0%	100.6%	102.3%	97.0%	99.9%	99.4%	104.7%	100.3%	98.6%	98.1%	101.3%
Dry_5Yr	YR2030	102.2%	100.0%	101.1%	104.5%	94.1%	99.7%	98.9%	109.4%	100.6%	97.2%	96.3%	102.7%
Dry_5Yr	YR2035	103.8%	100.1%	100.7%	100.0%	92.5%	98.2%	100.4%	110.2%	102.8%	96.2%	92.4%	100.5%
Dry_5Yr	YR2040	105.5%	100.2%	100.4%	95.5%	90.9%	96.7%	101.9%	110.9%	105.0%	95.1%	88.6%	98.2%
Dry_5Yr	YR2045	107.1%	100.4%	100.0%	90.9%	89.4%	95.2%	103.5%	111.7%	107.2%	94.0%	84.8%	96.0%
Wet_1Yr	YR2025	102.3%	99.3%	102.2%	99.9%	96.9%	97.2%	99.7%	100.0%	100.0%	100.0%	95.7%	100.0%
Wet_1Yr	YR2030	104.5%	98.5%	104.4%	99.7%	93.8%	94.4%	99.4%	100.0%	100.0%	100.0%	91.4%	100.0%
Wet_1Yr	YR2035	104.3%	98.0%	103.0%	98.6%	89.7%	95.6%	101.8%	100.0%	100.0%	100.0%	87.5%	100.0%
Wet_1Yr	YR2040	104.1%	97.5%	101.7%	97.4%	85.6%	96.7%	104.2%	100.0%	100.0%	100.0%	83.7%	100.0%
Wet_1Yr	YR2045	103.9%	97.0%	100.3%	96.3%	81.6%	97.9%	106.6%	100.0%	100.0%	100.0%	79.9%	100.0%
Wet_5Yr	YR2025	101.2%	99.4%	99.9%	101.3%	98.5%	97.2%	100.6%	100.1%	99.4%	98.8%	97.2%	98.9%
Wet_5Yr	YR2030	102.4%	98.9%	99.7%	102.7%	96.9%	94.4%	101.1%	100.3%	98.9%	97.6%	94.4%	97.9%
Wet_5Yr	YR2035	103.0%	98.6%	99.6%	99.9%	95.6%	95.0%	102.7%	100.7%	100.6%	96.4%	91.6%	97.6%
Wet_5Yr	YR2040	103.6%	98.3%	99.5%	97.1%	94.2%	95.6%	104.3%	101.0%	102.4%	95.2%	88.8%	97.4%
Wet_5Yr	YR2045	104.2%	98.1%	99.3%	94.3%	92.9%	96.2%	105.9%	101.4%	104.2%	94.0%	85.9%	97.1%

Table B3: Projected Changes in Rainfall Under Wetter with Moderate Warming Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	100.8%	99.9%	100.6%	101.6%	97.4%	98.9%	100.1%	102.5%	100.1%	97.0%	97.8%	99.7%
Normal	YR2030	101.6%	99.7%	101.1%	103.1%	94.8%	97.9%	100.3%	105.0%	100.3%	94.1%	95.6%	99.4%
Normal	YR2035	102.0%	107.6%	108.9%	96.9%	93.4%	95.8%	100.9%	101.9%	119.6%	88.8%	95.3%	97.6%
Normal	YR2040	102.4%	115.6%	116.7%	90.7%	92.0%	93.7%	101.5%	98.9%	139.0%	83.5%	95.0%	95.9%
Normal	YR2045	102.7%	123.5%	124.4%	84.5%	90.6%	91.6%	102.1%	95.8%	158.4%	78.2%	94.7%	94.1%
Dry_1Yr	YR2025	101.1%	99.1%	101.8%	103.8%	98.3%	100.0%	100.0%	101.3%	100.0%	97.4%	96.7%	98.9%
Dry_1Yr	YR2030	102.2%	98.2%	103.6%	107.6%	96.6%	100.0%	100.0%	102.7%	100.0%	94.8%	93.3%	97.9%
Dry_1Yr	YR2035	106.5%	104.0%	110.5%	104.0%	92.8%	97.5%	100.0%	92.2%	100.0%	94.3%	93.6%	93.6%
Dry_1Yr	YR2040	110.9%	109.7%	117.3%	100.3%	89.0%	95.0%	100.0%	81.7%	100.0%	93.7%	93.9%	89.2%
Dry_1Yr	YR2045	115.3%	115.4%	124.1%	96.7%	85.2%	92.5%	100.0%	71.2%	100.0%	93.1%	94.2%	84.9%
Dry_5Yr	YR2025	101.1%	100.0%	100.6%	102.3%	97.0%	99.9%	99.4%	104.7%	100.3%	98.6%	98.1%	101.3%
Dry_5Yr	YR2030	102.2%	100.0%	101.1%	104.5%	94.1%	99.7%	98.9%	109.4%	100.6%	97.2%	96.3%	102.7%
Dry_5Yr	YR2035	105.2%	106.0%	109.1%	96.6%	94.0%	98.5%	100.2%	105.5%	122.3%	92.4%	95.8%	95.8%
Dry_5Yr	YR2040	108.3%	112.0%	117.2%	88.6%	93.8%	97.2%	101.7%	101.6%	143.9%	87.6%	95.4%	88.9%
Dry_5Yr	YR2045	111.4%	118.0%	125.2%	80.6%	93.7%	95.9%	103.1%	97.6%	165.6%	82.8%	95.0%	82.0%
Wet_1Yr	YR2025	102.3%	99.3%	102.2%	99.9%	96.9%	97.2%	99.7%	100.0%	100.0%	100.0%	95.7%	100.0%
Wet_1Yr	YR2030	104.5%	98.5%	104.4%	99.7%	93.8%	94.4%	99.4%	100.0%	100.0%	100.0%	91.4%	100.0%
Wet_1Yr	YR2035	104.0%	101.9%	118.8%	94.4%	91.1%	96.2%	102.0%	100.0%	100.0%	100.0%	93.6%	100.0%
Wet_1Yr	YR2040	103.4%	105.3%	133.3%	89.1%	88.5%	97.9%	104.5%	100.0%	100.0%	100.0%	95.9%	100.0%
Wet_1Yr	YR2045	102.9%	108.6%	147.8%	83.8%	85.9%	99.6%	107.0%	100.0%	100.0%	100.0%	98.2%	100.0%
Wet_5Yr	YR2025	101.2%	99.4%	99.9%	101.3%	98.5%	97.2%	100.6%	100.1%	99.4%	98.8%	97.2%	98.9%
Wet_5Yr	YR2030	102.4%	98.9%	99.7%	102.7%	96.9%	94.4%	101.1%	100.3%	98.9%	97.6%	94.4%	97.9%
Wet_5Yr	YR2035	104.8%	106.2%	107.8%	97.8%	95.2%	93.5%	101.6%	100.2%	120.6%	95.3%	94.9%	98.2%
Wet_5Yr	YR2040	107.1%	113.5%	115.8%	92.9%	93.4%	92.5%	102.1%	100.0%	142.3%	93.1%	95.3%	98.4%
Wet_5Yr	YR2045	109.5%	120.8%	123.9%	88.0%	91.7%	91.5%	102.6%	99.9%	164.1%	90.8%	95.8%	98.7%

Table B4: Projected Changes in San Gabriel River Flow Under Drier with Extreme Warming Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	100.3%	99.9%	99.3%	98.8%	98.5%	99.4%	99.9%	100.1%	100.0%	99.6%	98.6%	99.3%
Normal	YR2030	100.6%	99.7%	98.5%	97.6%	96.9%	98.9%	99.7%	100.3%	100.0%	99.1%	97.2%	98.5%
Normal	YR2035	98.7%	96.3%	94.6%	92.8%	93.7%	97.3%	98.8%	99.5%	101.2%	100.4%	94.2%	99.7%
Normal	YR2040	96.9%	92.9%	90.7%	88.0%	90.5%	95.7%	97.9%	98.8%	102.5%	101.7%	91.1%	100.9%
Normal	YR2045	95.0%	89.5%	86.9%	83.3%	87.2%	94.2%	97.1%	98.0%	103.8%	103.0%	88.0%	102.0%
Dry_1Yr	YR2025	99.3%	98.6%	97.6%	99.4%	99.6%	99.9%	100.0%	100.0%	99.9%	99.3%	99.3%	100.0%
Dry_1Yr	YR2030	98.5%	97.2%	95.2%	98.9%	99.1%	99.7%	100.0%	100.0%	99.7%	98.5%	98.5%	100.0%
Dry_1Yr	YR2035	90.7%	89.4%	87.6%	93.7%	96.4%	98.2%	99.1%	99.6%	100.3%	97.2%	96.7%	100.6%
Dry_1Yr	YR2040	83.0%	81.5%	80.1%	88.5%	93.8%	96.7%	98.3%	99.2%	101.0%	95.9%	94.9%	101.2%
Dry_1Yr	YR2045	75.2%	73.6%	72.5%	83.4%	91.1%	95.2%	97.4%	98.9%	101.6%	94.6%	93.1%	101.9%
Dry_5Yr	YR2025	99.9%	98.6%	98.1%	98.0%	98.0%	99.6%	99.9%	100.0%	100.0%	99.4%	98.6%	98.6%
Dry_5Yr	YR2030	99.7%	97.2%	96.3%	95.9%	95.9%	99.1%	99.7%	100.0%	100.0%	98.9%	97.2%	97.2%
Dry_5Yr	YR2035	96.7%	93.2%	93.2%	92.2%	93.6%	98.1%	99.1%	99.5%	100.0%	97.9%	94.3%	97.7%
Dry_5Yr	YR2040	93.7%	89.2%	90.2%	88.5%	91.2%	97.1%	98.5%	99.0%	100.0%	97.0%	91.4%	98.1%
Dry_5Yr	YR2045	90.6%	85.2%	87.2%	84.7%	88.9%	96.1%	97.8%	98.5%	100.0%	96.1%	88.4%	98.5%
Wet_1Yr	YR2025	99.1%	100.3%	99.1%	99.1%	98.1%	98.3%	99.6%	102.2%	100.4%	98.3%	97.6%	100.0%
Wet_1Yr	YR2030	98.2%	100.6%	98.2%	98.2%	96.3%	96.6%	99.1%	104.4%	100.9%	96.6%	95.2%	100.0%
Wet_1Yr	YR2035	94.9%	96.3%	100.6%	96.9%	92.3%	94.7%	98.2%	99.2%	100.8%	111.2%	90.0%	97.3%
Wet_1Yr	YR2040	91.7%	91.9%	102.9%	95.6%	88.3%	92.8%	97.3%	94.1%	100.8%	125.9%	84.8%	94.5%
Wet_1Yr	YR2045	88.4%	87.6%	105.3%	94.3%	84.4%	90.9%	96.4%	88.9%	100.8%	140.5%	79.7%	91.7%
Wet_5Yr	YR2025	100.6%	100.1%	98.8%	98.1%	98.3%	99.4%	99.9%	100.0%	101.1%	100.0%	99.4%	99.3%
Wet_5Yr	YR2030	101.1%	100.3%	97.6%	96.3%	96.6%	98.9%	99.7%	100.0%	102.2%	100.0%	98.9%	98.5%
Wet_5Yr	YR2035	102.1%	96.7%	95.7%	92.4%	92.8%	97.5%	99.0%	99.5%	107.7%	102.4%	99.5%	104.5%
Wet_5Yr	YR2040	103.1%	93.1%	93.9%	88.6%	89.0%	96.2%	98.2%	99.0%	113.3%	104.7%	100.1%	110.4%
Wet_5Yr	YR2045	104.0%	89.5%	92.0%	84.8%	85.2%	95.0%	97.4%	98.5%	118.8%	107.1%	100.8%	116.4%

Table B5: Projected Changes in San Gabriel River Flow Under Median Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	100.3%	99.9%	99.3%	98.8%	98.5%	99.4%	99.9%	100.1%	100.0%	99.6%	98.6%	99.3%
Normal	YR2030	100.6%	99.7%	98.5%	97.6%	96.9%	98.9%	99.7%	100.3%	100.0%	99.1%	97.2%	98.5%
Normal	YR2035	100.6%	99.8%	97.9%	95.7%	95.6%	98.4%	99.5%	100.0%	101.0%	99.0%	96.3%	97.1%
Normal	YR2040	100.6%	100.0%	97.2%	93.9%	94.2%	98.1%	99.2%	99.8%	102.0%	98.9%	95.4%	95.7%
Normal	YR2045	100.6%	100.1%	96.6%	92.0%	92.9%	97.7%	99.0%	99.5%	103.0%	98.7%	94.4%	94.2%
Dry_1Yr	YR2025	99.3%	98.6%	97.6%	99.4%	99.6%	99.9%	100.0%	100.0%	99.9%	99.3%	99.3%	100.0%
Dry_1Yr	YR2030	98.5%	97.2%	95.2%	98.9%	99.1%	99.7%	100.0%	100.0%	99.7%	98.5%	98.5%	100.0%
Dry_1Yr	YR2035	96.1%	95.1%	92.0%	96.9%	98.4%	99.3%	99.8%	99.9%	100.6%	98.1%	97.6%	99.9%
Dry_1Yr	YR2040	93.6%	93.0%	88.8%	95.0%	97.6%	99.0%	99.5%	99.8%	101.5%	97.7%	96.7%	99.8%
Dry_1Yr	YR2045	91.1%	90.8%	85.5%	93.0%	96.8%	98.6%	99.2%	99.6%	102.4%	97.4%	95.8%	99.6%
Dry_5Yr	YR2025	99.9%	98.6%	98.1%	98.0%	98.0%	99.6%	99.9%	100.0%	100.0%	99.4%	98.6%	98.6%
Dry_5Yr	YR2030	99.7%	97.2%	96.3%	95.9%	95.9%	99.1%	99.7%	100.0%	100.0%	98.9%	97.2%	97.2%
Dry_5Yr	YR2035	99.0%	96.5%	95.3%	94.0%	94.7%	98.6%	99.5%	99.9%	100.0%	98.4%	96.5%	95.8%
Dry_5Yr	YR2040	98.2%	95.6%	94.3%	92.0%	93.4%	98.1%	99.2%	99.8%	100.0%	98.1%	95.6%	94.3%
Dry_5Yr	YR2045	97.4%	94.8%	93.4%	90.1%	92.2%	97.6%	99.0%	99.6%	100.0%	97.7%	94.8%	92.8%
Wet_1Yr	YR2025	99.1%	100.3%	99.1%	99.1%	98.1%	98.3%	99.6%	102.2%	100.4%	98.3%	97.6%	100.0%
Wet_1Yr	YR2030	98.2%	100.6%	98.2%	98.2%	96.3%	96.6%	99.1%	104.4%	100.9%	96.6%	95.2%	100.0%
Wet_1Yr	YR2035	98.3%	100.8%	99.3%	96.8%	93.8%	95.8%	98.7%	102.0%	101.2%	95.2%	94.4%	96.6%
Wet_1Yr	YR2040	98.5%	101.1%	100.3%	95.3%	91.3%	95.0%	98.4%	99.6%	101.6%	93.9%	93.5%	93.2%
Wet_1Yr	YR2045	98.6%	101.3%	101.3%	93.9%	88.9%	94.1%	98.0%	97.3%	101.9%	92.5%	92.7%	89.9%
Wet_5Yr	YR2025	100.6%	100.1%	98.8%	98.1%	98.3%	99.4%	99.9%	100.0%	101.1%	100.0%	99.4%	99.3%
Wet_5Yr	YR2030	101.1%	100.3%	97.6%	96.3%	96.6%	98.9%	99.7%	100.0%	102.2%	100.0%	98.9%	98.5%
Wet_5Yr	YR2035	101.2%	100.9%	97.6%	94.5%	95.1%	98.4%	99.6%	100.0%	106.3%	100.2%	98.3%	97.1%
Wet_5Yr	YR2040	101.4%	101.5%	97.6%	92.7%	93.6%	98.1%	99.5%	100.0%	110.4%	100.5%	97.8%	95.7%
Wet_5Yr	YR2045	101.5%	102.1%	97.6%	90.9%	92.1%	97.7%	99.3%	100.0%	114.6%	100.8%	97.3%	94.2%

Table B6: Projected Changes in San Gabriel River Flow Under Wetter with Moderate Warming Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	100.3%	99.9%	99.3%	98.8%	98.5%	99.4%	99.9%	100.1%	100.0%	99.6%	98.6%	99.3%
Normal	YR2030	100.6%	99.7%	98.5%	97.6%	96.9%	98.9%	99.7%	100.3%	100.0%	99.1%	97.2%	98.5%
Normal	YR2035	102.5%	110.7%	108.5%	100.1%	97.2%	99.2%	100.0%	100.0%	109.1%	101.4%	97.0%	96.6%
Normal	YR2040	104.5%	121.6%	118.5%	102.6%	97.5%	99.6%	100.2%	99.8%	118.3%	103.7%	96.7%	94.6%
Normal	YR2045	106.5%	132.6%	128.5%	105.1%	97.7%	100.0%	100.5%	99.5%	127.4%	106.0%	96.5%	92.7%
Dry_1Yr	YR2025	99.3%	98.6%	97.6%	99.4%	99.6%	99.9%	100.0%	100.0%	99.9%	99.3%	99.3%	100.0%
Dry_1Yr	YR2030	98.5%	97.2%	95.2%	98.9%	99.1%	99.7%	100.0%	100.0%	99.7%	98.5%	98.5%	100.0%
Dry_1Yr	YR2035	93.1%	107.8%	107.5%	108.3%	101.8%	101.3%	100.9%	100.4%	119.5%	103.2%	101.2%	101.8%
Dry_1Yr	YR2040	87.6%	118.4%	119.8%	117.9%	104.5%	103.0%	101.8%	100.8%	139.2%	107.9%	104.0%	103.5%
Dry_1Yr	YR2045	82.2%	128.9%	132.2%	127.4%	107.2%	104.6%	102.6%	101.1%	159.0%	112.5%	106.7%	105.2%
Dry_5Yr	YR2025	99.9%	98.6%	98.1%	98.0%	98.0%	99.6%	99.9%	100.0%	100.0%	99.4%	98.6%	98.6%
Dry_5Yr	YR2030	99.7%	97.2%	96.3%	95.9%	95.9%	99.1%	99.7%	100.0%	100.0%	98.9%	97.2%	97.2%
Dry_5Yr	YR2035	99.0%	102.6%	103.6%	97.1%	96.3%	99.6%	100.2%	100.0%	100.9%	97.9%	96.9%	94.6%
Dry_5Yr	YR2040	98.2%	107.9%	111.0%	98.4%	96.7%	100.1%	100.7%	100.0%	101.8%	97.0%	96.5%	91.9%
Dry_5Yr	YR2045	97.4%	113.3%	118.4%	99.6%	97.1%	100.7%	101.2%	100.0%	102.6%	96.1%	96.0%	89.2%
Wet_1Yr	YR2025	99.1%	100.3%	99.1%	99.1%	98.1%	98.3%	99.6%	102.2%	100.4%	98.3%	97.6%	100.0%
Wet_1Yr	YR2030	98.2%	100.6%	98.2%	98.2%	96.3%	96.6%	99.1%	104.4%	100.9%	96.6%	95.2%	100.0%
Wet_1Yr	YR2035	101.1%	109.9%	102.6%	97.2%	92.3%	94.0%	97.6%	99.2%	114.5%	91.4%	92.1%	93.9%
Wet_1Yr	YR2040	104.0%	119.3%	107.1%	96.1%	88.3%	91.4%	96.1%	94.1%	128.3%	86.3%	89.0%	87.7%
Wet_1Yr	YR2045	106.8%	128.7%	111.5%	95.1%	84.4%	88.9%	94.5%	88.9%	142.0%	81.1%	86.0%	81.6%
Wet_5Yr	YR2025	100.6%	100.1%	98.8%	98.1%	98.3%	99.4%	99.9%	100.0%	101.1%	100.0%	99.4%	99.3%
Wet_5Yr	YR2030	101.1%	100.3%	97.6%	96.3%	96.6%	98.9%	99.7%	100.0%	102.2%	100.0%	98.9%	98.5%
Wet_5Yr	YR2035	101.5%	112.8%	105.1%	98.7%	95.6%	98.6%	99.6%	99.9%	120.7%	99.6%	98.7%	94.2%
Wet_5Yr	YR2040	101.8%	125.4%	112.7%	101.2%	94.7%	98.3%	99.5%	99.8%	139.3%	99.2%	98.6%	90.0%
Wet_5Yr	YR2045	102.2%	137.9%	120.2%	103.6%	93.7%	98.1%	99.3%	99.6%	157.9%	98.9%	98.4%	85.7%

Table B7: Projected Changes in Outdoor Demand Under Drier with Extreme Warming Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	101.0%	100.6%	100.4%	100.6%	100.7%	100.6%	100.4%	100.4%	100.6%	100.7%	101.0%	101.1%
Normal	YR2030	101.9%	101.1%	100.9%	101.1%	101.4%	101.1%	100.9%	100.9%	101.1%	101.4%	101.9%	102.2%
Normal	YR2035	103.9%	103.1%	102.2%	102.9%	103.4%	102.8%	101.2%	101.3%	101.6%	102.5%	104.4%	104.4%
Normal	YR2040	106.0%	105.0%	103.5%	104.8%	105.5%	104.5%	101.6%	101.8%	102.1%	103.6%	106.9%	106.7%
Normal	YR2045	108.0%	106.9%	104.9%	106.6%	107.5%	106.2%	101.9%	102.3%	102.6%	104.6%	109.4%	108.9%
Dry_1Yr	YR2025	100.8%	100.7%	100.4%	100.4%	101.0%	100.7%	100.6%	100.4%	100.4%	100.6%	100.7%	100.8%
Dry_1Yr	YR2030	101.6%	101.4%	100.9%	100.9%	101.9%	101.4%	101.1%	100.9%	100.9%	101.1%	101.4%	101.6%
Dry_1Yr	YR2035	103.3%	102.2%	102.3%	102.2%	103.7%	102.7%	101.5%	102.1%	102.8%	104.3%	105.0%	103.7%
Dry_1Yr	YR2040	105.0%	103.1%	103.8%	103.5%	105.5%	104.0%	101.8%	103.3%	104.8%	107.4%	108.6%	105.7%
Dry_1Yr	YR2045	106.7%	103.9%	105.2%	104.9%	107.3%	105.4%	102.2%	104.5%	106.7%	110.6%	112.2%	107.8%
Dry_5Yr	YR2025	101.0%	100.6%	100.4%	100.4%	100.8%	100.6%	100.4%	100.6%	100.6%	100.7%	101.1%	101.1%
Dry_5Yr	YR2030	101.9%	101.1%	100.9%	100.9%	101.6%	101.1%	100.9%	101.1%	101.1%	101.4%	102.2%	102.2%
Dry_5Yr	YR2035	103.9%	103.2%	102.3%	102.4%	103.7%	102.7%	101.1%	101.7%	101.6%	102.3%	104.1%	104.1%
Dry_5Yr	YR2040	106.0%	105.2%	103.8%	104.0%	105.7%	104.3%	101.3%	102.3%	102.1%	103.3%	105.9%	105.9%
Dry_5Yr	YR2045	108.0%	107.3%	105.2%	105.6%	107.8%	105.9%	101.6%	102.9%	102.6%	104.3%	107.8%	107.8%
Wet_1Yr	YR2025	101.5%	100.6%	100.3%	100.6%	100.7%	100.7%	100.4%	100.6%	100.4%	100.6%	100.7%	100.8%
Wet_1Yr	YR2030	102.9%	101.1%	100.6%	101.1%	101.4%	101.4%	100.9%	101.1%	100.9%	101.1%	101.4%	101.6%
Wet_1Yr	YR2035	105.5%	103.8%	102.8%	104.8%	104.5%	104.2%	101.5%	101.6%	101.5%	102.6%	103.2%	102.6%
Wet_1Yr	YR2040	108.0%	106.5%	105.0%	108.4%	107.7%	106.9%	102.1%	102.1%	102.1%	104.0%	105.0%	103.6%
Wet_1Yr	YR2045	110.6%	109.1%	107.2%	112.0%	110.8%	109.7%	102.7%	102.6%	102.7%	105.5%	106.8%	104.5%
Wet_5Yr	YR2025	101.1%	100.6%	100.4%	100.6%	100.8%	100.7%	100.6%	100.6%	100.6%	100.7%	101.0%	101.1%
Wet_5Yr	YR2030	102.2%	101.1%	100.9%	101.1%	101.6%	101.4%	101.1%	101.1%	101.1%	101.4%	101.9%	102.2%
Wet_5Yr	YR2035	104.3%	103.1%	102.1%	102.9%	103.4%	103.2%	101.5%	101.6%	101.6%	102.7%	104.0%	104.5%
Wet_5Yr	YR2040	106.4%	105.0%	103.3%	104.8%	105.2%	105.0%	101.8%	102.1%	102.1%	104.0%	106.2%	106.9%
Wet_5Yr	YR2045	108.5%	106.9%	104.5%	106.6%	107.0%	106.8%	102.2%	102.6%	102.6%	105.4%	108.3%	109.3%

Table B8: Projected Changes in Outdoor Demand Under Median Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	101.0%	100.6%	100.4%	100.6%	100.7%	100.6%	100.4%	100.4%	100.6%	100.7%	101.0%	101.1%
Normal	YR2030	101.9%	101.1%	100.9%	101.1%	101.4%	101.1%	100.9%	100.9%	101.1%	101.4%	101.9%	102.2%
Normal	YR2035	102.7%	101.8%	101.6%	101.8%	102.2%	101.7%	101.2%	101.3%	101.5%	102.0%	102.9%	103.3%
Normal	YR2040	103.6%	102.6%	102.3%	102.6%	103.1%	102.3%	101.6%	101.8%	101.8%	102.6%	103.8%	104.5%
Normal	YR2045	104.4%	103.3%	103.0%	103.3%	103.9%	102.9%	101.9%	102.3%	102.2%	103.2%	104.8%	105.7%
Dry_1Yr	YR2025	100.8%	100.7%	100.4%	100.4%	101.0%	100.7%	100.6%	100.4%	100.4%	100.6%	100.7%	100.8%
Dry_1Yr	YR2030	101.6%	101.4%	100.9%	100.9%	101.9%	101.4%	101.1%	100.9%	100.9%	101.1%	101.4%	101.6%
Dry_1Yr	YR2035	102.2%	101.7%	101.5%	101.6%	102.7%	101.9%	101.4%	101.5%	101.6%	102.0%	102.3%	102.7%
Dry_1Yr	YR2040	102.8%	102.1%	102.1%	102.3%	103.6%	102.3%	101.6%	102.1%	102.3%	102.8%	103.3%	103.8%
Dry_1Yr	YR2045	103.4%	102.5%	102.7%	103.0%	104.4%	102.8%	101.8%	102.7%	103.0%	103.7%	104.3%	104.9%
Dry_5Yr	YR2025	101.0%	100.6%	100.4%	100.4%	100.8%	100.6%	100.4%	100.6%	100.6%	100.7%	101.1%	101.1%
Dry_5Yr	YR2030	101.9%	101.1%	100.9%	100.9%	101.6%	101.1%	100.9%	101.1%	101.1%	101.4%	102.2%	102.2%
Dry_5Yr	YR2035	102.5%	101.7%	101.5%	101.6%	102.2%	101.7%	101.3%	101.6%	101.5%	102.0%	103.0%	103.3%
Dry_5Yr	YR2040	103.1%	102.3%	102.1%	102.3%	102.8%	102.3%	101.8%	102.1%	101.8%	102.6%	103.8%	104.5%
Dry_5Yr	YR2045	103.7%	102.9%	102.7%	103.0%	103.4%	102.9%	102.3%	102.6%	102.2%	103.2%	104.6%	105.7%
Wet_1Yr	YR2025	101.5%	100.6%	100.3%	100.6%	100.7%	100.7%	100.4%	100.6%	100.4%	100.6%	100.7%	100.8%
Wet_1Yr	YR2030	102.9%	101.1%	100.6%	101.1%	101.4%	101.4%	100.9%	101.1%	100.9%	101.1%	101.4%	101.6%
Wet_1Yr	YR2035	104.1%	102.2%	101.3%	102.0%	102.5%	102.1%	101.2%	101.5%	101.3%	101.8%	102.1%	102.4%
Wet_1Yr	YR2040	105.2%	103.3%	102.0%	102.8%	103.6%	102.8%	101.6%	101.8%	101.8%	102.6%	102.8%	103.1%
Wet_1Yr	YR2045	106.4%	104.4%	102.8%	103.7%	104.6%	103.6%	101.9%	102.2%	102.3%	103.3%	103.6%	103.8%
Wet_5Yr	YR2025	101.1%	100.6%	100.4%	100.6%	100.8%	100.7%	100.6%	100.6%	100.6%	100.7%	101.0%	101.1%
Wet_5Yr	YR2030	102.2%	101.1%	100.9%	101.1%	101.6%	101.4%	101.1%	101.1%	101.1%	101.4%	101.9%	102.2%
Wet_5Yr	YR2035	103.1%	101.8%	101.5%	101.8%	102.4%	102.0%	101.5%	101.5%	101.5%	102.0%	102.6%	103.2%
Wet_5Yr	YR2040	104.1%	102.6%	102.1%	102.6%	103.1%	102.6%	101.8%	101.8%	101.8%	102.6%	103.3%	104.3%
Wet_5Yr	YR2045	105.0%	103.3%	102.7%	103.3%	103.8%	103.2%	102.2%	102.2%	102.2%	103.2%	104.0%	105.4%

Table B9: Projected Changes in Outdoor Demand Under Wetter with Moderate Warming Scenario

YearType	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Normal	YR2025	101.0%	100.6%	100.4%	100.6%	100.7%	100.6%	100.4%	100.4%	100.6%	100.7%	101.0%	101.1%
Normal	YR2030	101.9%	101.1%	100.9%	101.1%	101.4%	101.1%	100.9%	100.9%	101.1%	101.4%	101.9%	102.2%
Normal	YR2035	103.0%	100.9%	100.5%	100.6%	101.3%	101.5%	101.1%	101.0%	101.0%	101.1%	101.9%	102.9%
Normal	YR2040	104.0%	100.6%	100.1%	100.1%	101.1%	101.8%	101.3%	101.1%	100.9%	100.9%	101.9%	103.6%
Normal	YR2045	105.1%	100.4%	99.7%	99.7%	101.0%	102.2%	101.6%	101.2%	100.7%	100.7%	101.9%	104.3%
Dry_1Yr	YR2025	100.8%	100.7%	100.4%	100.4%	101.0%	100.7%	100.6%	100.4%	100.4%	100.6%	100.7%	100.8%
Dry_1Yr	YR2030	101.6%	101.4%	100.9%	100.9%	101.9%	101.4%	101.1%	100.9%	100.9%	101.1%	101.4%	101.6%
Dry_1Yr	YR2035	101.8%	100.7%	100.2%	100.2%	101.8%	102.0%	101.6%	101.7%	102.6%	102.9%	103.2%	102.8%
Dry_1Yr	YR2040	101.9%	99.9%	99.6%	99.6%	101.7%	102.6%	102.1%	102.6%	104.3%	104.8%	105.0%	104.0%
Dry_1Yr	YR2045	102.0%	99.2%	99.0%	99.0%	101.5%	103.2%	102.6%	103.4%	106.0%	106.6%	106.8%	105.2%
Dry_5Yr	YR2025	101.0%	100.6%	100.4%	100.4%	100.8%	100.6%	100.4%	100.6%	100.6%	100.7%	101.1%	101.1%
Dry_5Yr	YR2030	101.9%	101.1%	100.9%	100.9%	101.6%	101.1%	100.9%	101.1%	101.1%	101.4%	102.2%	102.2%
Dry_5Yr	YR2035	102.9%	100.7%	100.5%	100.6%	101.3%	101.5%	101.0%	101.2%	101.0%	101.0%	101.8%	102.9%
Dry_5Yr	YR2040	103.8%	100.4%	100.1%	100.3%	100.9%	101.8%	101.1%	101.4%	100.9%	100.7%	101.5%	103.6%
Dry_5Yr	YR2045	104.8%	100.0%	99.7%	100.1%	100.6%	102.2%	101.2%	101.5%	100.7%	100.3%	101.1%	104.3%
Wet_1Yr	YR2025	101.5%	100.6%	100.3%	100.6%	100.7%	100.7%	100.4%	100.6%	100.4%	100.6%	100.7%	100.8%
Wet_1Yr	YR2030	102.9%	101.1%	100.6%	101.1%	101.4%	101.4%	100.9%	101.1%	100.9%	101.1%	101.4%	101.6%
Wet_1Yr	YR2035	103.8%	100.6%	100.2%	100.5%	101.9%	101.7%	101.2%	101.1%	101.1%	101.1%	101.5%	102.1%
Wet_1Yr	YR2040	104.8%	100.1%	99.8%	99.9%	102.3%	102.1%	101.6%	101.1%	101.3%	101.1%	101.6%	102.6%
Wet_1Yr	YR2045	105.7%	99.7%	99.5%	99.3%	102.8%	102.5%	101.9%	101.1%	101.6%	101.1%	101.7%	103.1%
Wet_5Yr	YR2025	101.1%	100.6%	100.4%	100.6%	100.8%	100.7%	100.6%	100.6%	100.6%	100.7%	101.0%	101.1%
Wet_5Yr	YR2030	102.2%	101.1%	100.9%	101.1%	101.6%	101.4%	101.1%	101.1%	101.1%	101.4%	101.9%	102.2%
Wet_5Yr	YR2035	102.9%	100.7%	100.3%	100.7%	101.6%	101.6%	101.2%	101.0%	101.0%	100.8%	101.2%	102.6%
Wet_5Yr	YR2040	103.6%	100.4%	99.9%	100.4%	101.6%	101.9%	101.4%	100.9%	100.9%	100.2%	100.5%	103.1%
Wet_5Yr	YR2045	104.3%	100.0%	99.4%	100.0%	101.6%	102.1%	101.5%	100.7%	100.7%	99.6%	99.8%	103.6%

9.3 Appendix C

Table C-1: Identification of Potential Mitigation Actions and Their Key Identifiers

Project Number	Agency	Type of Mitigation Action	Project/Program Name	Location	Stage	Regional Partners	Timing/ Schedule	Estimated Capital Costs ($)	Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability			Regional Water Supply Reliability and Resiliency	Regional Benefits	Timing/ Schedule
									New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency			
1	Cal Poly Pomona	Groundwater Treatment Projects	VOC Treatment at Well 2	34°03'05"N 117°48'32"W	Conceptual		≤ 1 yr	$1,300,000			X				X			Meets 2 of the regional benefits	Single agency action	Short-term action
2	Cal Poly Pomona	Groundwater Treatment Projects	Install Additional RO Train at ROWTP	34°03'27"N 117°49'04"W	Conceptual		2-4 yrs	$750,000			X				X			Meets 2 of the regional benefits	Single agency action	Mid-term action
3	Cal Poly Pomona	Enhanced Well Efficiency	Repurpose Farm Well #4 water	34°02'33"N 117°48'48"W	Conceptual		1-2 yrs	≤ $2M		X					X			Meets 2 of the regional benefits	Single agency action	Short-term action
4	Cal Poly Pomona	New Extraction Wells	Future wells as injection (recycled water) and extraction		Conceptual	Three Valleys	1-2 yrs	$2-5M	X						X			Meets 2 of the regional benefits	Regional action	Short-term action
5	Rowland Water District & Walnut Valley Water District (through Puente Basin Water Agency)	New Extraction Wells	Six Basins Groundwater Project		Construction	RWD, WVWD	Late 2024	≥ $10M	X						X		X	Meets 2 of the regional benefits	Action involves multiple adjacent agencies	Short-term action
6	Rowland Water District & Walnut Valley Water District (through Puente Basin Water Agency)	System Interties	Covina Irrigating Company Interconnection		Conceptual	RWD, WVWD	2-4 yrs	$4,122,000				X			X		X	Meets 2 of the regional benefits	Action involves multiple adjacent agencies	Mid-term action
7	Walnut Valley Water District w/ Pomona (through Spadra Basin GSA)	New Extraction Wells	Spadra Basin Optimization Scenario 3		Conceptual	WVWD, Pomona	≥ 4 yrs	$160,527,246	X						X		X	Meets 2 of the regional benefits	Action involves multiple adjacent agencies	Long-term action
8	City of Covina Water Department	Upgrade Aging Infrastructure	Grand Avenue Water Main Replacement Project		Unknown		2027	$8,500,000					X					Meets 1 of the regional benefits	Single agency action	Mid-term action

									Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability					
Project Number	**Agency**	**Type of Mitigation Action**	**Project/Program Name**	**Location**	**Stage**	**Regional Partners**	**Timing/ Schedule**	**Estimated Capital Costs ($)**	New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency	**Regional Water Supply Reliability and Resiliency**	**Regional Benefits**	**Timing/ Schedule**
9	City of Covina Water Department	Upgrade Aging Infrastructure	Pipeline Replacement		Unknown		≥ 4 yrs	$2-5M					X		X	X		Meets 2 of the regional benefits	Single agency action	Long-term action
10	City of Covina Water Department	Upgrade Aging Infrastructure	Hurst Tract Water Main Replacement Project	From Cypress Avenue to Covina Boulevard and Grand Avenue to Brightview Drive	Unknown		FY25	$1,500,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
11	City of Covina Water Department	Upgrade Aging Infrastructure	Edna Place Pipe Improvements Project	Grand Avenue to Barranca Avenue	Unknown		FY28	$6,000,000					X					Meets 1 of the regional benefits	Single agency action	Mid-term action
12	City of Covina Water Department	Upgrade Aging Infrastructure	Navilla and Forestdale Main Replacement Project	From Puente Street to Rowland Avenue and From Grand to Barranca Avenue	Unknown		FY26	$5,000,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
13	City of Covina Water Department	Upgrade Aging Infrastructure	Azusa Avenue Main Installation Project	From Badillo Street to Edna Place	Unknown		FY27	$2,500,000					X					Meets 1 of the regional benefits	Single agency action	Mid-term action
14	City of Covina Water Department	Upgrade Aging Infrastructure	Fourth Avenue Water Main Replacement Project & Cypress Avenue Water Main Replacement Project	From Badillo Street to San Bernardino Road From Citrus Avenue to Barranca Avenue	Unknown		FY25	$2-5M					X					Meets 1 of the regional benefits	Single agency action	Short-term action

Project Number	Agency	Type of Mitigation Action	Project/Program Name	Location	Stage	Regional Partners	Timing/ Schedule	Estimated Capital Costs ($)	Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability					
									New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency	Regional Water Supply Reliability and Resiliency	Regional Benefits	Timing/ Schedule
15	City of Covina Water Department	Upgrade Aging Infrastructure	Cypress Reservoir Water Booster Improvement Project	1051 E. Cypress Street	Unknown		FY24	$850,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
16	City of Covina Water Department	Upgrade Aging Infrastructure	Rancho La Merced Water Improvement Project (Design Only)	Rancho La Merced	Unknown		FY24	$100,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
17	City of Covina Water Department	Conservation and Efficiency	Water Master Plan & Rate Update City-Wide	City-Wide	Unknown		FY24	$250,000						X				Meets 1 of the regional benefits	Single agency action	Short-term action
18	City of Covina Water Department	Upgrade Aging Infrastructure	San Joaquin Road and Rambling Road Main Replacement	From Covina Hills to Navilla Place	Unknown		FY27	$4,000,000					X					Meets 1 of the regional benefits	Single agency action	Mid-term action
19	City of Glendora	Enhanced Well Efficiency	Well #7 (Vosburg) Replacement	201 South Virginia Ave. Azua, CA	Feasibility		≥ 4 yrs	$2,000,000		X								Meets 1 of the regional benefits	Single agency action	Long-term action
20	City of Glendora	Upgrade Aging Infrastructure	North Glendora Tank Replacement	Glendora, CA	Feasibility		1-2 yrs	$1,180,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
21	City of Glendora	New Extraction Wells	Well #14 Replacement	Glendora, CA	Feasibility		≥ 4 yrs	$600,000	X						X	X		Meets 2 of the regional benefits	Single agency action	Long-term action
22	City of Glendora	Conservation and Efficiency	Turf Removal for Large Commercial and Municipal Properties	Glendora, CA	Design		≤ 1 yr	$550,000.00						X	X	X		Meets 2 of the regional benefits	Single agency action	Short-term action

Project Number	Agency	Type of Mitigation Action	Project/Program Name	Location	Stage	Regional Partners	Timing/ Schedule	Estimated Capital Costs ($)	Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability			Regional Water Supply Reliability and Resiliency	Regional Benefits	Timing/ Schedule
									New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency			
23	City of Glendora	Enhanced Well Efficiency	Redrilling Wells 10 and 11 for Exploration	Well-10 Location: GPS-340839.06N / 1175102.54W - Elev. 918' Cable Tool-1912 to 525' Well-11 Location: GPS-340829.20N / 1175113.46W - Elev.882' Cable Tool-1913 to 496'	Unknown		≥ 4 yrs	$2-5M		X								Meets 1 of the regional benefits	Single agency action	Long-term action
24	City of Glendora	System Interties	Pipeline Intertie Replacements		Unknown		2-4 yrs	≤ $2M				X						Meets 1 of the regional benefits	Single agency action	Mid-term action
25	City of Glendora	Enhanced Well Efficiency	Well 2 Replacement		Unknown		1-2 yrs	$2-5M		X								Meets 1 of the regional benefits	Single agency action	Short-term action
26	City of La Verne	System Interties	Connections to Weymouth WTP		Conceptual		2-4 yrs	≤ $2M				X						Meets 1 of the regional benefits	Single agency action	Mid-term action
27	City of La Verne	Groundwater Treatment Projects	Well Treatment 6th and White, Lincoln and Mills - Ion-Ex Plant	6th and white water facility	Conceptual		≥ 4 yrs	$2-5M			X				X	X		Meets 2 of the regional benefits	Single agency action	Long-term action
28	City of La Verne	Enhanced Well Efficiency	La Verne Heights Well #1 Replacement - Ion-Ex	LVH #1	Conceptual		≥ 4 yrs	$2-5M		X								Meets 1 of the regional benefits	Single agency action	Long-term action

Project Number	Agency	Type of Mitigation Action	Project/Program Name	Location	Stage	Regional Partners	Timing/ Schedule	Estimated Capital Costs ($)	Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability			Regional Water Supply Reliability and Resiliency	Regional Benefits	Timing/ Schedule
									New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency			
29	City of La Verne	System Interties	Conjunctive Use Concepts (Six Basins, Pomona Basin, Live Oak Basin)		Conceptual		≥ 4 yrs	≥ $10M				X						Meets 1 of the regional benefits	Single agency action	Long-term action
30	City of La Verne	Conservation and Efficiency	AMI	City wide	Design		2-4 yrs	$2-5M						X				Meets 1 of the regional benefits	Single agency action	Mid-term action
31	City of Pomona	New Extraction Wells, Enhanced Well Efficiency, Upgrade Aging Infrastructure, Groundwater Treatment Projects	Pomona Combined Project (Groundwater Quality Improvement, Anion Exchange Plant, & Reservoir 5)		Unknown		≥ 4 yrs	≥ $10M	X	X	X		X		X	X		Meets all regional benefits	Single agency action	Long-term action
32	City of Pomona	Upgrade Aging Infrastructure	Reservoir 6		Unknown		2029	≤ $2M					X					Meets 1 of the regional benefits	Single agency action	Long-term action
33	City of Industry	System Interties	Surface Water Storage Project		Unknown		≥ 4 yrs	≥ $10M				X						Meets 1 of the regional benefits	Single agency action	Long-term action
34	City of Industry	System Interties	Water Distribution System Reliability Project	Lat: 33.957826 Long: -117.858392	Design		Late 2025	$1,200,000				X						Meets 1 of the regional benefits	Single agency action	Short-term action
35	Three Valleys	Groundwater Treatment Projects	Filter Drain Valves		Conceptual		2025	$200,000			X							Meets 1 of the regional benefits	Regional action	Short-term action
36	Three Valleys	System Interties	Padua Pump Station		Conceptual		≥ 4 yrs	$5-10M				X						Meets 1 of the regional benefits	Regional action	Long-term action

Project Number	Agency	Type of Mitigation Action	Project/Program Name	Location	Stage	Regional Partners	Timing/ Schedule	Estimated Capital Costs ($)	Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability					
									New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency	Regional Water Supply Reliability and Resiliency	Regional Benefits	Timing/ Schedule
37	Three Valleys	Upgrade Aging Infrastructure, Conservation and Efficiency	Sludge Pond Mixing Upgrade		Conceptual		2027	$800,000					X	X				Meets 1 of the regional benefits	Regional action	Mid-term action
38	Three Valleys	Enhanced Well Efficiency	Grand Avenue Well Improvement		Conceptual		2029	$250,000		X								Meets 1 of the regional benefits	Regional action	Long-term action
39	Three Valleys	Enhanced Well Efficiency	Well 2 Improvement		Conceptual		2027	$200,000		X								Meets 1 of the regional benefits	Regional action	Mid-term action
40	Three Valleys	Conservation and Efficiency	PM-21 [Miramar] Bypass Magmeter		Conceptual		2026	$2,300,000						X				Meets 1 of the regional benefits	Regional action	Short-term action
41	Three Valleys	System Interties	Miramar Pumpback		Conceptual		2028	$2,000,000				X			X			Meets 2 of the regional benefits	Regional action	Short-term action
42	Three Valleys	Upgrade Aging Infrastructure	Hydroelectric Facilities Efficiency Upgrades		Conceptual		2030	$3,000,000					X					Meets 1 of the regional benefits	Regional action	Long-term action
43	Three Valleys	System Interties, Enhanced Well Efficiency	Groundwater Reliability Improvement Program		Feasibility	RWD, WVWD, Glendora	≥ 4 yrs	≥ $10M		X		X			X			Meets all regional benefits	Regional action	Long-term action
44	Three Valleys	Conservation and Efficiency	Renewable Energy Project[1]		Conceptual		2027	$250,000										Meets 1 of the regional benefits	Regional action	Mid-term action
45	Three Valleys	Upgrade Aging Infrastructure	Miramar System Condition Assessment		Conceptual		1-2 yrs	$2-5M					X					Meets 1 of the regional benefits	Regional action	Short-term action

Project Number	Agency	Type of Mitigation Action	Project/Program Name	Location	Stage	Regional Partners	Timing/ Schedule	Estimated Capital Costs ($)	Potential Benefits									Review		
									Increase Local Supply			Operational Flexibility			Water Supply Reliability					
									New Extraction Wells	Enhanced Well Efficiency	Groundwater Treatment Projects	System Interties	Upgrade Aging Infrastructure	Conservation and Efficiency	Projects that increase overall supply	Projects that reduce drought dependency	Projects that reduce overall dependency	Regional Water Supply Reliability and Resiliency	Regional Benefits	Timing/ Schedule
46	Suburban Water System	Groundwater Treatment Projects	201 PFOA/PFAS treatment	9825 Mission Mill Road Whittier, CA 90601	Design		2-4 yrs	$30,000,000			X							Meets 1 of the regional benefits	Single agency action	Mid-term action
47	Suburban Water System	Groundwater Treatment Projects	Plant 410 Treatment Plant		Unknown		2-4 yrs	$3,200,000			X							Meets 1 of the regional benefits	Single agency action	Mid-term action
48	Suburban Water System	Upgrade Aging Infrastructure	Plant 128 Pump Station and Reservoir Replacement		Unknown		≤ 1 yr	$5,500,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
49	Valencia Heights Water Company	Upgrade Aging Infrastructure	Grand Ave waterline replacement		Design		2-4 yrs	$400,000					X					Meets 1 of the regional benefits	Single agency action	Mid-term action
50	Valencia Heights Water Company	Upgrade Aging Infrastructure	Reservoir rehab and retrofitting #4a		Design		2-4 yrs	$400,000					X					Meets 1 of the regional benefits	Single agency action	Mid-term action
51	Valencia Heights Water Company	Upgrade Aging Infrastructure	Reservoir rehab and retrofitting #6b		Design		1-2 yrs	$500,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
52	Valencia Heights Water Company	Upgrade Aging Infrastructure	Reservoir rehab and retrofitting #6a		Design		1-2 yrs	$500,000					X					Meets 1 of the regional benefits	Single agency action	Short-term action
53	Valencia Heights Water Company	Upgrade Aging Infrastructure	Reservoir rehab and retrofitting #4b		Design		≥ 4 yrs	$500,000.00					X					Meets 1 of the regional benefits	Single agency action	Long-term action
54	Valencia Heights Water Company	Upgrade Aging Infrastructure	Golden Bough waterline replacement		Design		≥ 4 yrs	$550,000					X					Meets 1 of the regional benefits	Single agency action	Long-term action

[1] Project #44 is included to account for all proposed mitigation actions. However, upon further review with Three Valleys, it was determined that Project #44 does not qualify as a drought mitigation action.