2020
URBAN WATER MANAGEMENT PLAN

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Mission Statement

The Adelanto Water Department, through the Adelanto Public Utility Authority (APUA), is charged with providing safe, good quality, uninterrupted water at a reasonable pressure, to meet health and fire protection needs of that portion of the city served by the public water system. The Department must operate and maintain the water utility system in accordance with the City of Adelanto's ordinances and policies and the Environmental Protection Agency's Safe Drinking Water Act.

The Department, through the APUA, is also charged by the State of California with providing wastewater treatment consistent with requirements set forth in the Waste Discharge Requirements for the residents and customers of the City of Adelanto.

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ACRONYMS AND ABBREVIATIONS

20x2020	20% water use reduction in GPCD by year 2020
AB	Assembly Bill
ACT	Urban Water Management Planning Act
AF	Acre-Feet
AFY	Acre-Feet per Year
APG	Adaptation Planning Guide
APUA	Adelanto Public Utilities Authority
ASCE	American Society of Civil Engineers
AWAC	Alliance for Water Awareness and Conservation
AWWA	American Water Works Association
BAP	Base Annual Production
BMO	Basin Management Objective
BMP	Best Management Practice
CA	California
CALSIM	California Water Allocation and Reservoir Operations Model
CalWEP	California Water Efficiency Partnership
CASGEM	California Statewide Groundwater Elevation Monitoring
CCF	Hundred Cubic Feet
CII	Commercial/Industrial/Institutional
CIMIS	California Irrigation Management Information System
CH4	Methane
City	City of Adelanto
CO2	Carbon Dioxide
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council (now CalWEP)
CWC	California Water Code
CWP	California Water Plan
CWRP	Cooperative Water Resource Program
DBP	Disinfection Byproducts
DAC	Disadvantaged Community
DCR	State Water Project Delivery Capability Report
DMM	Demand Management Measure
DOE	Department of Energy
DOF	State Department of Finance
Domestic Water	Potable Water
DRA	Drought Risk Assessment
DWR	Department of Water Resources
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ET	Evapotranspiration
ETc	Evapotranspiration for a specific crop
ETo	Reference Evapotranspiration / for a standardized grass surface

ETr	Evapotranspiration for a standardized alfalfa surface
FPA	Free Production Allowance
GAC	Granular Activated Carbon
GAFB	George Air Force Base (Now Southern California Logistics Airport
GHG	Greenhouse Gases
GPCD	Gallons per Capita per Day
GPM	Gallons per Minute
GWMP	Groundwater Management Plan
HDR	High Desert Regional (Energy Leader Partnership)
HECW	High-Efficiency Clothes Washers
HET	High-Efficiency Toilets
Interim Target	2015 GPCD Interim Target
IRWM	Integrated Regional Water Management
IWA	International Water Association
kWh	Kilowatt Hours
Legislature	State of California Legislature
LID	Low Impact Development
M&I	Municipal and Industrial
MAF	Million Acre-Feet
MG	Million Gallons
MGD	Million Gallons per Day
MEEC	Mojave Environmental Education Consortium
Metropolitan	Metropolitan Water District of Southern California
MHI	Median Household Income
MGD	Million Gallons per Day
MWA	Mojave Water Agency
MWELO	Model Water Efficient Landscape Ordinance
N2O	Nitrous Oxide
NWIS	National Water Information System, USGS
PSY	Production Safe Yield
R3 or R-Cubed	Regional Recharge and Recovery Project
RNHA	Regional Housing Needs Assessment
RUWMP	Regional Urban Water Management Plan
RWMP	Regional Water Management Plan
RWQCB	Regional Water Quality Control Board
SBX7-7	Senate Bill X7-7, The Water Conservation Act of 2009
SB	Senate Bill
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SEMS	State Emergency Management System
SGMA	Sustainable Groundwater Management Act
SGWP	Sustainable Groundwater Plan
SFR	Single Family Residential
SWP	State Water Project

SWRCB or State Water Board	California State Water Resources Control Board
Target	2020 GPCD Target
TDS	Total Dissolved Solids
UCR	University of California Riverside
ULFT	Ultra Low Flow Toilet
USBR	United States Bureau of Reclamation
US EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VVWRA	Victor Valley Wastewater Reclamation Authority
VWD	Victorville Water District
Water Authority	Adelanto Water Authority
WRF	Water Reclamation Facility
WSCP or WSC Plan	Water Shortage Contingency Plan
WUE	Water Use Efficiency

EXECUTIVE SUMMARY

The City of Adelanto (City) 2020 Urban Water Management Plan (UWMP) is an update to its 2015 UWMP. The UWMP is a long-term resource planning document required by the State of California Water Code (CWC) Sections 10610-10657, updated by urban water suppliers every five years. The 2020 UWMP includes significant augmentation due to new requirements enacted by the State Legislature since 2015.

The UWMP presents the purpose of the plan, coordinated planning with other agencies, how the plan was prepared, and a description of the City's water service area, climate, and demographics (Chapters 1, 2 and 3).

The UWMP gathers, characterizes, and synthesizes water-related information from numerous sources to assess and project the City's water reliability. The City's 2020 UWMP includes water reliability forecasts through the year 2045. It also acts as a guide to maintain efficient use of urban water supplies, promote conservation programs and policies, and proactively plan and update the City's strategies to ensure that water supplies are available to meet existing and future needs for the community.

This Executive Summary satisfies the new requirement of CWC Section 10630.5, which requires a simple lay description of the UWMP to include a description of water supply and demand – how much water the City has and how much it uses. It also requires a summary of the City's strategy for meeting its water demands, the challenges facing the City, and other information necessary to provide a general understanding of the City's UWMP.

ES.1 WATER USE

Potable water is water that is safe to drink. The City treats, tests, and publishes reports on its water to ensure it meets numerous Federal and State drinking water regulations. The City provides this potable water to residential, commercial, industrial, institutional, and landscape customers within the City's service area.

In 2020, water demand for potable water totaled 4,647 acre feet (AF), as summarized by water use type in **"Single-Family"** and "Multi-Family" are residential homes. "Single-Family" means a residence that houses one family. "Multi-Family" refers to duplexes, apartments, and condominiums. "Losses" in **Table ES-1** refers to water losses in the distribution system, as supported by Water Loss Audit Forms the City prepares annually. The distribution system is the system of underground pipes, wells, pumps, and components that deliver drinking water and throughout the city. **Table ES-1** also shows the water demand projections for potable and recycled water in five year increments through 2045. . "Single-Family" and "Multi-Family" are residential homes. "Single-Family" means a residence that houses one family. "Multi-Family" refers to duplexes, apartments, and condominiums. "Losses" in **Table ES-1** refers to water losses in the distribution system, as supported by Water Loss Audit Forms the City prepares annually. The distribution system is the system of underground pipes, wells, pumps, and components that

deliver drinking water and throughout the city. **Table ES-1** also shows the water demand projections for potable and recycled water in five year increments through 2045. The projections reflect increasing usage based on the population projections in Chapter 3, planned residential and commercial development, and development of the recycled water system.

TABLE ES-1: DEMANDS FOR POTABLE AND RECYCLED WATER – 2020 AND PROJECTED

Use Type	Additional Description	2020 Actual (AF)	Projected Water Use (AF)				
			2025	2030	2035	2040	2045
Single Family	Residential	2,606	3,360	3,656	3,744	3,853	3,979
Multi-Family	Residential	162	100	109	111	114	116
Commercial		809	874	894	950	977	1,009
Industrial		0.35	1.5	1.5	1.5	1.7	1.7
Landscape/Irrigation		82	100	105	109	112	115
Other Potable		0.69	0.5	0.5	0.5	0.6	0.6
Losses		987	560	494	510	526	544
TOTAL POTABLE		**4,647**	**4,996**	**5,260**	**5,426**	**5,584**	**5,766**
Landscape/Irrigation	**TOTAL RECYCLED**	**0**	**20**	**23**	**25**	**25**	**27**

Climate change causes the weather to become more variable with longer and more frequent droughts, and increased periods of heavy rain and snow events. This results in an intensification of impacts on all water-related or dependent activities and systems. Climate change adds a level of uncertainty to the challenges of water planning—both for water supply and water use. The City has considered a range of climate change impacts in the water use projections for the 25-year planning period, as well as in its future water supply discussed below.

Given increased temperatures and evapotranspiration, it is expected that landscape irrigation use may tend to increase. However, this is countered by the statewide mandate to reduce per-capita use and limit outdoor per-capita use in the coming years. These mandates will likely outweigh any climate-related changes quantified.

ES.2 CALIFORNIA WATER CONSERVATION ACT (SBX7-7)

California Senate Bill X7-7, enacted in 2009, required a reduction in per person water use of 20 percent by 2020. The City's 2020 target water use was set in 2010 at 192 gallons per capita per day (GPCD). This means that each person living within the city should use no more than 192 gallons of water each day by the year 2020. The City Supplier achieved its targeted water use reduction for 2020, with an actual GPCD of 116.

ES.3 WATER SUPPLY

The City obtains all of its water supply from local groundwater in the Mojave River Groundwater Basin, commonly referred to as the Mojave Basin Area. The Mojave Basin Area was the subject of a court ordered adjudication in 1993 due to the rapid growth within the area, increased

withdrawals, and lowered groundwater levels. The court's Judgment appointed Mojave Water Agency (MWA) as Watermaster of the Mojave Basin Area. Judgment detail is provided in Chapter 6.

The Mojave Basin Judgment assigned Base Annual Production (BAP) rights to each water supplier using 10 AF or more, based on historical groundwater production during the period 1986-1990. The Judgment allocates a variable free production allowance (FPA), adjusted annually, which is a percentage of the BAP and the limit that a supplier may pump. The BAP is reduced or "ramped-down" over time until the FPA comes within 5 percent of the Production Safe Yield as defined by the Judgment. The FPA for the Alto Subarea is currently set at 65 percent of the BAP for agriculture and 55 percent of BAP for municipal and industrial for water year 2020-2021, down from 80 percent and 60 percent, respectively in 2015.

In 2020, the City used local groundwater as the sole source of water supply and does not purchase or import water from any other water suppliers or entities. The City has obtained some water from its connection with the Victorville Water District, which is also from local groundwater sources. Future water supply forecasts show supplemental water will be obtained through the MWA, which is also from groundwater. As of 2021, the City began purchasing water from MWA through the new Regional Recharge and Recovery Project (R3) Project.[1]

City wells tap into water from the Alto Subarea of the Mojave Basin. Conservation, importation of State Water Project water, MWA's R3 Project, and implementation of the Judgment have resulted in hydrologic balance in the Alto Subarea. The purpose of percentage rampdown is not to cause a reduction in pumping but a reduction in FPA to cause imported water supply to be purchased to offset deficits. However, should drier than average water supply conditions persist, or if localized water level declines result in degraded water quality, poor well performance or well failure or harm to riparian habitat, the Watermaster will re-visit rampdown recommendations in the Alto Subbasin.

Projected water supply available through 2045 is shown in **Table ES-2**. The City intends to continue to use groundwater as the sole source of potable supply combined with supplemental water through the intertie with MWA. The City's projected supply is the available FPA, which is currently 2,851 AFY, which may be adjusted annual by the Watermaster. Transfers between MWA and the City is also from groundwater; future year projections are determined based on the difference between available FPA and forecasted demand, although more would be available as needed. Recycled water will begin delivery for irrigation uses by 2025, increasing through 2045.

[1] The R^3 Project provides access to an alternative delivery system for the major water providers in the Mojave Basin and partially offsets their need to continue pumping within the local regional aquifer system. The Project is described in Chapter 6.

Table ES-2: Water Supplies – Projected to 2045						
Water Supply	**Additional Detail on Water Supply**	**Projected Water Supply Reasonably Available Volume (AF)**				
		2025	**2030**	**2035**	**2040**	**2045**
Safe Yield of Alto Subarea						
Alto Subarea	Production Safe Yield[1]	64,406	64,406	64,406	64,406	64,406
Reasonably Available Volume						
City of Adelanto	FPA of Safe Yield	2,851	2,851	2,851	2,851	2,851
Mojave Water Agency	Intertie with MWA	2,145	2,409	2,575	2,733	2,915
Recycled Water	Non-Potable	20	23	25	25	27
	Totals	**5,016**	**5,283**	**5,451**	**5,609**	**5,793**
NOTES: *DWR Submittal Table 6-9. [1] MWA Watermaster Report Water Year 2019-20, May 2021, Table 5-1						

ES.4 WATER RELIABILITY AND DROUGHT RISK ASSESSMENT

Water service reliability addresses the capability of the water supply to meet water demand during long-term droughts and emergency events in normal (average) existing conditions. One of the primary purposes of the UWMP is to have water suppliers determine if water supplies will be reliable during average years, a single dry year, and a five-year consecutive drought. A drought risk assessment was prepared by the City to ensure water service reliability. With continued effective water management strategies, the City is projected to have 100 percent water reliability in a single dry year or five-consecutive-year drought. Projections assume that City residents and businesses continue to conserve water, and increase conservation rates during droughts, as outlined in Chapter 7.

Table ES-3 shows the prediction of supply availability during a drought. Data is based on MWA's base years and reliability in the region and for the Mojave Basin.

Table ES-3: Reliability Assessment	
Year Type	**Percent of Average Supply (%)**
Average Year	100%
Single-Dry Year	100%
Consecutive Dry Years 1st Year	100%
Consecutive Dry Years 2nd Year	100%
Consecutive Dry Years 3rd Year	100%
Consecutive Dry Years 4th Year	100%
Consecutive Dry Years 5th Year	100%

Notes: MWA has indicated it has adequate supplies to meet demands during average, single-dry, and multiple-dry years throughout the 25-year planning period (MWA 2020 UWMP, May 2021).

ES.5 WATER SHORTAGE PLANNING

The City is responsible for conserving the available water supply, protecting the integrity of water infrastructure, and implementing a contingency plan in times of drought, supply reductions, failure of water distribution systems or emergencies. Particular emphasis is placed on use of potable water, sanitation, fire protection, and preserving public health, welfare, and safety, in addition to minimizing the adverse impacts of water supply shortage or other water supply emergency conditions that do not include recycled water.

The City of Adelanto Water Shortage Contingency Plan (WSC Plan) will serve as the City's operating plan to prevent catastrophic water service disruptions through proactive, rather than reactive, mitigation of water shortages. The WSC Plan provides the strategic responses the City may take if a water shortage is declared to conserve and manage precious water resources that are essential to maintain public health and community vitality. While the WSC Plan is included as an appendix to this 2020 UWMP as required by the Water Code, the WSC Plan is a separate document from the City's 2020 UWMP and can be amended, as needed, without amending the 2020 UWMP.

The WSC Plan includes the processes and procedures that will be deployed when shortage conditions arise, as summarized in Chapter 8. These procedures set the foundation for the City Council, City management, and staff to easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate to the degree of water shortage anticipated.

The WSC Plan establishes levels of water shortage (six levels) and the corresponding shortage response actions the City will take and require of its customers. The response actions are designed to help balance water demand with available supplies. The WSC Plan is a stand-alone plan (**Appendix I**) that can be updated separately, as-needed, from this UWMP.

ES.6 DEMAND MANAGEMENT MEASURES

"Water conservation is the easiest, most efficient and most cost-effective way to quickly reduce water demand and extend supplies, providing flexibility for all California communities. Water can be conserved even when it's raining, especially by turning off outdoor irrigation when the weather is providing ample irrigation." - *State Water Resources Control Board, Resolution 2017-004.*

Water conservation/water use efficiency is a key strategy for meeting future demand, especially amidst the prolonged drought conditions in California. Efficient water use is the most cost-effective way to achieve long-term conservation goals and provide the water supply reliability needed to adapt to the longer and more intense droughts that climate change is causing in California.

The City's Mandatory Water Conservation Plan (Chapter 8.20 City of Adelanto Municipal Code) Section 8.20.030 Regulations, and the City's Landscaping/Water Conservation Ordinance (Chapter 17.60, City of Adelanto Municipal Code) (**Appendix D**), provide a foundation of

permanent water conservation best management practices to be implemented by water consumers at all times. These regulations also include operational best practices utilized by the City.

Also known as "demand management," water use efficiency and conservation are an integral part of sustainably managing water resources in the City and in California. A growing population can increase the demand for water. Without mitigation measures, increased water demand, coupled with reduced supplies or shifts in supplies related to climate change and other factors, can jeopardize water reliability.

Demand management is a key strategy in the City's plan to managing water resources. As the City grows and population increases, water demand typically increases. However, the City's demand management measures (DMMs) promote the efficient use of water by the community. DMMs are discussed in detail in Chapter 9 and summarized below:

- **Water Waste Prevention Ordinances** The City has established a Mandatory Water Conservation Plan (Chapter 8.20). The nearly 20 regulations aim to establish water conservation as a way of life – even during years of normal average rainfall. The City also established Landscaping/Water Conservation regulations, which provides the minimum water conservation and landscape development standards.
- **Metering** Every water connection except for fire service is metered. Any significant increase in water usage is flagged and the City contacts the user to communicate a probable leak.
- **Conservation Pricing** Water billing rates encourage water conservation through a tiered rate structure. Each water account pays both a flat rate based on meter size as well as a volume-based rate based on amount of water used. The volume-based rate incorporates higher rates for higher usage tiers.
- **Public Education and Outreach** The City works collaboratively with MWA and the Alliance for Water Awareness and Conservation (AWAC) to provide outreach, educational and informational materials and literature, and water use efficiency programs. Regional conservation slogan and campaign "Save Water: Live Like a Desert Native", which reminds citizens that living in a desert region requires continual conservation. The City maintains an informational kiosk in the lobby at City Hall, hosts community events, participates in landscape rebate programs, staff workshops on conservation, and partners with the school districts to educate students and parents on water conservation and water use efficiency.
- **Programs to Assess and Manage Distribution System Real Loss** The City performs leak detection to identify water losses, whether on private property or city-owned pipes, and maintains a program to repair and replace City-owned water infrastructure. The City continue to focus on its water loss control program to reduce the amount of water loss. Understanding and controlling water loss from a distribution system is an effective way for the City to achieve regulatory standards and manage its existing resources.
- **Water Conservation Program Coordination and Staffing Support** The City's Customer Service Supervisor is responsible for coordination of water conservation and water use efficiency activities and programs for the benefit of the City's residents and businesses, as well as conservation ordinances and plans. In addition, the Customer Service Supervisor works in collaboration with and is supported by programs and information from MWA and AWAC, as described above.

With the City's strong water reliability, it is easy to become complacent with respect to water conservation. However, it is important that the City's residents continue to conserve water.

On May 31, 2018, two long-term water use efficiency bills were signed into law that will require urban water providers throughout California to set new permanent water use objectives for their service areas by 2022. The objectives are for the water supplier, not individual users.

CWC Section 10609 establishes new standards, practices and objectives as follows:

- Indoor residential water use of 55 GPCD – dropping incrementally to 52.5 GPCD beginning in 2025, then 50 GPC in 2030 and thereafter.

For the following, the California Department of Water Resources (DWR) is working to develop the criteria and quantity:

- Outdoor residential water use based on a community's climate and the amount of landscape area.
- CII water use – commercial water users, industrial water users, institutional water users, and large landscape water users.
- Water loss due to leaks in the water system pipes.
- Other unique local uses and situations, i.e., livestock water use.
- Credit for recycled water use.

The DWR will propose and implement methodologies for tracking and reporting indoor residential water for 2023. The City is preparing to meet these tracking and reporting requirements. The community's commitment to water conservation and demand management measures will need to ensure that indoor residential water use meets the legislated water use objectives.

ES.7 PLAN ADOPTION AND SUBMITTAL

As required by the CWC, the City notified the City of Victorville and the County of San Bernardino, as well as the Mojave Water Agency, specific City departments, and the Adelanto Public Utilities Authority, along with other stakeholders in the community, that it was updating its UWMP and its WSC Plan. The City also notified the same agencies that a public hearing by the City Council would be held before adoption of each plan.

The City encouraged community and public interest involvement in the UWMP update through inspection of the Draft UWMP and the Draft WSCP and through participation in the public hearing. The City posted the draft plans on its website, appropriately published the public hearing notification, and held the public hearing on August 25, 2021.

The City Council adopted each plan by resolution, submitted them to the DWR, and made the final UWMP and final WSCP publicly available on the City's webpage.

1.0 INTRODUCTION AND OVERVIEW

1.1 UWMP BACKGROUND, IMPORTANCE AND PURPOSE

Water planning is an essential function of water suppliers and is critical as California grapples with ongoing drought and expected long-term climate changes. Prior to the adoption of the Urban Water Management Planning Act (Act)[1], there were no specific requirements that water agencies conduct long-term resource planning. While many water agencies conducted long-term water supply and resource planning prior to the Act, those that did not were left vulnerable to supply disruptions during dry periods or catastrophic events.

Originally enacted in 1983, the Act ensures that urban water suppliers are proactively reviewing and managing water reliability, and also requires and provides the substance for the California Department of Water Resources (DWR) reporting to the State legislature on the status of water supply planning in California. The drought of 1976-1977 created severe water supply shortages throughout California. With several cities and water districts/agencies witnessing reduction in their water supplies and having to look for additional water sources elsewhere, an immediate need arose for a statewide, local level, long-term water management planning platform. To address and reduce the potential for future emergencies caused by inadequate water resource planning, the Act was proposed and adopted in 1983.

The Act has been modified over the years in response to the State's water shortages, droughts, and other factors. A significant amendment was made in 2009, after the drought of 2007-2009 and as a result of the Governor's call for a statewide 20 percent reduction in urban water use by the year 2020. This was the Water Conservation Act of 2009, also known as SB X7-7. This Act required agencies to establish water use targets for 2015 and 2020 that would result in statewide savings of 20 percent by 2020.

The UWMP is the legal and technical water management foundation for water suppliers throughout California. The UWMP gathers, characterizes, and synthesizes water-related information from numerous sources into a plan with local, regional, and statewide practical utility. This City of Adelanto (City) 2020 UWMP provides a framework for long-term water planning and informs the public of the City's plans for long-term resource planning to ensure adequate water supplies for existing and future demands. The UWMP documents the availability of an appropriate level of reliability of water service sufficient to meet the needs of the City's customers during normal, single dry and multiple dry years. This 2020 UWMP also identifies if the City has met its 2020 target. A long-term reliable supply of water is essential to protect the productivity of the City's and California's businesses and economic climate.

[1] California Water Code Section 10610-10656 Codes: Code Search (ca.gov)

1.2 URBAN WATER MANAGEMENT PLANNING, THE CALIFORNIA WATER CODE, AND LEGISLATURE DECLARATIONS

In addressing urban water management issues, the California Legislature has made a number of significant declarations including:

- The waters of the state are a limited and renewable resource subject to ever increasing demands.
- Conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
- A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.
- As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.
- Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.
- Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.
- Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.
- Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.
- The quality of source supplies can have a significant impact on water management strategies and supply reliability.

The Legislature also finds and declares that it is the policy of the State as follows:

- The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
- The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
- Urban water suppliers shall be required to develop water management plans to achieve the efficient use of available supplies and strengthen local drought planning.

California Water Code (CWC) Sections 10608 through 10657 are directly relevant to preparation of the urban water management plan. These sections include the Act and the Sustainable Water Use and Demand Reduction (SB X7-7) requirements. The CWC Section 10644 requires each urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to update its UWMP at least every five years on or before July 1 in years ending in six and one, incorporating updated and new information from the five years preceding each update.

The purpose of the UWMP is to integrate water supply and demand in a methodical planning platform to address short- and long-term water reliability. Specifically, the UWMP provides water supply planning for a 25-year planning period in five-year increments and identifies water supplies needed to meet existing and future demands. The demand analysis must identify supply reliability under three hydrologic conditions: a normal year, a single-dry year, and multiple-dry years. Enhanced water reliability planning encompasses:

- Changes in natural hydrology, climate, and groundwater conditions.
- Implications of regional, state, and federal regulations.
- Supply conditions and water use variability.
- Regional constraints on or opportunities for shared water resources.
- Local land-use changes, development, plans, and population growth.
- Water shortages and unforeseen calamities.
- Infrastructure improvements.
- Project funding needs and opportunities.

Since the Act was passed, it has undergone significant expansion and revision. Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions not only affect each supplier's water reliability determinations, but also the broad picture of statewide water reliability overseen by DWR, the State Water Resources Control Board (State Water Board), and the State of California Legislature (Legislature). Accordingly, the Act has grown to address changing conditions as it guides California's water resource management.

1.3 NEW REQUIREMENTS

In 2015 and again in 2020, DWR published an extensive Urban Water Management Plan Guidebook. The California legislature passed a number of additional requirements for the 2020 UWMP, which are included in the 2020 UWMP Guidebook and are included in Adelanto's 2020 UWMP. Highlights of the new requirements include:

- **Five Consecutive Dry-Year Water Reliability Assessment.** The Legislature modified the dry-year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive water years" designation. This statutory change requires a

Supplier to analyze the reliability of its water supplies to meet its water use over an extended drought period.

- **Drought Risk Assessment.** The Drought Risk Assessment (DRA) requires a Supplier to assess water supply reliability over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for five consecutive dry years.
- **Seismic Risk.** Suppliers must address seismic risk to their water infrastructure.
- **Water Shortage Contingency Plan Updates.** Adelanto's 2015 UWMP contained a Water Shortage Contingency Plan; however, 2018 legislative changes require modifications/enhancements to this Plan.
- **Groundwater Supplies Coordination.** 2020 UWMPs should be consistent with Groundwater Sustainability Plans, in areas where those plans have been completed by Groundwater Sustainability Agencies.
- **Urban Water Use Objectives and Water Use Reporting**. Water suppliers are now required to develop new water use objectives that are based on specific standards for certain water use sectors. Suppliers are to calculate an urban water use objective and provide actual water use no later than November 1, 2023, and by November 1 every year thereafter. The first report will require information on what demand management measures suppliers will implement to meet their objectives.
- **Lay Description.** The Legislature included a new statutory requirement for Suppliers to include a lay description of the fundamental determinations of the UWMP, especially regarding water service reliability, challenges ahead, and strategies for managing reliability risks. This UWMP includes the lay description in the Executive Summary.

1.4 URBAN WATER MANAGEMENT PLANS IN RELATIONS TO OTHER PLANNING EFFORTS

Development of the City's UWMP has been prepared in coordination with other planning efforts and agencies. Development of the UWMP was led by the Adelanto Water Department through the Adelanto Public Utilities Authority (APUA). [2] The APUA is charged with providing safe, good quality, uninterrupted water at a reasonable pressure, to meet health and fire protection needs of that portion of the city served by the public water system. The APUA staff coordinated with the City Planning Department, the City Clerk, the Mojave Water Agency (MWA) and others in development, distribution and adoption of the plan.

[2] References to the water system as the City or the APUA shall be considered synonymous.

The City's General Plan[3], specifically the 2014-2021 Housing Element, as well as the Adelanto North 2035 Comprehensive Sustainable Plan have been used to inform specific growth and socio economic elements within the city. The City's 2020 Local Hazard Mitigation Plan informed the UWMP new requirement to identify seismic risk to water infrastructure. Regional documents were also used including MWA's 2020 UWMP; the 2014 Mojave Region Integrated Regional Water Management (IRWM) Plan and 2018 Addendum to the IRWM Plan; the Metropolitan Water District of Southern California (Metropolitan) Draft 2020 UWMP; the California Water Plan California Water Plan Update 2009; and DWR's 2020 Urban Water Management Plans Guidebook for Urban Water Suppliers.

These documents have been used to incorporate information that support urban water management planning in the City and to ensure a holistic and consistent planning process in the region. Additional information on this coordination with other agencies is included in Section 2.

1.5 UWMP ORGANIZATION

The City's 2020 UWMP has been prepared in compliance with the requirements of the Act, as amended to 2020[4], and included in the CWC. The City's UWMP is organized in the following chapters:

Chapter 1 - Introduction and Overview: Importance and extent of the City's water management planning efforts, and Plan organization.

Chapter 2 - Plan Preparation: The City's process for developing this UWMP, including efforts in coordination and outreach.

Chapter 3 – Water System and Service Area Description: Description and map of the City's water service area, the City's history and organizational structure, the Public Water System, climate data and potential effects of climate change, and population and demographics.

Chapter 4 - Water Use Characterization: Describes and quantifies the current and projected water uses in normal conditions within the City's service area.

Chapter 5 - SBX7-7 Baselines and Targets: Describes the City's methodology for calculating its baseline and target water consumption, and identifies compliance of achieving its 2020 water use target.

Chapter 6 - Water Supply Characterization: Describes and quantifies the current and projected water sources available to the City, including water volumes for average year conditions, origin of water supply, water quality, issues unique to the supply, management

[3] City of Adelanto General Plan | Adelanto, CA (https://www.ci.adelanto.ca.us/352/City-of-Adelanto-General-Plan)
[4] California Water Code, Division 6, Part 2.6; §10610, et. seq. Established by Assembly Bill 797 (1983); can be found at: Codes: Code Search (ca.gov)

actions and projects that are anticipated to meet future water demand, and climate change impacts on supply.

Chapter 7 - Water Service Reliability and Drought Risk Assessment: Describes the reliability of the City's water supply and projects reliability for a 25-year planning horizon for normal, single dry years and five consecutive dry years. Includes an analysis of the City's water reliability risk to drought.

Chapter 8 - Water Shortage Contingency Plan: Describes the City's shortage level plan for responding to water shortages, including a catastrophic supply interruption. Includes shortage response actions for each of the six shortage levels, communication protocols, enforcement, reporting, and refinement procedures.

Chapter 9 - Demand Management Measures: Demonstrates the City's efforts to promote water conservation and to reduce demand on its water supply, specifically detailing efforts for designated demand management measures. The demand management measures include those the City has implemented, or Mojave Water Agency has implemented on behalf of the City or is considering implementing pursuant to the requirements of the Act.

Chapter 10 - Plan Adoption and Submittal: Describes the City's actions taken to provide notification to agencies, adopt and submit the UWMP to the DWR, make it available to the public, and process to amend the adopted UWMP, if needed.

The sections in this UWMP correspond to the outline of the Act and as recommended in the DWR 2020 Guidebook for Urban Water Suppliers. Further, the tables included are required by DWR and in the format presented in the 2020 Guidebook. They are both inclusive in the UWMP and submitted to DWR as a separate Excel file through the online WUEdata Portal. The DWR Urban Water Management Plan Checklist form from the Guidebook has been completed and is included in **Appendix A**. The Checklist identifies the location in this UWMP where required elements can be found.

The UWMP is intended to serve as a general, flexible, and open-ended document that periodically can be updated to reflect changes in regional water supply trends and water use efficiency policies. The City's UWMP, along with other City planning documents, will be used by City staff to guide water use and management efforts through the year 2025, when the UWMP is required to be updated.

2.0 URBAN WATER MANAGEMENT PLAN PREPARATION

The Urban Water Management Planning Act requires that a description be provided for the process that was used for the preparation of the UWMP. This chapter provides the legal requirement to prepare this plan, the option of regional planning, and the coordination and outreach related to this plan. This chapter also includes related reporting tables that are required by DWR.

To assist in preparation of the City's 2020 UWMP, consultants to the City for preparation of the UWMP participated in multiple online UWMP webinars in winter 2020-21 facilitated by DWR. This UWMP includes required standardized forms and tables specified by DWR, including a tables to report water use and supply information and specific tables to provide information sufficient to assess compliance with 20x2020 conservation targets.

2.1 BASIS FOR PREPARING THE PLAN

California Health and Safety Code 116275 (h) "Public Water System" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. The City's Public Water System data has been reported to the California Water Resources Control Board, which determines whether or not the City has reached the UWMP reporting threshold of 3,000 or more connections or 3,000 AF of water supplied.

At year-end 2020, the City served more than 3,000 water connections, and thus continued to qualify as an urban water supplier subject to the legislated requirements to prepare an urban water management plan. Therefore, the City was required to update its 2015 UWMP to 2020 information and submit the Plan to DWR.

Table 2-1 shows the City's 2020 water system information that demonstrates it is considered a Public Water System.

Table 2-1: Public Water System

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 (AF)
CA3610001	City of Adelanto	8,228	4,647
	TOTAL	**8,228**	**4,647**

NOTES: The City of Adelanto serves only one public water system.

2.2 INDIVIDUAL OR REGIONAL COMPLIANCE

An urban water supplier may elect to submit an individual UWMP or may work with other entities to provide a regional plan.

The City communicates regularly with related water supply stakeholders; however, for purposes of the UWMP, the City reports solely on the City's service area and is not a part of a regional alliance or regional urban water management plan, as shown in **Table 2-2**.

The City has notified and coordinated with all appropriate regional agencies and stakeholders.

Table 2-2: Plan Identification		
☑	Individual UWMP	
☐	Regional UWMP (RUWMP)	
	Select One:	
	☐	RUWMP includes a Regional Alliance
	☐	RUWMP does not include a Regional Alliance

2.3 TYPE OF AGENCY, CALENDAR YEAR, AND UNITS OF MEASURE

The City of Adelanto is a retailer water supplier, defined as a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

DWR prefers that agencies report on a calendar year basis in order to ensure UWMP data is consistent with data submitted in other reports to the State. However, DWR also understands that for some agencies fiscal year reporting ensures consistency with local, regional, and/or financial reports. The City has reported data on a calendar year in this UWMP.

Water agencies use various units of measure when reporting water volumes, such as acre-feet (AF), million gallons (MG), or hundred cubic feet (CCF). The City of Adelanto is reporting its units of measure to report water volume in AF. **Table 2-3**, as required, shows the type of agency, reporting years, and units of measure for the City.

Table 2-3: Agency Identification	
Type of Agency	
☐	Agency is a wholesaler
☑	Agency is a retailer
Fiscal or Calendar Year	
☑	UWMP Tables Are in Calendar Years
☐	UWMP Tables Are in Fiscal Years
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF

2.4 COORDINATION AND OUTREACH

2.4.1 WHOLESALE AND RETAIL COORDINATION

Retail agencies that receive water supply from one or more wholesalers are required to provide their wholesaler(s) with the retail agency's projected water demand from that source, in five-year increments for 20 years, or as far as data is available. **Table 2-4** shows the City has provided information to the Mojave Water Agency (MWA), as its wholesale water supplier, of its projected water demand. Over the past ten years, 100 percent of the City's potable water supply has been pumped from the groundwater aquifer. The groundwater basin is managed by MWA, which has rights to imported water from the DWR State Water Project (SWP).

Table 2-4 Retail: Water Supplier Information Exchange
The City of Adelanto, retail supplier, has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
Wholesale Water Supplier Name
Mojave Water Agency

2.4.2 COORDINATION WITH OTHER AGENCIES AND THE COMMUNITY

The UWMP requires coordination with other planning agencies and is most effective when integrated with other planning efforts to ensure a holistic planning process. A regional, cross-sector planning process can help the City better meet requirements, maintain consistency with other processes, create stronger water management, and further planning objectives.

The APUA staff coordinated with the City Planning Department, the City Clerk, the Mojave Water Agency (MWA) and others in development, distribution and adoption of the plan as shown in **Table 2-5**.

Table 2-5: Adelanto 2020 UWMP Development Coordination and Public Involvement						
Agency	**Participated in UWMP Preparation**	**Used Agency Data as an Information Resource**	**Sent and/or Available To: Copy of Draft UWMP**	**Commented on Draft UWMP**	**Sent Notice of Public Hearing**	**Attended Public Hearing**
APUA	√	√	√	√	√	√
City Planning Department	√	√	√	√	√	√
City Clerk		√	√		√	√
MWA		√	√			
Victorville Water District		√	√		√	
County of San Bernardino		√	√		√	
CA Department of Water Resources		√				
General Public			√		√	√

Over the past 15 years, 100 percent of the City's potable water supply has been pumped from the groundwater aquifer. The groundwater basin is managed by MWA, which has rights to imported water from the DWR State Water Project (SWP). This UWMP incorporates data obtained from these agencies where appropriate.

The intent of this UWMP is to focus on specific issues unique to the City's water service area. However, in preparing the 2020 UWMP, the City utilized information from the following regional agency documents:

- MWA's 2020 UWMP.[5] While some regional UWMP issues are introduced in the City's 2020 UWMP, more comprehensive regional information is presented in MWA's 2020 UWMP.
- 2015 Mojave Salt and Nutrient Management Plan (SNMP).[6] The City is a stakeholder in the SNMP. The purpose of the Mojave SNMP is to (1) promote reliance on local sustainable water sources such as recycled water and stormwater, while maximizing the use of available high-quality imported State Water Project (SWP) supplies in the MWA service area, and (2) manage salts and nutrients from all sources on a sustainable basis to ensure attainment of water quality objectives and protection of beneficial uses so

[5] 2020 MWA UWMP, May 27, 2021, available at: https://www.mojavewater.org/files/MWA2020UWMP_Final061621.pdf

[6] Planning - Mojave Water Agency (https://www.mojavewater.org/planning.html)

compliance with the Regional Water Quality Control Plans (Basin Plans) is met.

- 2014 Mojave Region Integrated Regional Water Management (IRWM) Plan and 2018 Addendum to the IRWM Plan.[7]
- Mojave Basin Area Watermaster Reports.[8] MWA was appointed as Watermaster in 1993 pursuant to the Court Judgment which adjudicated the rights to pump groundwater in the Mojave Basin Area.
- The Metropolitan Water District of Southern California (Metropolitan) Draft 2020 UWMP, February 2021[9] (a source of information pertaining to the SWP). Metropolitan's 2020 UWMP is being developed as part of the 2020 Integrated Water Resources Plan (IRP) planning process. Metropolitan's IRP represents Metropolitan's comprehensive resource planning process and serves as Metropolitan's blueprint for long-term water reliability, including key supply development and water use efficiency goals. The IRP is where Metropolitan discusses specific activities.
- The California Water Plan Update 2018. [10] The California Water Plan provides recommended actions, funding scenarios, and an investment strategy to bolster efforts by water and resource managers, planners, and decision-makers to overcome California's most pressing water resource challenges.
- The *"2020 Urban Water Management Plans Guidebook for Urban Water Suppliers", Final March 2020* prepared by DWR.

This UWMP details the specifics as they relate to the City and its service area and will refer to MWA and other agencies throughout. Numerous references were used in the development of this UWMP and are cited in footnotes throughout the Plan.

2.4.3 NOTICE TO CITIES AND COUNTIES

As the urban water supplier to the City of Adelanto service area, the City provided notification to the following agencies that it was reviewing its 2015 UWMP and considering amendments or changes to the plan.

- City of Victorville
- County of San Bernardino
- Mojave Water Agency

Notification was provided on March 26, 2021, within the required 60 days before the public hearing on the UWMP, and an additional notice was provided on July 14, 2021 regarding the date of the public hearing. Additional information regarding the public hearing and adoption of the plan are included in Chapter 10. Copies of the notification letters are included in **Appendix J**.

[7] 2014 Mojave Region IRWM Plan and 2018 Addendum available at: http://www.mywaterplan.com/irwm-plan-documents.html
[8] Watermaster Department - Mojave Water Agency (https://www.mojavewater.org/watermaster.html)
[9] www.mwdh2o.com/PDF_About_Your_Water/Draft_Metropolitan_2020_UWMP_February_2021.pdf
[10] Update 2018 (ca.gov) (https://water.ca.gov/Programs/California-Water-Plan/Update-2018)

3.0 WATER SYSTEM AND SERVICE AREA DESCRIPTION

3.1 GENERAL DESCRIPTION

Water Service Area

Incorporated in 1970, Adelanto is located on U.S. Highway 395, in the western portion of California's Mojave Desert in southwestern San Bernardino County. The City of Adelanto (City) is situated 35 miles north of the City of San Bernardino, via Interstate 15. Elevations within the City range approximately between 2,700 and 3,200 feet above mean sea level and are separated into three (3) pressure zones – Zone 1, Zone 2, and Zone 3. The terrain generally slopes from southwest to northeast. The terrain has allowed the development to occur mostly in Assessment District 1A and towards the northern end of the City.

The City encompasses approximately 34,565 acres (53.8 square miles) and additional 2,306 acres (3.6 square miles) that may be annexed into the City. Its sphere of influence extends that figure to approximately 77 square miles. Section 3.2 identifies and shows the water service area maps.

Water Utility and System Facilities

In 2020, about 4.03 million gallons (12.37 acre-feet [AF]) of water were pumped each day from a combination of seven (7) of the City's active wells. This pumped water comes from underground storage areas (called "aquifers") located within the City and along the Mojave River. These aquifers are recharged by rainfall, snowmelt, and (artificially) by the State Water Project (SWP). The City also has an emergency source connection with the City of Victorville for backup or emergency needs

The City's water system delivers water to three pressure zones and consists of wells, transmission and distribution pipelines, booster stations and reservoirs. These facilities include:[1]

- Approximately 113 miles of transmission and distribution mains ranging in diameter from 6- to 24-inches;
- Seven active potable water wells with a total pumping capacity of 4,728 gallons per minute (GPM). The City also has eight wells, which are currently inactive, but some of which may be returned to service in future years. These totals include two wells rehabilitated since 2007 and two new wells drilled in 2005 and 2008;
- Seven welded steel tanks ranging in size from 0.75 million gallons (MG) to 5 MG with a total capacity of 21.75 MG;
- Four booster stations which pump water from lower to upper pressure zones;
- Four pressure reducing stations, transferring water from upper to lower pressure zones; and
- Two emergency interties with the Victorville Water District and one with the Mojave Water Agency.

[1] Water facility information extracted from the City of Adelanto Water Master Plan, December 2007, prepared by So & Associates Engineers, Inc., with adjustments based on input from City staff.

Land Use

Land use within the City's water service area consists of a combination of residential, commercial, manufacturing/industrial, airport park, airport development district, public/semi-public open space, and specific plan area. The majority of the City is manufacturing/industrial and residential development, consisting of single-family housing, with some commercial acreage.

The newest City projects include land use for single-family homes, institutional, commercial, and industrial. Specifically, the Adelanto Detention Center West, Adelanto High School, Native Sun Power, Victor Phelan Solar, and Vulcan Materials. In planning and moving toward construction are the Lewis Retail Center, 241 new single-family homes, and multiple industrial businesses, including cannabis and processing plants. Development of several new hotels are also being considered.

Based on historical growth within the City boundary, it is expected that single family will continue to account for the majority of new growth during the planning horizon, with associated commercial/industrial developments. The City is currently approximately only 15 percent built out.

Organizational Structure

Adelanto was founded in 1915 by E.H. Richardson, the inventor of what became the Hotpoint Electric Iron. He sold his patent and purchased land for $75,000. He had planned to develop one of the first master planned communities in Southern California. Richardson subdivided his land into one-acre plots, which he hoped to sell to veterans with respiratory ailments suffered during World War I. He also hoped to build a respiratory hospital. While Richardson never fully realized his dream, it was his planning that laid the foundation for what is currently the City of Adelanto.

Adelanto continued as a "community services district" until 1970, when the city incorporated, and Adelanto became San Bernardino County's smallest city, later becoming a charter city in November 1992. As described in Chapter 2, the City of Adelanto is a retailer water supplier, providing water and wastewater services through the Adelanto Public Utilities Authority (APUA/Authority), a component unit of the City. The Authority was formed by action of the Adelanto City Council on October 22, 1996. The Authority was formed for the purpose of purchasing and operating the City's wastewater operations. In conjunction with that purchase, the Authority issued bonds to finance the down payment to the City and the construction of a wastewater treatment plant. The Authority also issued a note payable to the City to finance the purchase of the existing wastewater assets.

On February 29, 2000, the APUA entered into a purchase agreement with the Adelanto Water Authority (Water Authority) to purchase the Water Authority's water system (Water Enterprise), including the Water Enterprise's total assets and assumption of its total liabilities and obligations under the original agreement in January 1996, under which the Water Authority was first formed by the City.

The Authority is an integral part of the reporting entity of the City. The funds of the Authority are included within the scope of the basic financial statements of the City because the City Council is the governing board over the operations of the Authority.

3.2 SERVICE AREA AND BOUNDARY MAP

Starting with the regional area, **Figure 3-1** shows the Mojave Water Agency location in relation to the State of California, which the City is a water supplier agency of the Mojave Water Agency. Looking closer, **Figure 3-2** shows the largest water suppliers of the Mojave Water agency, including the City of Adelanto.

The City's water service area boundaries are depicted in **Figure 3-3**, which are consistent with the City's boundaries. While water lines shown in areas outside the City boundaries, all lines are strictly transmission lines and not service lines.

In the 2015 UWMP, it was noted that in small areas of the City that did not have water lines, residents in those areas purchased water from a water fill station located at the City's main Water Service yard. Water sales were metered and accounted for in Commercial water use. Since that time, the water fill stations have since been concluded due to liabilities.

3.3 SERVICE AREA CLIMATE DATA AND POTENTIAL EFFECTS OF CLIMATE CHANGE

Climate Characteristics

The City's service area lies within California's High Desert with a climate that differs considerably from other areas of Southern California. A broad range of temperature fluctuations between summer and winter, as well as between day and night, characterize the high desert's climate. Also characteristic of the high desert is an average humidity of 42% and strong winds that blow in a northeasterly direction. It is not unusual to experience winds of 30- 40 mph or higher, although the average wind speed is 10.9 mph.

A regional network of weather stations provides climate data throughout the watershed. Annual variations in evapotranspiration, precipitation and air temperature, for Victorville CA, are shown in **Table 3-1** and **Table 3-2**. The Victorville weather station is representative of the City's service area climate.

Average annual rainfall in Adelanto is just 5.52", typically occurring in late fall and winter, although the high desert does experience summer thunderstorms. Some snow also falls during winter months, averaging 1.4" annually. The average maximum and minimum temperatures are 77.5^{o}F and 43.9^{o}F, respectively. **Table 3-1** summarizes area temperatures and precipitation data.

Figure 3.1 Mojave Water Agency Area

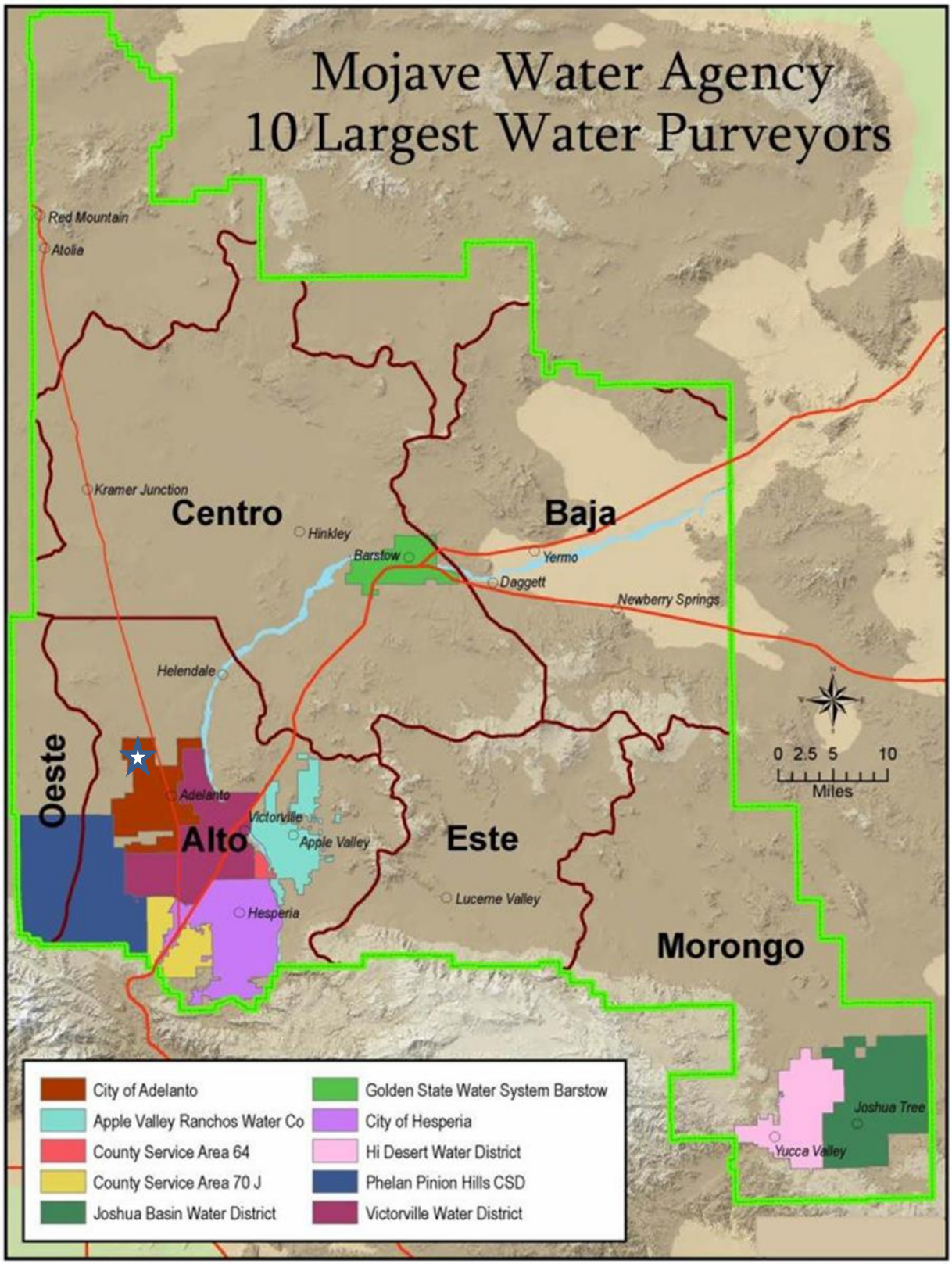


Figure 3.2 Location of City of Adelanto in Mojave Water Agency Area

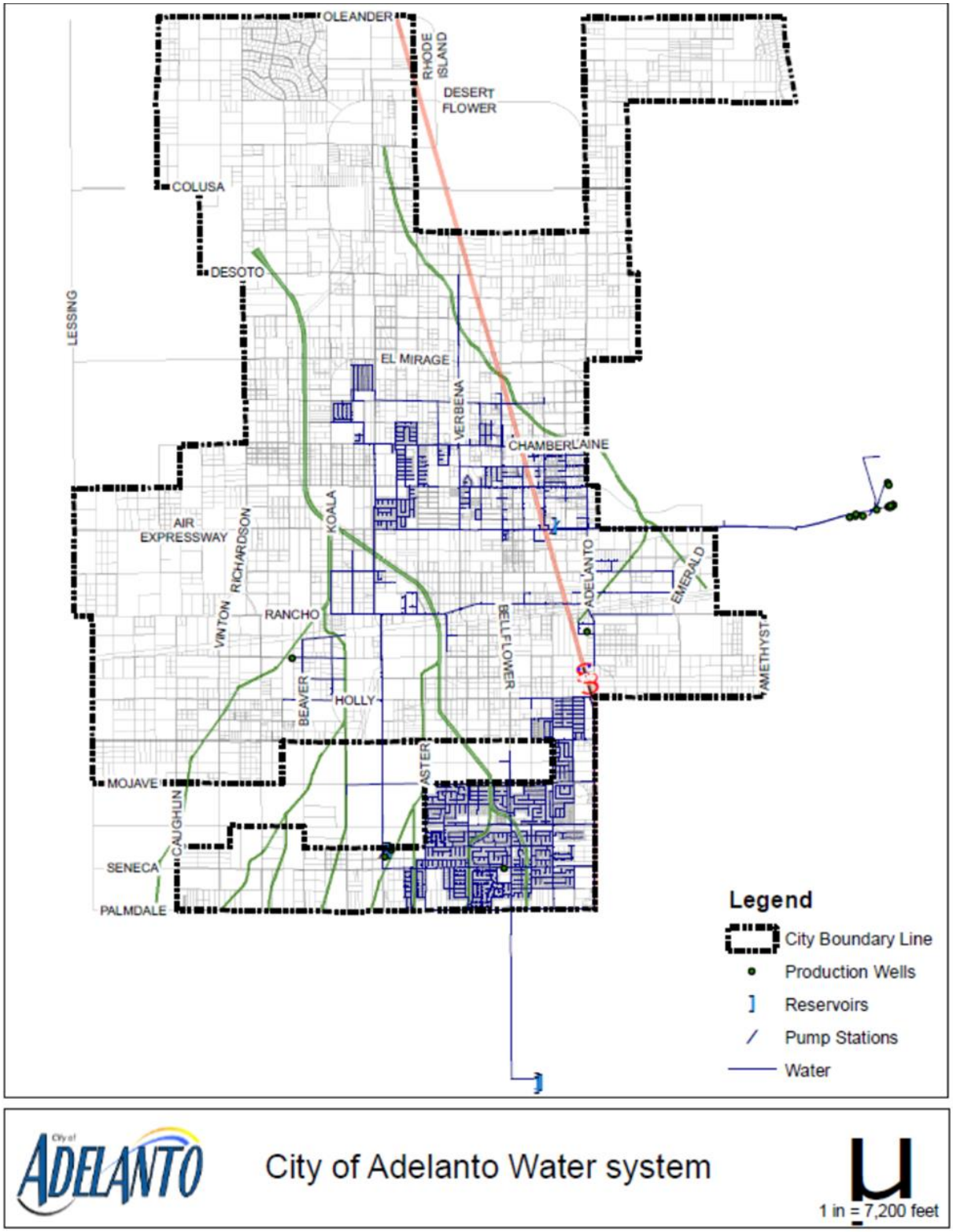


Figure 3.3 City of Adelanto Water Service Area

Table 3-1: Adelanto Average Temperatures and Precipitation[2]														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total or Average
Temp (ºF)	Max	58.0	603	67.5	73.3	81.9	91.7	96.5	95.6	89.9	77.9	66.0	56.4	
	Min	39.9	40.2	44.3	47.6	54.0	61.1	67.7	67.1	63.2	54.8	46.0	39.0	
Rainfall (inches)		2.0	2.4	1.4	0.7	0.3	0.1	0.5	0.4	0.3	0.5	0.6	1.5	10.6
Snowfall (inches)		0.9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.4

Evapotranspiration

Evapotranspiration (ET) is the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). It is an indication of how much water crops, lawn, garden, and trees need for healthy growth and productivity. For ET to take place, the following conditions have to be met. First, water has to be present at the surface. Second, there must be some form of energy to convert the liquid water into a water vapor. Third, there must be a mechanism to transport the water vapor away from the evaporating surface.

Precipitation and irrigation are the two primary sources of water that plants use. Plant leaves and soil surfaces temporarily retain some part of the water applied to the field. This part is readily available for evaporation. The remaining part infiltrates into the soil. Plants extract the infiltrated water through their roots and transport it up to their leaves for photosynthesis, a process by which plants produce glucose (sugar).

Multiple factors affect ET, including:

- Weather parameters such as solar radiation, air temperature, relative humidity and wind speed;
- Soil factors such as soil texture, structure, density and chemistry; and
- Plant factors such as plant type, root depth, foliar density, height and stage of growth.

Although ET can be measured using such devices as lysimeters, estimating ET using analytical and empirical equations is a common practice because measurement methods are expensive and time consuming. Most ET equations were developed by correlating measured ET to measured weather parameters that directly or indirectly affect ET. Since there are so many factors affecting ET, it is extremely difficult to formulate an equation that can produce estimates of ET under different sets of conditions. Therefore, the idea of a reference crop ET was developed by researchers. Reference ET is the ET rate of a reference crop expressed in inches or millimeters.

Reference crops are either grass or alfalfa surfaces whose biophysical characteristics have been studied extensively. ET from a standardized grass surface is commonly denoted as ETo whereas ET from a standardized alfalfa surface is denoted as ETr. The American Society of Civil Engineers

[2] Data obtained from https://en.climate-data.org/north-america/united-states-of-america/california/adelanto-16155/.

(ASCE) recommends the use of ETos and ETrs, respectively, where "s" stands for standardized surface conditions. The logic behind the evapotranspiration idea is to set up weather stations on standardized reference surfaces for which most of the biophysical properties used in ET equations are known. ET from such surfaces can then be estimated using these known parameters and measured weather parameters. Then a crop factor, commonly known as the "crop coefficient" of "Kc" is used to calculate the actual evapotranspiration (ETc) for a specific crop in the same microclimate as the weather station site.

The California Irrigation Management Information System (CIMIS), DWR, Office of Water Efficiency is using well-watered actively growing closely clipped grass that is completely shading the soil as a reference crop at most of its over 130 weather stations. Therefore, reference evapotranspiration is mostly referred to as ETo on the CIMIS website, although there are a few notable exceptions with ETr. There are many theoretical and empirical equations around the world to estimate ETo. The choice of any one method depends on the accuracy of the equation under a given condition and the availability of the required data. For reference surfaces with known biophysical properties, the main factors affecting ETo include solar radiation, relative humidity/vapor pressure, air temperature and wind speed. Therefore, ETo can be estimated quite accurately using a model (a series of mathematical equations).

The monthly average ETo data shown in **Table 3-2** has been extracted from the CIMIS Victorville station (#117)[3], which is the closest station to Adelanto (located in Victorville near the intersection of Mojave Fish Hatchery Road and Jacaranda Avenue).

Table 3-2: Evapotranspiration (ETo) Rates for Adelanto Area – May 2020 – April 2021[4]

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
ETo (inches)	8.63	9.03	10.00	9.22	6.86	4.79	2.88	2.09	2.41	3.44	5.11	7.28	71.83

Source: CIIMIS, Victorville – San Bernardino – Station 117, Activated February 1, 1994

Potential Effects of Climate Change

Climate change is driven by increasing concentrations of carbon dioxide and other greenhouse gases (GHG) that cause an increase in temperature and stress natural systems, such as oceans and the hydrologic cycle. There is scientific evidence that global climate conditions are changing and will continue to change due to continued build-up of GHG in the earth's atmosphere. Climate change is expected to affect temperature, storm intensity, flooding, riparian and aquatic habitat and ecosystems, and seawater intrusion all across the state. Changes in climate can affect water supply and water quality through modifications in the timing, amount, and form of precipitation.

[3] For additional information, refer to the CIMIS website at:
http://www.cimis.water.ca.gov/cimis/frontStationDetailInfo.do?stationId=174&src=info
[4] Data based on CIMIS station #117 in Victorville, CA, the closest station to Adelanto (http://www.cimis.water.ca.gov/cimis/monthlyEToReport.do);

Increased temperatures also influence water supplies through ETo and increased water demands, particularly for agriculture.

Atmospheric GHG play a critical role in the Earth's radiation amount by trapping infrared radiation emitted from the Earth's surface, which otherwise would have escaped to space. Prominent GHG contributing to this process include carbon dioxide (CO2), methane (CH4), ozone, water vapor, nitrous oxide (N2O), and chlorofluorocarbons (CFCs). This phenomenon, known as the Greenhouse Effect, is responsible for maintaining a habitable climate. These gases allow solar radiation into the earth's atmosphere, but prevent radioactive heat from escaping, thus warming the earth's atmosphere. GHG can occur naturally as it has in the past with the previous ice ages. GHGs are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural GHG effect, the earth's average temperature would be approximately 61° Fahrenheit cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

Emissions of gases that induce climate change are attributable to human activities associated with industrial/manufacturing, agriculture, utilities, transportation, and residential land uses. Transportation is responsible for 41 percent of the State's GHG, followed by electricity generation.

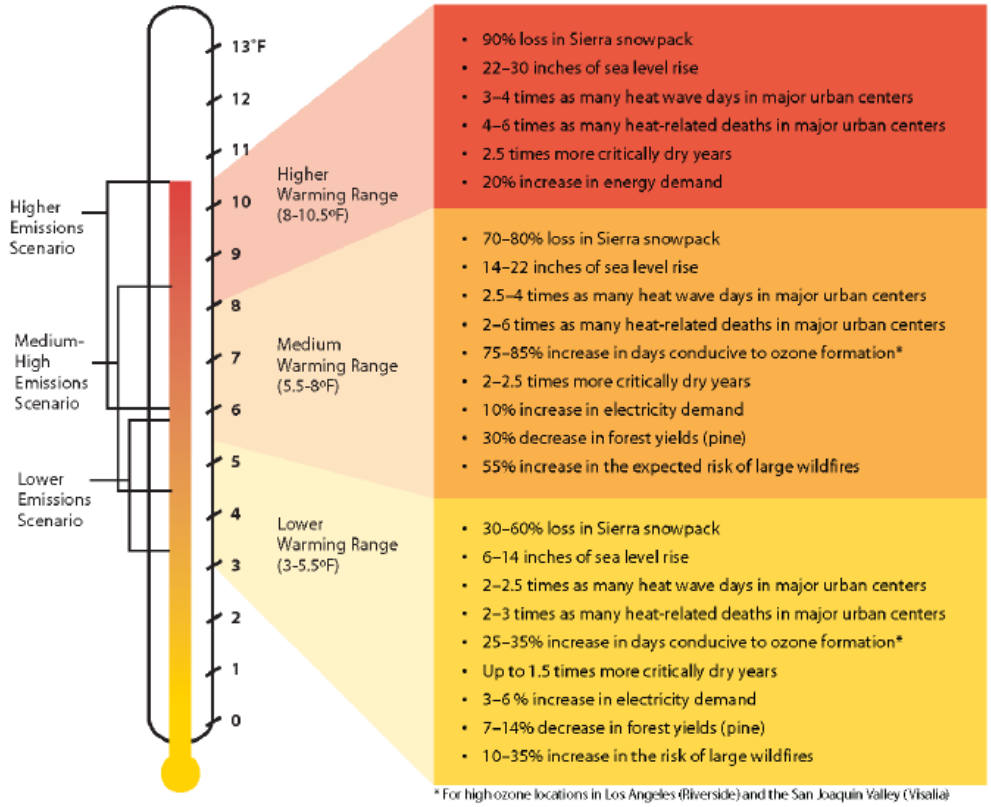
Effects on Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation.

Greenhouse Gases and Health Effects

The potential health effects related directly to the emissions of CO2, CH4, and N2O as they relate to development projects are still being debated in the scientific community. Their cumulative effects to global climate change have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas. **Figure 3.4** shows a summary of project global warming (climate change) impacts.



Source: Barbara H. Allen-Diaz. "Climate change affects us all." *University of California, Agriculture and Natural Resources*, 2009.

Figure 3.4 Summary of Projected Climate Change Impact, 2070-2099 (as compared with 1961-1990)

California Water Plan Climate Change Considerations

The California Water Plan Update 2018 (CWP) (DWR, June 2019) considers how climate change may affect water availability, water use, water quality, and the ecosystem.[5] The CWP states people and ecosystems of California are increasingly vulnerable to extremes that underscore the need to bolster planning and infrastructure to prepare for the effects of climate change. Specifically, climate change is exacerbating many critical challenges, including flood risk, reduced water supply, and increased wildfire. Communities proactively planning and investing in water management strategies are showing resilience.

The CWP envisions a future where all Californians benefit from reduced flood risk, more reliable water supplies, reduced groundwater depletion, and greater habitat and species resiliency. It recommends actions to help align decision-making processes, track outcomes, and adaptively

[5] California Water Plan Update 2018 Managing Water Resources for Sustainability, https://water.ca.gov/Programs/California-Water-Plan/Update-2018

manage programs and investments to make the state's water resource systems more resilient and achieve the sustainability goals.

The CWP recommends a significant additional investment in infrastructure and ecosystem improvements to overcome challenges to sustainability. It also recommends bold actions to overcome and resolve systemic and institutional issues. Recommended actions support the following six goals for sustainability in the face of climate change:

- Improve Integrated Watershed Management
- Strengthen resiliency and operational flexibility of existing and future infrastructure
- Restore critical ecosystem functions
- Empower California's under-represented or vulnerable communities
- Improve inter-agency alignment and address persistent regulatory challenges
- Support real-time decision-making, adaptive management, and long-term planning

California's interconnected systems for using and managing water are extremely complex and subject to continually changing natural and human-made conditions. Climate change, demographic changes, and other variables underscore the need to manage these valuable water resources for sustainability.

From 2012 through 2016, California experienced severe drought accompanied by accelerated groundwater depletion and overdraft, continued habitat and species declines, and a massive die-off of trees within California's headwaters. This dry period was followed by the second wettest year on record, resulting in extremely high runoff events.

Critical water challenges from climate change include the following:

More extreme hydrologic events. In any given year, the state can experience extreme hydrologic events, such as drought and flood. In times of drought, there is not enough water to meet all uses; during floods, the excess water threatens human lives, property, and economic well-being. Severe drought conditions in the western United States, followed by extreme precipitation in 2017, directly affected the health and livelihoods of Californians. The wide swings in climatic conditions are exposing the vulnerability of water systems and ecosystems.

Increasing flood risk. Risk of catastrophic flooding is exceptionally high, and as more precipitation falls as rain than snow, hydrologic events become more extreme. Every county in California has been declared a federal disaster area for a flooding event at least once in the last 20 years (California Department of Water Resources and U.S. Army Corps of Engineers 2013). This statistic underscores the need to invest in aging flood management infrastructure and in measures to modernize flood systems to adapt to climate change and increased extreme weather events. Modernization can also produce beneficial effects and support natural functions (e.g., replenishing ecosystems with sediment and nutrients and helping to recharge groundwater aquifers).

Reduced access to clean, safe, reliable, and affordable water supplies. During the recent drought, many vulnerable communities were unable to provide reliable and safe water to their residents. Nearly 700 communities have water systems that rely on contaminated groundwater

(State Water Resources Control Board 2013). Of the City's 15 water wells, it currently maintains seven (7) wells to access groundwater sources that continue to meet water quality standards for drinking water. Source water assessment have been conducted on all 15 wells to determine the vulnerability of the wells to possible contaminating activities. Even though, during the months of July-November of 2020, the City imported water from the City of Victorville due to a shortage of water supply from its active wells.

Declining groundwater levels. Driven by recent and extended drought, groundwater levels in some parts of the state are declining at unprecedented rates. These declines have led to land subsidence in some areas, resulting in costly damage to water supply, transportation, and flood infrastructure. Surface water and groundwater have largely been managed as separate resources when, in reality, they are a highly interdependent system of watersheds and groundwater basins. Integrated management of these resources will have positive effects and advance sustainability.

MWA is working collaboratively with each of its water agencies, including the City, to develop a portfolio of resource management strategies that consider regional water-management challenges and can be implemented to address regional issues.

Water Quality Degradation. Changes in land use and water use have resulted in increased runoff of agricultural, industrial, and urban pollutants to surface water and groundwater. Increased agricultural and urban wastewater discharges, as well as changes in commercial and recreational activities, have negatively affected water quality. Higher temperatures, extreme hydrologic events, wildfire and forest management practices, and ecosystem degradation have further diminished water quality. As the quality diminishes, treatment costs increase.

Changing Demands for Water. Future statewide water scenarios show an increase in urban water demand ranging from 1 million acre feet (maf) to 7 maf per year by 2050 (depending on population growth). The high end of this range is equivalent to twice the storage capacity of Lake Oroville. Water-use efficiency measures and mandates have made a difference. California's population is expected to increase from 39.4 million in 2016, to 51.1 million by 2060 (California Department of Finance 2018). Shifts in agriculture to permanent crops will also make it more difficult to reduce water use during droughts and periods of low supply (i.e., "demand hardening").

Sacramento-San Joaquin Delta Conflicts. Competing demands for the Delta's resources have contributed to escalating conflicts among water, environmental, and local stakeholders. The Delta's future will be affected by increasing land subsidence; heightened seismic risk; and the effects of climate change, such as rising temperatures, changes in runoff timing, sea level rise, and changes in storm timing, intensity, and frequency (California Department of Water Resources and U.S. Bureau of Reclamation 2016; Delta Stewardship Council 2013).

Additional critical challenges from climate change include declining ecosystems, aging and inadequate built infrastructure, declining forest and headwater health, catastrophic wildfires, and unstable regional economies.

State Water Project (SWP) Delivery Capability Report

The 2019 Delivery Capability Report[6] provides information about the key factors affecting the operation of the SWP in California, its long-term capability as a source of water for beneficial use, and an estimate of its current delivery capability, including the capability from effects of climate change. Operational capability during intense flood and drought cycles, including Delta risk management and anticipation of sea level rise, are among the policies and planning efforts regarding climate change.

Complications induced by climate change also pose the threat of increased variability in floods and droughts, and the projected sea level rise, caused by the increase in average temperature, complicate efforts to manage salinity levels in the channels affected by tides. Higher ocean levels could result in more frequent water quality degradation in the Delta channels requiring additional outflow from the Delta to maintain water quality objectives, and reduced delivery capability.

In order to respond to multiple concerns, considerable effort has been spent during the past several decades to study ways that the problems in the Delta can be addressed, and the more recent attention to the effects of climate change has helped the water community to realize the urgency of addressing these problems. The essential part of all these efforts has been to find a comprehensive solution that brings various, sometimes competing, interests together in a coordinated and concerted set of actions. The Delta Plan and the Delta Conveyance are two large-scale planning efforts that are in development. Once implemented, both efforts, could affect SWP water delivery capability in different ways, and at different scales.

Mojave Integrated Regional Water Management (IRWM) Plan, Amended 2018

The Mojave IRWM Plan included a climate change assessment that evaluated the vulnerability of the region's surface water supplies, future frequency of flooding, and a complete inventory of GHG emissions from the water sector. The plan offers measures for agency to work cooperatively to meet federal and state requirements for conservation and reducing GHG from operations.

Climate changes that may affect the Mojave Basin water resources include:

- Higher temperatures, lower precipitation, and heat waves that increase demand for water, especially for agricultural and residential irrigation uses.
- Water Uncertainty: A projected overall decrease in precipitation levels coupled with more intense individual storm events may lead to increased flooding. Higher temperatures that may cause more precipitation to fall as rain rather than snow, hasten snowmelt and increase runoff will affect water storage planning. Increased evaporation will create a generally drier climate, with wildfires likely to increase and groundwater basins likely to receive less replenishment.

[6] State Water Project Final Delivery Capability Report, 2019 - State of California Natural Resources Agency, Department of Water Resources, August 26, 2020, https://data.cnra.ca.gov/dataset/state-water-project-delivery-capability-report-dcr-2019/resource/119da5c5-1c47-4142-8896-334628ca61cd

MWA prepared a Climate Change Assessment as part of the Mojave Integrated Regional Water Management Plan, Final June 2014 Report,[7] which describes the potential effects of climate change, the region's vulnerability to climate change, and potential strategies for adapting to climate change. Much of the assessment was based on the Mojave River Watershed Climate Change Assessment, which was a 2013 report published by the Technical Service Center of the US Bureau of Reclamation (USBR), in partnership with MWA. The analysis consisted of three tasks: 1) assess future surface water supplies, including native flows and imports; 2) project potential changes in flood frequency; and 3) conduct a GHG emissions inventory for the water sector.

The Climate Change Assessment identifies relevant studies of historical trends and future projections of climate variables for the region. The studies cover a range of geographic extents, but all are relevant to the USBR Lower Colorado Region, of which the Mojave River Groundwater Basin (Mojave Basin Area) is a part.

In general, scenarios for the region identify an overall decrease in precipitation levels coupled with more intense individual storm events that may lead to increased flooding. Higher temperatures that may cause more precipitation to fall as rain rather than snow, hasten snowmelt and increase runoff, will affect water storage planning. Increased evaporation will create a generally drier climate, with wildfires likely to increase and groundwater basins likely to receive less replenishment.

There has been extensive scientific research on climate change impacts and findings have been published in a vast collection of peer-reviewed technical literature. However, specific tools are just now becoming available on how address climate change impacts on water resources. The USBR Climate Report begins to explore climate change impacts on water supplies and flood events in the Mojave Region, providing the foundation for sections in the Mojave IRWM Plan.

US Bureau of Reclamation (USBR) Water Reliability in the West – 2021 Secure Water Act Report

The USBR's Water Reliability in the West - 2021 SECURE Water Act Report[8] includes a 2021 West-Wide Climate and Hydrology Assessment and seven individual basin reports. These assessments and reports provide detailed information on climate change impacts and adaptation strategies to increase water supply reliability in the West. The 2021 West-Wide Assessment provides estimates of changes in temperature, precipitation, snowpack, and streamflow across the West using consistent methodology. Results will enable water managers to compare the frequency and severity of droughts that occurred several hundred years ago to projections of future droughts and develop water management strategies in time to take action.

Reclamation's 2021 Assessment uses multiple approaches that leverage projections, stream gages, and paleohydrology. Collectively, these analyses illustrate potential future conditions.

[7] No amendments were made to the climate change information in the 2018 Amendment to the Mojave IRWM Plan.

[8] https://www.usbr.gov/climate/secure/docs/2021secure/2021SECUREReport.pdf

Temperature: Temperatures are projected to increase over the West during the 21st century from the last decade of the 20th century. Projected temperature increases become greater with time.

Precipitation: Precipitation is projected to increase over the northwestern and northcentral portions of the United States and decrease in southwestern and southcentral areas. Projections of future precipitation are more variable and less certain than those for future temperature.

Snowpack: Snowpack is projected to decrease for almost all locations in the West.

Streamflow (runoff): Timing and quantity of streamflow are projected to continue to change as temperature and precipitation levels change. On average, snowmelt is projected to occur sooner, shifting streamflow earlier in the year.

Droughts: The duration, severity, and frequency of droughts are projected to increase in the future compared to droughts of the distant past.

Water demands: Increased temperatures and longer growing seasons are projected to result in increased evaporation and irrigation water requirements.

Groundwater: The amount of water infiltrating into the groundwater system is projected to mirror changes in precipitation with some decreases from increased evapotranspiration. However, unique local precipitation characteristics, topography, land use, and aquifer properties have considerable influence as well.

A summary of mitigation strategies to vulnerabilities from climate change are included in Section 4.6.

3.4 SERVICE AREA POPULATION, DEMOGRAPHICS AND SOCIOECONOMICS

Population Forecasts

Service area population and land use projections are critical to developing a useful planning framework as population dynamics and growth are a primary influence on water use. These projections directly influence planning measures for system supply, delivery, infrastructure, and demand management. This section of the UWMP addresses these factors to provide a supportable basis for forecasting future water use.

In 2020, MWA led the effort to develop population forecasts for its service area and for each of its water purveyors using the required data and methodology for baselines and targets as required by DWR. MWA commissioned Beacon Economics[9] update the population forecasts for the region to reflect on-going changes to local demographic and population characteristics. The 2020 population update provides the foundation for population information included in the following subsections and for the water use forecasts provided in Chapter 4.

[9] Beacon Economics has prepared population forecasts in past UWMPs; www.BeaconEcon.com

To forecast projected service area population as accurately as possible requires consideration of the past growth rate, local economic predictions, and current and projected land uses. Importantly, one of the recent statutory updates to the UWMP Act states urban water suppliers "shall coordinate with local or regional land use authorities" regarding land uses that may affect water management planning.

Historically, there was a sizeable migration into the incorporated cities within the MWA between 2000 to 2010. Their annual average growth rate outpaced the overall county rate of 1.9%, including the City of Adelanto at 5.9%. Between 2011 to 2019, the City's growth rate slowed to 1.1%.

Population growth for California has been revised downward repeatedly as birthrates and migration continue to decline. San Bernardino County is no exception to this trend. From 2007 to 2018, birthrates in San Bernardino County dropped 24.2%. Net migration averaged below zero between 2010 to 2019. However, the incorporated cities of the MWA service area still have some of the most affordable housing in the entire Southern California region, which should keep growth rate above the county average, including the City of Adelanto. Growth is still projected to be above the state and county averages through 2060, but the rate is slower than previously forecasted. The University of California, Riverside, Center for Economic Forecasting and Development's MWA population update (the UCR Study) estimates the population of the MWA service area to increase by 39.2% in the next 40 years, compared to 21.1% for the entire county and 12.9% for the state at-large. The City's population makes up 7.26% of the MWA service area 40-year growth.

Permits for new home construction declined dramatically between 2010 to 2019 compared to the previous decade. In 2004, the pre-recession peak, more permits were issued for the MWA service area than during the entire last decade. However, a slow resurgence is now occurring. In 2019, 1,081 new home permits were issued, which is the most in the past 12 years. This and other important factors were evaluated in the UCR Study to derive projected populations for the entire MWA service area from 2020 through 2065. This population estimate used several different subdivisions within MWA's service area, including an estimate for population growth within each of the retail water service purveyors in the region, including the City.

With the entire MWA service area, notably, some of the retail urban service areas are expected to grow significantly, while others have only nominal growth. The projected population growth is reflected in several known development projects as well as expected but yet-to-be named new developments that will be necessary to accommodate the expected growth.

Current and projected populations for the City are summarized in **Table 3-3**, which depicts projections in five-year increments to the year 2045. These population projections refine what was depicted in the City's 2015 UWMP to correlate with population trends more closely in the surrounding area. The projections show that population is anticipated to increase over the next five years by nearly 10% and then growth will decrease by percentage from approximately 7% to down to a 3.5% population increase through 2045.

Table 3-3: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045
	35,811	39,238	41,958	44,242	46,159	47,770
Source: *Mojave Water Agency Population Forecast, 2020 Edition,* August 2020, Beacon Economics/UC Riverside School of Business Center for Economic Forecasting and Development						

Economic Trends & Other Social and Demographic Factors

The Inland Empire has seen some of the strongest employment growth in California since the end of the Great Recession, with the third largest workforce of the state's metropolitan areas. As a logistical hub for the region, there has been significant employment increases in the transportation, trade, and warehouse industries. With relatively more affordable housing compared to areas closer to the coast, there is also a large commuter population that work in nearby Los Angeles and Orange Counties. The number of residents commuting to jobs in neighboring counties is expected to increase in the near-term as housing prices continue to rise and supply remains constrained. Over the past decade, the employment growth rate for nonfarm labor in the Inland Empire outpaced all other regions in Southern California and sustained less economic impact from the pandemic slump in 2020 than Los Angeles, Orange, or San Diego Counties. A main driver of this explosive growth has been in logistics, which ballooned at a rate of 47.7%, three times the rate of neighboring counties.

The 2020 pandemic slump severely impacted the service sector, especially leisure/hospitality and instore retail. The healthcare sector has also experienced significant job losses as patients cancel routine and elective procedures due to the mandated lockdowns. The total non-farm employment rate decreased 10% in the first four months of the pandemic. However, demand for transportation and warehousing increased, driven by a shift to online commerce and direct-to-consumer shopping.

Although cities in the region, including the City of Adelanto, offer more affordable housing compared to the rest of the region, relatively lower paying jobs in the booming logistics industry may not be enough to overcome the desirability of other states, especially Texas and Arizona, which are attracting large numbers of Californians with their booming economies. California is expected to continue losing residents in net domestic migration, although positive net foreign migration is currently offsetting that loss.

Based on the U.S. Census Bureau's QuickFacts, the City's demographic profile is shown below. Demographics is the collection and analysis of general characteristics about groups of people and populations, such as age, gender, and income.

Age

- 5.6% 65 years and over
- 51.1% 19 years to 64 years
- 34.6% under 18 years
- 8.7% under 5 years

Race

- 62.9% White (can include Hispanic)
- 11.8% White (not Hispanic)
- 18.9% Black
- 0.5% American Indian
- 1.7% Asian
- 0.2% Native Hawaiian and Other Pacific Islander
- 65.8% Hispanic (can be of any race; also included across other races)
- 6.1% Two or more races

Housing

- 53.9% Owner-occupied housing unit rate
- $195,800 Median value of owner-occupied housing

Families & Living Arrangements

- 4.06 Persons per household
- 48.5% Language other than English spoken at home

Education

- 66.4% High school graduate over 25 years
- 6% over 25 years with at least a bachelor's degree

Economy

- 51.3% Employed and over 16 years
- $2,587 Total retail sales per capita

Income & Poverty

- $45,380 Median household income
- $14,238 Per capita income
- 28.5% of total population is living in poverty, based on the Orange County's median household income of $90,234 for 2015-2019

Health

- 9% with a disability and under 65 years
- 12.2% of less than 65 years does not have health insurance

4.0 WATER USE CHARACTERIZATION

System water use addresses the City's water demand—past, current, and projected—identifying the level of treatment when delivered—potable and recycled.

This chapter provides a characterization and analysis of projected water use through the year 2045. Projections considered past and current water use, anticipated development of the vacant land in the City, new regulations, changing climate conditions, and trends in customer water behaviors. This analysis examined water use by sector and aggregated the information into a comprehensive demand projection of customer water use. In Chapter 7, these water demand projections are integrated with the City's water supplies to assess long-term water system reliability.

The City has chosen to provide projections through 2045, a 25-year planning period. This will improve the use of the UWMP for other land use planning and regulatory compliance issues by bridging the gap between planning cycles.

4.1 WATER USE BY TYPE – POTABLE 2020

The City's potable water consumption can be projected by understanding the type of use and customer type creating the demand. Developing local water use profiles helps to identify quantity of water used, and by whom, within the City's service area. A comprehensive profile of the City's service area enables the City to adequately plan for future demands and assess trends in customer end uses that may result in changes in demographics, the economy, weather and climate, as well as from active and passive water conservation efforts.

The City currently provides domestic water to residential, commercial, industrial and institutional, and landscape customers within the City's service area. In 2020, water demand for potable water totaled 4,333 AF, as summarized in **Table 4-1**.

Table 4-1 shows 2020 actual volume of water use. All water demand is for potable water; the City does not utilize raw water or recycled water at this time.

Table 4-1: Demands for Potable - 2020 Actual

Use Type	2020 Actual		
	Additional Description, as needed	Level of Treatment When Delivered	Volume (AFY)
Single Family		Drinking Water	2,606
Multi-Family		Drinking Water	162
Commercial/Institutional		Drinking Water	809
Industrial		Drinking Water	0.35
Landscape/Irrigation	Agricultural and non-agricultural	Drinking Water	82
Other		Drinking Water	0.69
Losses		Drinking Water	987
		TOTAL	**4,647**

4.2 WATER USE BY SECTOR - PROJECTED

Water supply derived from managed groundwater is the primary source of water to meet demands for all entities within the Mojave Water Agency service area, including the City. Mojave Water Agency supports the groundwater management within its service area by importing water supplies that are used to replenish groundwater extractions and support the legal and regulatory requirements of the applicable management structures.

Accordingly, the Mojave Water Agency worked cooperatively with its consultant, Tully & Young, and each retail water supplier within its service area to develop water demand projections through 2065 (**Appendix B)**.

Table 4-2 presents projected water demand for the years 2025 through 2045. The projections reflect increasing usage based on the population projections in **Table 3-3** and planned development.

TABLE 4-2: DEMANDS FOR POTABLE WATER - PROJECTED

Use Type	Additional Description	Projected Water Use (AF)				
		2025	2030	2035	2040	2045
Single Family		3,360	3,656	3,744	3,853	3,979
Multi-Family		100	109	111	114	116
Commercial		874	894	950	977	1,009
Industrial		1.5	1.5	1.5	1.7	1.7
Landscape		100	105	109	112	115
Other Potable		0.5	0.5	0.5	0.6	0.6
Losses		560	494	510	526	544
TOTAL		**4,996**	**T,260**	**5,426**	**5,584**	**5,766**

4.3 WATER USE BY WATER TYPE – PAST, CURRENT, AND PROJECTED

While not part of the DWR UWMP Reporting Tables, the Water Code requires retail suppliers to quantify past water use. Understanding past water use provides valuable information for development of projected uses as it helps to understand water use trends, effects of temporary use restrictions imposed during the most recent prolonged drought and recovery, effects of long-term demand management measures, and other pertinent water use factors.

Table 4-3 provides total water demand by water source type for each year from 2016 through 2020 actual use and for 2025 through 2045 projections.

TABLE 4-3: TOTAL GROSS WATER USE BY WATER TYPE – PAST, CURRRENT AND PROJECTED (AF)					
Past/Current – Years	**2016**	**2017**	**2018**	**2019**	**2020**
Potable Water	4,184	4,323	4,141	4,483	4,647
Recycled Water Demand	0	0	0	0	0
TOTAL PAST/CURRENT WATER DEMAND	**4,184**	**4,323**	**4,141**	**4,483**	**4,647**
Projected – Years	**2025**	**2030**	**2035**	**2040**	**2045**
Potable Water	4,996	5,260	5,426	5,584	5,766
Recycled Water Demand	20	23	25	25	27
TOTAL PROJECTED WATER DEMAND	**5,016**	**5,283**	**5,451**	**5,609**	**5,793**

4.4 DISTRIBUTION SYSTEM WATER LOSSES

Urban water suppliers are required to quantify their distribution system water losses in a manner consistent with the American Water Works Association (AWWA) water system balance methodology for the most recent 12-month period available. Reporting of system losses was first required by the CWC in the 2015 UWMPs.

System water loss is the difference between water production and water consumption and represents "lost" water. AWWA categorizes distribution system losses as Apparent Losses and Real Losses, which are defined as follows:

- **Apparent Losses:** Unauthorized consumption, metering inaccuracies, and systematic data handling errors. Apparent Losses include all types of inaccuracies associated with customer metering (worn meters and improperly sized meters or wrong type of meter for the water usage profile) and systematic data handling errors (meter reading, billing, archiving and reporting), plus unauthorized consumption (theft or illegal use).
- **Real Losses:** Physical water losses from the pressurized system (water mains and customer service connections) and storage tanks, up to the point of customer consumption (customer meter). The annual volume lost through all types of leaks, breaks, and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks, and overflows.

AWWA also defines Non-Revenue Water, which is the sum of Apparent Losses + Real Losses + Unbilled Metered Consumption + Unbilled Unmetered Consumption. This is water that does not provide revenue potential to the City. Unbilled Consumption is not included in the volume of water loss in **Table 4-5** because it is authorized. Unbilled consumption is defined as follows:

- **Unbilled Authorized Consumption:** All consumption that is unbilled but still authorized by the District. Includes both unbilled metered and unmetered consumption typically in non-account uses, including water for firefighting and training, flushing of water mains and sewers, street cleaning, watering of municipal gardens, public fountains, or similar public-minded uses. Occasionally, these uses may be metered and billed (or charged a flat fee), but usually, they are unmetered and unbilled.

The City has prepared the required AWWA Water Audit Software (WAS) v6.0 (**Appendix C**) water loss audit worksheets based on the best available information and in accordance with the DWR guidelines for each of the prior five years. The calculated water losses (water supplied less authorized consumption) identified using the AWWA Water Audit are shown in **Table 4-4**.

TABLE 4-4: LAST FIVE YEARS' WATER LOSS AUDIT REPORTING

Reporting Period Start Date (Month/Year)	Volume of Water Loss (Af)*	Total Water Production For Comparison (Af)
01/2020	929	4,647
01/2019	787	4,483
01/2018	433	4,141
01/2017	616	4,323
01/2016	812	4,184

Notes: Consistent with DWR Submittal Table 4-4.
* Source: FY 2016 – FY 2020 AWWA Water Audits; from the field "Water Losses" (combined Apparent and Real Losses).

The volume of water loss calculated for FY 2020 represents 20 percent of the City's annual water production. Although percentage indicators—typically, the ratio of authorized customer consumption to distribution system input—may be used, AWWA discourages use of percentage indicators. Using percentage indicators to assess water loss in distribution systems gives a misleading and unreliable measure of utility performance because a percentage indicator is greatly affected by changing levels of customer consumption, it is difficult to distinguish among the specific components of Non-Revenue Water occurring in a distribution system, and the percentage reveals nothing about water volumes and associated costs (the two most important factors in assessing water waste within a distribution system). Rather, the industry best practice for water loss auditing, created by International Water Association (IWA) and AWWA, now quantifies several key performance indicators, which provide a vastly superior means for assessing water loss performance in distribution systems, while recognizing that contributing factors and potential corrective measures are specific to each water utility.

Figure 4-1 shows a comparison of total water loss to total water production for the past five years.

The City will continue to focus on its water loss control program to reduce the amount of water loss. Understanding and controlling water loss from a distribution system is an effective way for the City to achieve regulatory standards and manage its existing resources.

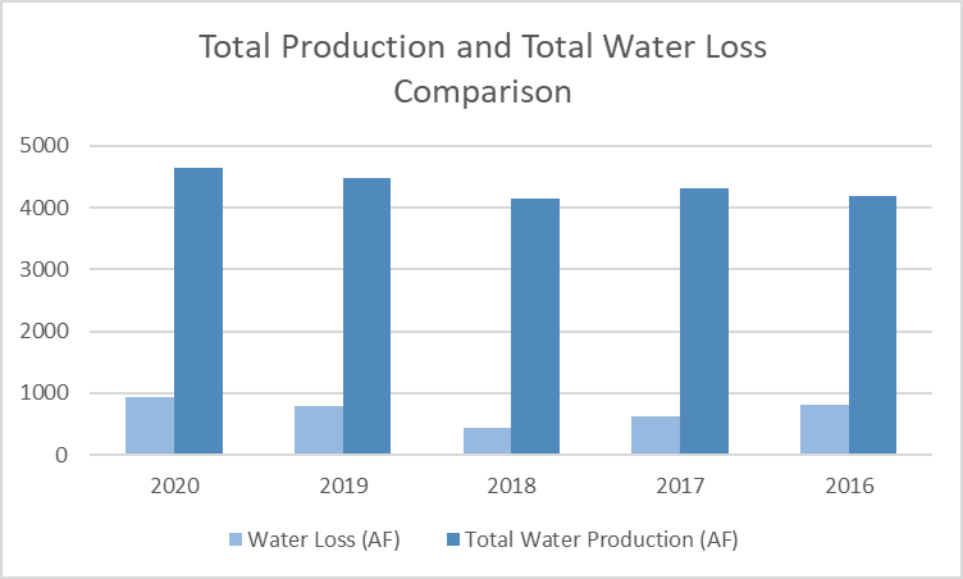


FIGURE 4-1: TOTAL WATER LOSS COMPARED TO TOTAL WATER PRODUCTION FOR 2016 THROUGH 2020

4.5 CHARACTERISTIC FIVE-YEAR WATER USE

New for the 2020 UWMP, CWC Section 10635(b) requires every urban water supplier to include a drought risk assessment for its water service as part of information considered in developing the demand management measures and water supply projects and programs to be included in the UWMP. The drought risk assessment is discussed in Chapter 7, Water Service Reliability and Drought Risk Assessment.

The first step is to estimate a realistic representation of expected water use that would be anticipated for the next five years, absent drought conditions or any prescribed actions taken per the WSC Plan (Chapter 8)—also known as "unconstrained demand." In other words, unconstrained demand is water demand absent any water supply restrictions. The more realistic these numbers are, the better prepared the City will be in the event of a long-term drought. These demand numbers can then be adjusted to estimate the five years' cumulative drought effects in the drought risk assessment.

The City is already implementing actions to reduce water use. Therefore, the City has chosen to consider that normal, unconstrained water use includes those actions.

Table 4-5 identifies if water savings are included in water uses projections for the years 2021 through 2025.

TABLE 4-5: INCLUSION IN WATER USE PROJECTIONS	
Are future water savings included in projections?	Yes
If yes, indicate section or page number where citations of the codes, ordinances, etc., utilized in demand projections are located.	Section 4.8, Chapters 8 & 9, and Appendix D
Are lower income residential demands included in projections?	Yes

Estimates of characteristic, expected water use that would be anticipated for the next five years, based on unconstrained demand, are shown in **Table 4-6.** The amounts include water loss and authorized unbilled consumption.

TABLE 4-6: CHARACTERISTIC FIVE-YEAR WATER USE

Water Type	Current	Projected (AF)				
	2020	2021	2022	2023	2024	2025
Potable Water	4,647	4,717	4,786	4,856	4,926	4,996
Recycled Water	0	0	0	0	0	20

4.6 WATER USE FOR LOWER INCOME HOUSEHOLDS

Since 2010, the UWMP Act has required retail water suppliers to include water use projections for single-family and multi-family residential housing needed for lower income households. This will assist the City in complying with the requirement under Government Code Section 65589.7, granting priority for providing water service to affordable households.[1]

"Lower income households" mean persons and families whose income does not exceed the qualifying limits for lower income families. Generally, the State has established income limits for lower income households for all geographic areas of the state at 80 percent of area median income or median household income (MHI), adjusted for family size and revised annually.

DWR recommends retail water suppliers rely on the housing elements of applicable land use agency's general plans or other planning documents to quantify planned affordable housing for lower income households within the supplier's service area (DWR, 2020 UWMP Guidebook, Section 4.4, March 2021).

Low-income households are those that make less than 80 percent of the median income. The 2019 MHI in San Bernardino County was $67,903, while the City of Adelanto was $45,380—the MHI for the City and the County are substantially different. As such, Adelanto households making less than $36,304 per year are considered lower income.

The City's 2014–2021 Housing Element (September 2013)[2] utilized the Regional Housing Needs Allocation (RHNA) from the Southern California Association of Governments (SCAG), which is a projection of housing need for households by income level. The SCAG 6th Cycle Final RHNA Allocation Plan[3] identified Adelanto's remaining low-income housing need is an additional 566 units and very-low income housing need is an additional 394 units, for a total of 960 units.

[1] Each public agency or private entity providing water or sewer services shall grant a priority for the provision of these services to proposed developments that include housing units affordable to lower income households. Law Section (ca.gov) (CA Government Code Section 65589.7).

[2] https://www.ci.adelanto.ca.us/DocumentCenter/View/216/2014-2021-Housing-Element-Final-PDF?bidId=

[3] https://scag.ca.gov/sites/main/files/file-attachments/6th-cycle-rhna-final-allocation-plan.pdf?1625161899, March 22, 2021

Water demands were estimated using the average number of people per household (4.06)[4] multiplied by the 2020 gallons per capita per day (GPCD) of 108, which is the target GPCD shown in Chapter 5. Total estimated water demand for low-income housing units is shown in **Table 4-7**, which was included in the City's total projected water demands.

TABLE 4-7: CITY OF ADELANTO LOW-INCOME WATER DEMANDS

Housing Units	Housing Need*	Water Demand (AFY)
Very Low	394	0.53
Low	566	0.76
TOTALS	**960**	**1.29**

Source: *SCAG 6th Cycle Final RHNA Allocation Plan

4.7 CLIMATE CHANGE IMPACTS CONSIDERED IN WATER USE PROJECTIONS

Climate change adds a level of uncertainty to the challenges of water planning—both for water supply and water use. The City's water use demand projections are the summation of its residential water demand, commercial, industrial and institutional (CII) demand, large landscape demand, potential future recycled water demands, and water losses. The City has considered the following climate change impacts in these water use projections for the 25-year planning period, as well as in its future water supply projects presented in Chapter 6.

California. California's water supply planning has nearly 100 years of hydrological data regarding weather and water supply. The history of rainfall data has provided a sound foundation for forecasting both the frequency and the severity of future drought conditions, as well as the frequency and abundance of above-normal rainfall. However, changing climate patterns are expected to shift precipitation patterns and affect water supply, resulting in the need to change water use behavior. Unpredictable weather patterns will make water supply planning more challenging and increase the need for water use efficiency measures.

According to the California Climate Adaptation Planning Guidance (June 2020),[5] climate change is already impacting California and will continue to affect it for the foreseeable future. Current and projected climate changes include increased temperatures; sea-level rise; a reduced winter snowpack resulting in less runoff to fill reservoirs, lakes, and streams; altered precipitation patterns; increases in wildfires; and more frequent storm events. Over the long term, reducing greenhouse gas (GHG) emissions can help make climate change less severe.

Climate change causes the weather to become more variable with longer and more frequent droughts, and increased periods of heavy rain and snow events. This results in an intensification of impacts on all water-related or dependent activities and systems. With higher temperatures, people and plants dry out faster, resulting in higher water demand from both households and agriculture.

[4] https://www.census.gov/quickfacts/adelantocitycalifornia

[5] California Adaptation Planning Guide or https://www.caloes.ca.gov/HazardMitigationSite/Documents/CA-Adaptation-Planning-Guide-FINAL-June-2020-Accessible.pdf

Higher temperatures also change the rate of chemical reactions in water and reduce water's ability to hold oxygen. These factors reduce the viability of water to support wildlife and ecosystems.

Given increased temperatures and evapotranspiration, it is expected that landscape irrigation use may tend to increase. However, this is countered by the statewide mandate to reduce per-capita use and limit outdoor per-capita use in the coming years. These mandates will likely override any climate-related changes quantified.

Regional. Climate change impacts were studied and summarized in the Mojave Region 2014 Integrated Regional Water Management (IRWM) Plan and 2018 Amendments.[6] The IRWM Plan prepared a vulnerability assessment to gauge the level of risk from each potential climate change impact in the region. The Mojave Region has unique vulnerabilities to climate change. Vulnerability is defined as the degree to which a system is exposed to, susceptible to, and able to cope with and adapt to, the adverse effects of climate change. The Mojave Region IRWM Plan vulnerability assessment highlights the water-related resources that are important to the Mojave Region and are sensitive to climate change. The Climate Change Vulnerability Checklist (IRWM Plan Appendix C.3) encompasses the following seven major topic areas: water demand, water supply, water quality, sea level rise, flooding, ecosystem and habitat vulnerability, and hydropower. Of these, all but sea level rise are of great concern to the region, potentially a high risk. High risk equals high priority, including rainfall reduction, more frequent droughts, and higher groundwater extraction, all of which were considered in the City's water use projections for this UWMP.

Climate change is driven by increasing concentrations of carbon dioxide and other greenhouse gases that cause an increase in temperature and stress natural systems, such as oceans and hydrologic cycle. Climate changes that may affect the Mojave Region water resources include the following:

- Higher temperatures and heat waves that increase demand for water, especially for agricultural and residential irrigation uses.
- Water Uncertainty: A projected overall decrease in precipitation levels coupled with more intense individual storm events may lead to increased flooding. Higher temperatures that may cause more precipitation to fall as rain rather than snow, hasten snowmelt and increase runoff will affect water storage planning. Increased evaporation will create a generally drier climate with groundwater basins likely to receive less replenishment.

Additionally, the U.S. Bureau of Reclamation (USBR) completed a Mojave River Watershed Climate Change Assessment (USBR, 2013), which examined potential future changes to surface water flows and flood frequency due to gradual changes in climate. Based on a compilation of results from various climate change models, projections suggest slightly increased annual runoff volumes in the near term (i.e., 2020's). Further into the future, median annual run-off projected at these locations is expected to decline by about 12-13 percent by the 2050's and 14-20 percent by the 2070's from the 1990's baseline. In addition, the climate assessment predicts that Sierra Nevada snowpack will be reduced by 25-40 percent by mid-century compared to the historical

[6] https://www.mywaterplan.com/irwm-plan-documents.html

average, which may reduce the availability of imported State Water Project water to the Mojave River Watershed.

4.8 CONSERVATION EFFECTS ON WATER USAGE

Water conservation/water use efficiency is a key strategy for meeting future demand, especially amidst the prolonged drought conditions in California. Efficient water use is the most cost-effective way to achieve long-term conservation goals and provide the water supply reliability needed to adapt to the longer and more intense droughts that climate change is causing in California. The State Water Resources Control Board (SWRCB) stated in Resolution 2017-004 that "Water conservation is the easiest, most efficient and most cost-effective way to quickly reduce water demand and extend supplies, providing flexibility for all California communities. Water can be conserved even when it's raining, especially by turning off outdoor irrigation when the weather is providing ample irrigation."

The City's Mandatory Water Conservation Plan (Chapter 8.20 City of Adelanto Municipal Code) Section 8.20.030 Regulations, and the City's Landscaping/Water Conservation Ordinance (Chapter 17.60, City of Adelanto Municipal Code) (**Appendix D**), provide a foundation of permanent water conservation best management practices to be implemented by water consumers at all times. These regulations also include operational best practices utilized by the City.

DWR and the SWRCB have placed emphasis on achieving improvements for long-term reliability and resilience to drought and climate change in California.

Water Conservation Act of 2009. The Water Conservation Act of 2009, or SB X7-7, provides the regulatory framework to support the statewide reduction of 20 percent urban per capita water use by the year 2020 (20x2020). Each retail water supplier was to determine and report its existing baseline water consumption and establish an interim target (2015) and a final 2020 target in their 2010 UWMP. In 2015, each retail water supplier was required to identify the status of its 2015 interim target and reaffirm its 2020 target. In this 2020 UWMP, each retail water supplier is to confirm that it met its 2020 target (Chapter 5).

The Mojave Water Agency is the founding member of the Alliance for Water Awareness and Conservation (AWAC), a locally organized coalition of over 20 agencies committed to achieving water conservation goals within the 4,900 square mile service area of the Mojave Water Agency.[7] The AWAC implements conservation programs and policies in partnership with and/or on behalf of its member agencies, including the City. Implementation of conservation programs and policies helps with both compliance with SBX7-7 and in meeting long-term water supply reliability goals. The City's 20x2020 baselines and targets are discussed in Chapter 5.

Making Conservation a Way of Life. In April 2017, five State agencies (SWRCB, DWR, Energy Commission, Public Utilities Commission, and Department of Food and Agriculture) published a framework document that was used to formulate the water conservation legislation. Legislation

[7] http://hdawac.org/

related to water supply planning in California has evolved to address these issues, namely Making Conservation a Way of Life (Assembly Bill (AB) 1668 and Senate Bill (SB) 606) and Water Loss Performance Standards (SB 555).

AB 1668 and SB 606 collectively build on ongoing efforts to make water conservation a way of life in California and create a new foundation for long-term improvements in water conservation and drought planning. The bills establish guidelines for efficient water use and a framework for the implementation and oversight of the new standards. The two bills strengthen the State's water resiliency in the face of future droughts with provisions that include the following:

> *Establishing water use objectives and long-term standards by November 1, 2023, and every November thereafter for efficient water use that applies to urban retail water suppliers; such objectives to be composed of indoor residential water use, outdoor residential water use, CII irrigation with dedicated meters, water loss, and other unique local uses. These water use objectives will further conserve water and increase reliability.*
>
> *Providing incentives for water suppliers to recycle water.*
>
> *Identifying small water suppliers and rural communities that may be at risk of drought and water shortage vulnerability and providing recommendations for drought planning.*
>
> *Requiring both urban and agricultural water suppliers to set annual water budgets and prepare for drought.*

SB 555 (2015, Water Code Section 10608.34, subdivision (i)) directs the SWRCB to "adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses." Pursuant to this law, urban retail water suppliers are required to submit water loss audit reports to DWR annually since October 2017.

The City's water use efficiency and conservation efforts are making a positive impact on customer water use. Also known as "demand management," water use efficiency and conservation are an integral part of sustainably managing water resources in California. A growing population can increase the demand for water. Without mitigation measures, increased water demand, coupled with reduced supplies or shifts in supplies related to climate change and other factors, can jeopardize water reliability. Chapter 9 presents the demand management measures the City is implementing to reduce demand, improve water service reliability, help meet State and regional water conservation goals, and reduce energy costs. Chapter 9 also explains the upcoming water use objectives.

5.0 SBX7-7 BASELINES AND TARGETS

The California Water Conservation Act of 2009, also known as SBX7-7 (Chaptered February 3, 2010), required water agencies to reduce per capita water use by 20 percent by the year 2020 (also known as 20x2020). Chapter 5 demonstrates that the City has complied with the requirements of SBX7-7.

5.1 ESTABLISHING BASELINES AND TARGETS

The City is required to be in compliance with SBX7-7 either individually or as part of an alliance, or demonstrate it has a plan or has secured funding to be in compliance, in order to be eligible for water-related state grants and loans.

To comply with the SBX7-7, the City established a baseline water usage in its 2010 UWMP, which was then used to set targets for 2015 (Interim Target) and 2020 (Target). The SBX7-7 legislation stipulates that targets were to be established by using one of four allowable methods.

In 2010 and in 2015, the City calculated its 2020 Urban Water Use Target by using **Method 1**, which assigns a static 2020 urban water use target based on a water supplier's location within one of the ten hydrological regions urban water use target areas. The allowable methods are briefly defined as follows:

- Method 1: Per capita daily use equals 80 percent of the water supplier's baseline per capita usage.
- Method 2: Per capita daily use is set based on performance standards applied to indoor residential use; landscape area water use, and commercial, industrial and institutional use.
- Method 3: Per capita daily use is set at 95 percent of the applicable State hydrologic region target based on DWR's 2011 20x2020 Water Conservation Plan (Adelanto is in the South Lahontan Region 9).
- Method 4: Per capita daily use is set based on standards consistent with California Urban Water Conservation Council (CUWCC)[1] BMPs.

Beginning in 2010, the City was required to develop a baseline per capita water use (gallons per capita per day [GPCD]) and set a per capita water use interim target for 2015 and a 2020 target that represents the required 20 percent reduction in water use. The City established baseline water use for two baseline periods, the 10- to 15-year baseline (baseline GPCD) and the 5-year baseline (target confirmation). In the 2015 UWMP, the City determined baseline water use during

[1] The CUWCC is now the California Water Efficiency Partnership (CalWEP). With increased pressure from a changing climate – more severe droughts and water uncertainty – and new mandatory regulations from the state of California, including the new framework to "Make Water Conservation a California Way of Life," the CUWCC membership voted to allow the organization to sunset after 25 years, replacing it CalWEP in March 2018.

a baseline period and identified water use targets for the years 2015 and 2020 to meet the state's water reduction goal. Baseline water use was calculated as a continuous 10-year average during a period, which ends no earlier than December 31, 2004, and no later than December 31, 2010. The City chose the 10-year period of 1996 to 2005 as its 10-year baseline period to establish its baseline GPCD. Since the City did not and currently does not supply recycled water, particularly in the year 2008, it must use a 10-year baseline period rather than an alternative period up to 15 years.

For the 2015 UWMP, the City had the opportunity to adjust the baseline and target per capita water use and compare 2015 per capita water use with set targets. The City did not revise its baseline per capita water use calculations. In the 2015 UWMP, the City demonstrated compliance with its 2015 Interim Target of 252 GPCD, with an actual Interim GPCD of 109.

Using Method 1, the City's 2020 urban water use target is documented as 192 gallons per capita per day (GPCD). This GPCD target is intended to be maintained through the UWMP planning horizon of 2045.

Error! Reference source not found. presents the baseline periods: the City's 10-year (1996 through 2005) and 5-year (2004 through 2008) periods, the average baseline GPCD for each, and the Confirmed 2020 Target of 192 GPCD.

Table 5-1: Baselines and Targets Summary (GPCD)

Baseline Period	Start Year	End Year	Average Baseline*	Confirmed 2020 Target*
10-15 Year	1996	2005	311	192
5 Year	2004	2008	202	
*All values are in Gallons Per Capita per Day (GPCD)				
NOTES: Data from 2015 UWMP SBX7-7 Verification Forms, previously submitted to and approved by DWR.				

For this 2020 UWMP, the City must demonstrate compliance with meeting its 2020 water use target.

5.2 NO CHANGE IN CALCULATIONS FROM 2015 UWMP

In the 2015 UWMP, CWC Section 10608.20 provided that an urban retail water supplier may choose to update its 2020 urban water use target, including changing the methodology. The City chose to continue with Method 1, although the targets were updated based on revised population data. DWR requires water suppliers to use the 2010 U.S. Census data for its baseline population calculations, and the full census data was not available until 2012. The target method may not be changed in any amendments to the 2015 UWMP or in the 2020 UWMP. For the 2020 UWMP, the City has not updated calculations for the water use targets.

5.3 SERVICE AREA POPULATION

To calculate annual GPCD, the City must correctly determine the population it served for each baseline year in both of the baseline periods, for the 2015 interim compliance year, and for the 2020 compliance year. As discussed above, the 2015 UWMP updated its baseline population, which adjusted the interim and target GPCD values originally calculated in the 2010 UWMP.

The 2020 population in the City's water service area is 35,811 as shown in Chapter 3, Section 3.4.

5.4 GROSS WATER USE

To calculate the 2020 GPCD, gross water use must be used. As defined in CWC Section 10608.12, "Gross Water Use" means the total volume of water, whether treated or untreated, entering the distribution systems of an urban retail water supplier, excluding all of the following: (1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier; (2) The net volume of water that the urban retail water supplier places into long-term storage; (3) The volume of water the urban retail water supplier conveys for use by another urban water supplier; and (4) The volume of water delivered for agricultural use except as otherwise provided in subdivision (f) of Section 10608.24. Additionally, "an urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector."

The City does not currently deliver recycled water within its service area, does not export domestic water to another urban retail supplier, does not deliver water for agricultural use, and does not have a substantial percentage of industrial water use. Therefore, there are no exceptions to be taken into consideration when calculating the City's gross water use. The City's total allowable Gross Water Use for 2020 GPCD compliance is 4,647 AF.

5.5 2020 COMPLIANCE GPCD

Under SBX7-7, individual agency targets must be established to meet the goal of a statewide 20 percent reduction in per capita use by 2020.

There are three allowable adjustments that can be made to a supplier's 2020 actual water use calculations in the 2020 UWMP. Suppliers must provide adequate documentation of their calculations and data to support any changes in baseline, targets, or adjustments to water use. These adjustments include the following: 1) Extraordinary institutional water use for one-time events, such as fire suppression, that substantially increased the compliance year institutional water use; 2) Economic adjustment that captures substantial changes to institutional water use from new or expanded operations, or substantial changes to commercial or industrial water use resulting from increased business output and economic development; and 3) Weather normalization during the compliance year that accounts for differences in evapotranspiration and

rainfall in the baseline and compliance reporting periods by removing the effects of weather on water consumption. The City did not have any adjustments for the 2020 compliance year.

In conformance with SBX7-7, the City surpassed the 2015 interim target and the 2020 target by achieving 109 GPCD in 2015 and 116 GPCD in 2020. The 2020 GPCD is an approximately 42 percent reduction from the 5-year baseline (202 GPCD) established in 2010.

There are many factors that contribute to the significant reduction in the City's per capita water use during this time period, including active conservation from City-initiated activities, passive conservation attributable to plumbing efficiency gains, as well as outside influences such as rainfall, or lack thereof. Annual variability in water use correlates with rainfall; per capita water use follows these annual patterns of rainfall. Droughts, both natural and regulatory, have had a significant effect on the City's per capita water use. The City's per capita water use reduction is directly tied to the State's drought declaration in 2014 and subsequent calls for mandatory conservation.

Error! Reference source not found. compares the City's 2020 Target GPCD to its actual 2020 GPCD consumption. Based on this comparison, the City is in compliance with its 2020 Target.

Table 5-2: 2020 Compliance

2020 GPCD*			2020 Confirmed Target GPCD	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD	2020 Total Adjustments	Adjusted 2020 GPCD		
116	0	116	192	Yes
**All values are in Gallons per Capita per Day (GPCD)*				

Included in **Appendix E** is a copy of the SBX7-7 Compliance Form, a set of standardized tables[2] to demonstrate compliance with the Water Conservation Act. These tables have been submitted electronically as an Excel file to DWR upon adoption of this 2020 UWMP.

5.6 REGIONAL ALLIANCE

Water Code Section 10608.20 allows urban retail water suppliers to comply with SBX7-7 on an individual or regional basis. Water Code Section 10608.28 defines regional options by mutual agreement, referred to as a Regional Alliance. A Regional Alliance allows water suppliers to work toward cooperatively developing programs and meeting regional water conservation targets, but not necessarily submitting a Regional Plan. The City is not part of a regional alliance and is not reporting any compliance information in a Regional Alliance Report.

[2] Table numbers in Appendix E are not in numerical order. Some tables were not required to be completed and therefore not included in the appendix, although the entire Excel file has been submitted to the State.

6.0 WATER SUPPLY CHARACTERIZATION

The Urban Water Management Planning Act requires a description and quantification of the current and projected sources of water available to the City. The Urban Water Management Planning Act also requires a discussion of potential uses and availability of the recycled water.

Chapter 6 provides an overview of the City's water sources, current and projected supply, wastewater services and available recycled water, other water source opportunities, future water supply projects, climate change impacts on water supply, and a review of energy intensity of City water facilities.

6.1 WATER SOURCES

The City obtains all of its water supply from local groundwater in the Mojave River Groundwater Basin, commonly referred to as the Mojave Basin Area.[1] The Mojave Basin Area was the subject of a court ordered adjudication in 1993 due to the rapid growth within the area, increased withdrawals, and lowered groundwater levels. The court's Judgment appointed Mojave Water Agency (MWA) as Watermaster of the Mojave Basin Area. Additional detail on the Judgment is provided later in this section.

The City of Adelanto is one of ten major retail purveyors that provide the majority of water in the Mojave Basin Area under MWA's management. For management purposes under the Mojave Basin Judgment, MWA subdivided the Mojave River watershed and associated groundwater basins into five subareas: Alto, Baja, Centro, Este, and Oeste. The City of Adelanto lies within MWA's Alto Subarea (**Figure 6.1**). Adelanto and the other purveyors in the area supply water to their customers from local groundwater. MWA replenishes the groundwater supply, primarily with imported water purchased from the State Water Project (SWP).

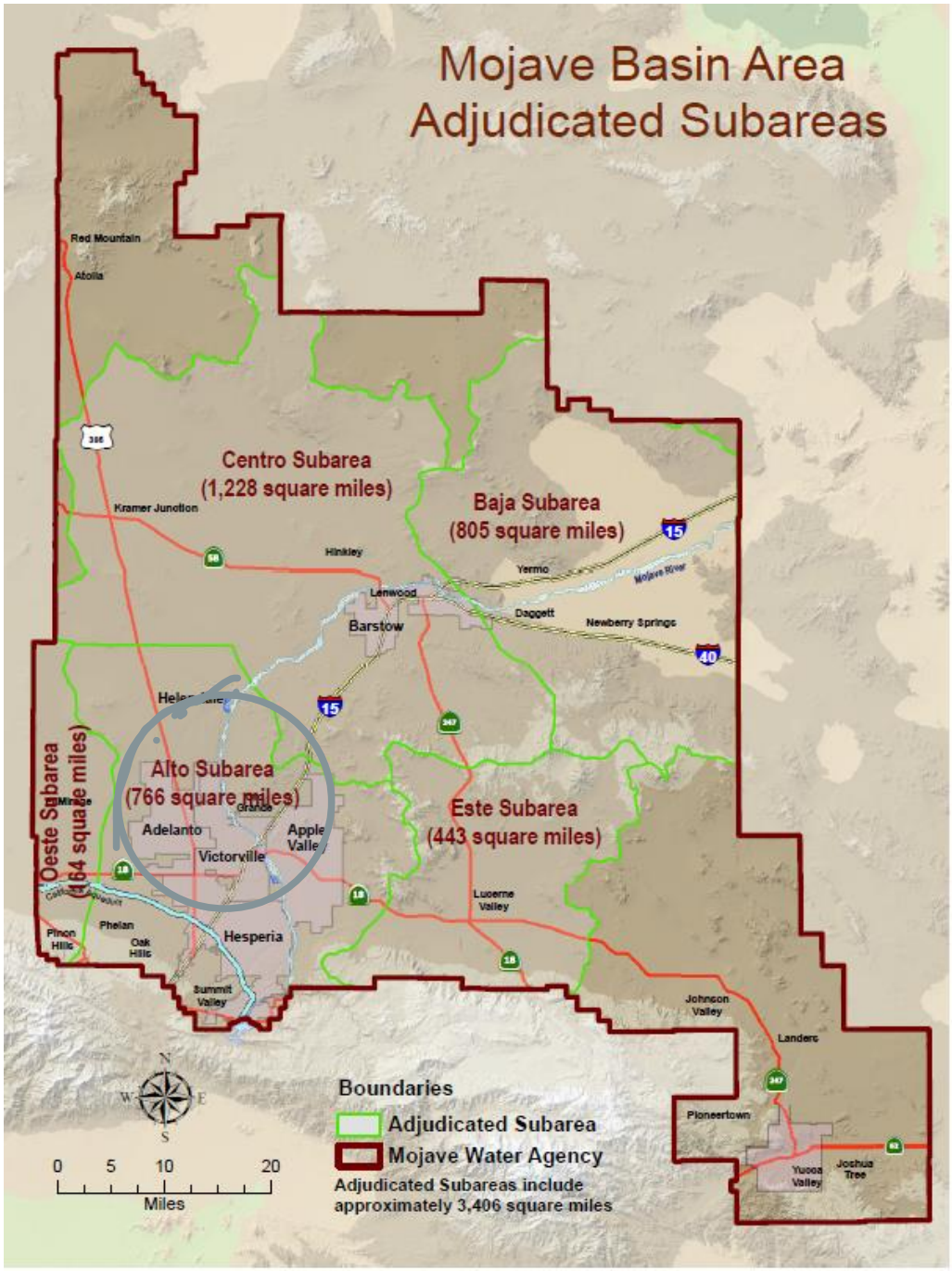
The court ordered adjudication of the Mojave Basin Area allocates a variable free production allowance (FPA) to each purveyor that supplies 10 AFY or more, including Adelanto. FPAs were determined as a percentage of the purveyor's highest verified annual use from 1986 to 1990. Each allocated FPA represents the purveyor's share of the water supply available from the MWA Subarea. The BAP is reduced or "ramped-down" over time until FPA comes within 5 percent of the Production Safe Yield (PSY) as defined by the Judgment.

The FPA for the Alto Subarea is currently set at 65 percent of Base Annual Production (BAP) for agriculture and 55 percent of BAP for municipal and industrial (M&I) for water year 2020-2021[2], down from 80 percent and 60 percent, respectively in 2015. The FPA can vary from year to year depending on the Watermaster's safe yield projections for the Basin. If Adelanto, or another

[1] The Mojave Groundwater Basin is all or a portion of 36 groundwater basins and subbasins as defined by DWR Bulletin 118-03. Collectively, these basins and subbasins are broadly grouped into two larger hydrogeologically distinct areas. Basins along the Mojave River and adjacent areas are referred to as the Mojave River Groundwater Basin; the area is commonly referred to as the Mojave Basin Area. Source: MWA 2020 UWMP, Section 3.2.1.

[2] Watermaster Report #27, filed May 1, 2021. https://www.mojavewater.org/files/27AR1920.pdf

purveyor, pumps more than its allotted FPA in any year, they are required to purchase Replacement Water equal to the amount of production in excess of the FPA or transfer unused FPA from another part within their Subarea. Funds collected for Replacement Water are then used by the MWA for purchase of SWP supplies and recharged into the Subarea they were produced from. In addition to purchasing water to offset the Replacement Water Obligations under the Judgment, MWA purchases and stores water in the Mojave Basin Area for future obligations.



Source: MWA Map Gallery, https://www.mojavewater.org/map-gallery.html

Figure 6.1 Alto Subarea in Mojave Basin Area

Table 6-1 shows the City's BAP and current allotted FPA from the Alto Subarea. While FPA is only 1.3% (percentage of BAP) greater than the estimated PSY, additional rampdown in Alto could be made if conditions warranted. Water levels in some wells show a continuing downward trend in response to locally drier than average water supply during the past 9 years. During 2019-20, inflow was about 68 percent of base period average; however, the average water supply during the recent 9-year period 2012-2020 was only 47 percent of the long-term average. Sustained periods of below average inflow will cause continued water level declines.

Table 6-1: Groundwater - Alto Subarea and City of Adelanto BAP and FPA – 2020-2021[1]

MWA Subarea	Base Annual Production (BAP)	Base Free Production Allowance (FPA)	Production Safe Yield (PSY)	Percent Difference	2019-2020 Verified Production
Alto Subarea	116,412	65,924	64,406	1.3%	73,441
City of Adelanto	5,182	2,851	n/a	n/a	4,647

[1] 27th Annual Report of the Mojave Basin Area Watermaster, Water Year 2019-20, pg. 36, May 1, 2021. https://www.mojavewater.org/files/27AR1920.pdf

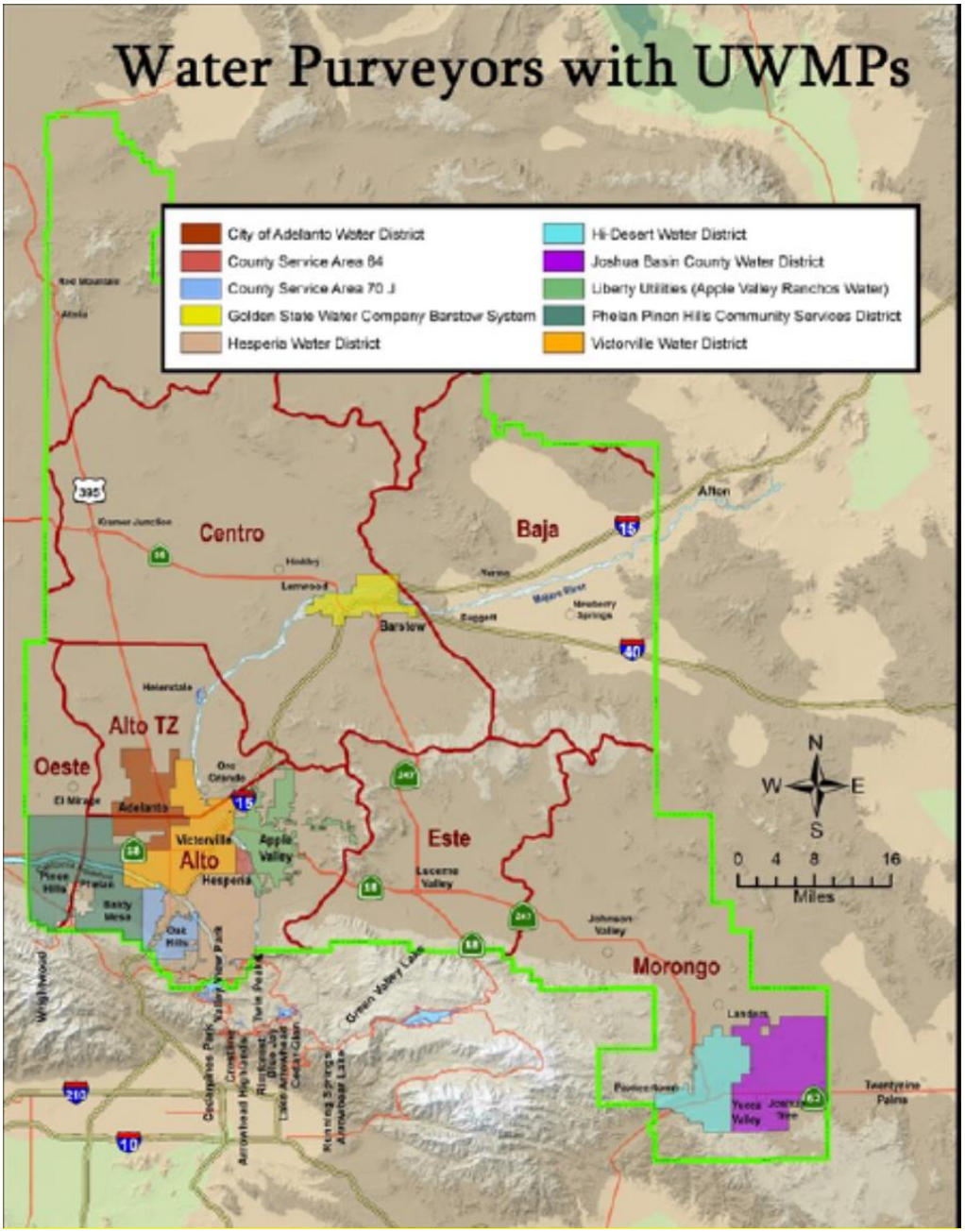
At one time, the City of Adelanto had access to an additional 3,433 AFY in BAP rights (with access to 2,060 AFY in FPA rights) in the Alto Subarea for water rights previously assigned to George Air Force Base (AFB). However, 80 percent of those rights have since been transferred to the Victorville Water District (VWD) in settlement of recent litigation filed by VWD. Adelanto received 20 percent or 686 AFY of the former George AFB rights, all of which is now incorporated into the 5,182 AFY BAP and the 2,851 AFY FPA allocation shown in **Table 6-1**.

Mojave Water Agency

The Mojave Water Agency (MWA) was created in 1960 to address concerns over declining regional groundwater levels and to ensure that sufficient water may be available to the people and land within its jurisdiction. MWA is one of 29 SWP contractors that provide Californians with drinking and irrigation water. MWA serves an area of approximately 4,900 square miles in San Bernardino County. MWA separates its service area into six management areas, including the five previously referenced subareas of the adjudicated Mojave Basin Area (Alto, Baja, Centro, Este, and Oeste) and the Morongo Basin/Johnson Valley Area. MWA's service area, its subareas, and its ten major water purveyors are shown in **Figure 6.2**.

MWA has five sources of water supply, which include:

1. Natural surface water flows;
2. Wastewater imports from outside the MWA service area;
3. SWP imports;
4. Agricultural depletion from storage; and
5. Return flow from pumped groundwater not consumptively used.



Source: Adelanto 2015 UWMP

Figure 6.2 Mojave Water Agency Service Area Large Water Purveyors

MWA considers agricultural depletion from storage as a supply derived from storage depletion to avoid showing demand from agriculture on imported water supplies. Return water includes water pumped from the ground that is returned to the groundwater aquifer, such as water used indoors that returns to the basin either by percolation from septic tanks or treated wastewater effluent.

6.2 WATER SUPPLY

6.2.1 PURCHASED OR IMPORTED WATER

In 2020, the City used local groundwater as the sole source of water supply and does not purchase or import water from any other water suppliers or entities. The City has obtained some water from its connection with the Victorville Water District (VWD), shown on some reports as "water imported" to the City; however, VWD pumps this water from local groundwater sources.

Future water supply forecasts show supplemental water will be obtained through the Mojave Water Agency, which is also from groundwater. As of 2021, the City began purchasing water from MWA through the new R3 Project.[3]

6.2.2 GROUNDWATER

For planning purposes, the State of California has been divided into 10 separate hydrologic regions by DWR, based on the state's major drainage basins. According to the California Water Plan Update 2018 (DWR, June 2019),[4] the City is located in the South Lahontan Hydrologic Region. The entire Mojave Region is a hydrologically diverse area covering over 5,400 square miles in the California High Desert, in San Bernardino County. The Mojave IRWM Region includes portions of both the South Lahontan and Colorado River Hydrologic Regions, as defined by the DWR California Water Plan, Bulletin 160 (DWR 2013a).

In addition to major surface water features, the region overlies portions or all of 36 local groundwater basins, which are experiencing general declines in water levels. Most of the Mojave Region groundwater is covered by two completed adjudications, relating to the major basins: the Mojave Basin Judgment and the Warren Valley Basin Adjudication, located within the Morongo Basin/Johnson Valley Area.

The Mojave IRWM Region encompasses 58 municipal water purveyors with authority over water supply and management in the region, who share a common interest in enhancing water resource management to improve the reliability and sustainability of available resources

The volume of groundwater pumped by the City over the past five years is shown in **Table 6-2**. Historically, the Mojave River Groundwater Basin, Alto Subarea has adequately met the City's water demands, and is anticipated to continue to adequately meet the City's future water demands.

In 2020, the City pumped 82 percent of its water supply from groundwater wells accessing the Mojave River Groundwater Basin, Alto Subarea. The balance of supply was purchased from Victorville Water District (VWD) through its intertie, which is also sourced from groundwater.

[3] The R[3] Project provides access to an alternative delivery system for the major water providers in the Mojave Basin and partially offsets their need to continue pumping within the local regional aquifer system. The Project is described on page 6-14.

[4] https://water.ca.gov/Programs/California-Water-Plan.

Table 6-2 shows groundwater that was pumped by the City and through VWD each of the last five years.

Table 6-2:* Retail Groundwater Volume Pumped Past Five Years

Groundwater Type	Location or Basin Name	Volume Pumped (AF)				
		2016	2017	2018	2019	2020
City - Alluvial Basin	Mojave River Groundwater Basin, Alto Subarea	4,181	3,599	3,963	3,631	3,785
VWD - Alluvial Basin	Mojave River Groundwater Basin, Alto Subarea	3	724	178	852	862
Totals		**4,184**	**4,323**	**4,141**	**4,483**	**4,647**

Notes: *DWR Submittal Table 6-1

The City has seven currently active potable groundwater wells, one non-potable well and nine inactive wells. The City's active wells vary in depth from 39 feet to 569 feet, with production of the potable water wells varying from 181 gallons per minute (gpm) to 1,074 gpm. The total estimated potable water system production capacity is approximately 4,728 gpm. Some of the current inactive wells may be returned to service in future years. All wells are located within the City of Adelanto accessing the Mojave River Groundwater Basin (the precise locations of the wells have not been identified for security purposes).

6.2.2.1 Basin Description

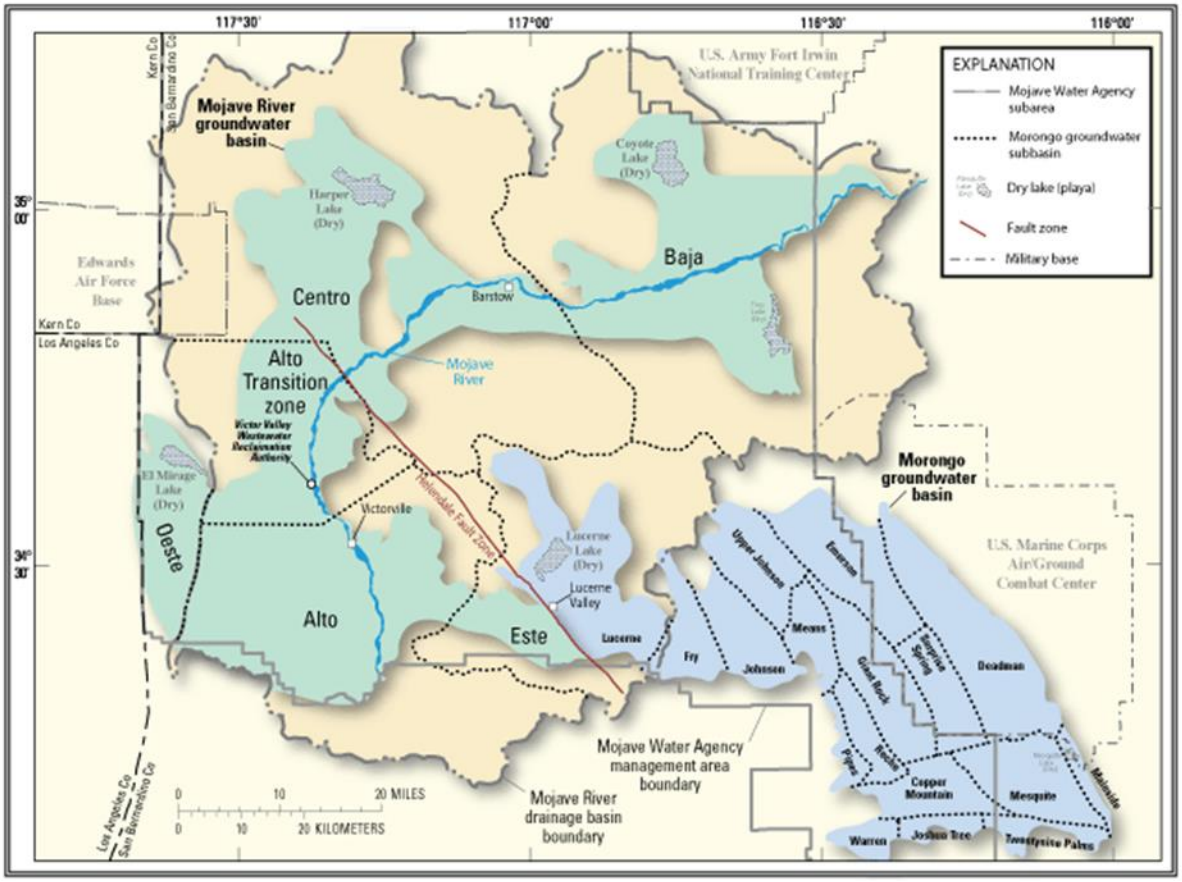
Mojave River Groundwater Basin

The MWA service area overlies all or a portion of 36 groundwater basins and subbasins as defined by DWR Bulletin 118-03. Collectively, these basins and subbasins are grouped into two larger hydrogeologically distinct areas – Mojave River Groundwater Basin and Morongo Groundwater Basin. Basins along the Mojave River and adjacent areas are referred to as the Mojave River Groundwater Basin (also referred to as the Mojave Basin Area). The Mojave River Groundwater Basin is the larger and more developed of the two areas within the 36 basins that overlie two broad hydrologic regions. **Figure 6.3** shows the two hydrologic regions.

Most of the Mojave River Groundwater Basin lies within the South Lahontan Hydrologic Region. The Mojave Region also overlaps a small portion of a DWR basin in the South Coast Hydrologic Region (Region 8); however, because this is such a small overlap, the Mojave Region is not involved with any jurisdictional issues with the South Coast Hydrologic Region (MWA, 2021).

Adelanto obtains all of its water from the Mojave River Groundwater Basin. The basin covers an area of approximately 1,400 square miles and has an estimated total water storage capacity of nearly 5 million acre-feet (MAF). The Mojave Basin Area is essentially a closed basin – limited groundwater enters or exits the basin; however, groundwater movement occurs between the different Subareas, as well as groundwater-surface water and groundwater-atmosphere interchanges. Groundwater is recharged into the basin predominantly by infiltration from the Mojave River, which accounts for approximately 80 percent of the total basin natural recharge.

Other sources of recharge include infiltration of storm runoff from mountains, desert washes and recharge from human activities such as irrigation return flows, wastewater discharge, and enhanced recharge with imported water. Over 90 percent of the basin groundwater recharge originates in the San Gabriel and San Bernardino Mountains. Groundwater is discharged from the basin primarily by well pumping, evaporation through soil, transpiration by plants, seepage into dry lakes where accumulated water evaporates, and seepage into the Mojave River. Recent investigations by MWA, U.S. Geological Survey, and others have resulted in an improved understanding of the geology and hydrogeology of the Mojave Basin Area. Specifically, a more refined examination of the hydrostratigraphy has allowed for differentiation between the more permeable Floodplain Aquifer that has a limited extent along the Mojave River and the more extensive but less permeable Regional Aquifer.



Source: USGS http://ca.water.usgs.gov/mojave/detail_location.html

Figure 6.3 Mojave Basin Area – Hydrologic Regions

The Mojave River provides an estimated average of 54,000 AFY per year of recharge to the Mojave River Groundwater Basin.[5] Other sources of recharge include recharge from human activities such as irrigation return flows, wastewater discharge, and enhanced recharge with imported water. Groundwater is primarily discharged from the basin through well pumping, evaporation, transpiration, and seepage into lakes and the Mojave River. During the water year

[5] The California Water Plan Update 2013, Volume 2, Regional Update, South Lahonton Hydrologic Region, Page SL-15; the plan is available at: http://www.water.ca.gov/waterplan/docs/cwpu2013/Final/Vol2_SouthLahontanRR.pdf

July 2019 to June 2020, total basin production from MWA purveyors was 129,192 AF, with 73,441 AF from the Alto Subarea.[6] The Mojave Basin provides a normal year water supply of 156,580 AF.

6.2.2.2 Groundwater Management

Basin Management – Adjudication

The Adjudication of the Mojave Basin Area was the legal process that allocated the right to produce water from the available natural water supply. Until adjudication proceedings were initiated and an independent Court issued the Mojave Basin Area Judgment, water production rights and obligations had never been defined in the Mojave Basin. Triggered by the rapid growth within the Mojave Water Agency service area, particularly in the Victor Valley area (the cities of Adelanto, Apple Valley, Hesperia, Victorville and surrounding communities), the City of Barstow and the Southern California Water Company (now Golden State Water Company) filed a complaint on May 30, 1990 against upstream water users claiming that the increased withdrawals and lowering of groundwater levels reduced the amount of natural water available to downstream users to the central part of the Mojave Basin where the City of Barstow is located. The complaint requested that 30,000 AF of water be made available to the Barstow area annually and that MWA obtain supplemental water for use in other areas of MWA's service area.

The Mojave Basin Area was the subject of a court ordered adjudication in an interim judgment in 1993. In January of 1996, the Riverside County Superior Court issued a final ruling on the adjudication for the basin in the Mojave Basin Judgment (**Appendix F**). The Judgment allocated water rights to purveyors with groundwater usage higher than 10 AFY from the Mojave River Groundwater Basin and appointed MWA as Watermaster of the Mojave Basin Area. The Judgment was triggered by the rapid growth within the Mojave Water Agency service area in the early 1990's that led to increased withdrawals and lowered groundwater levels. Text of the Judgment is included in the 2014 Mojave Region Integrated Regional Water Management Plan.[7]

A cross-complaint was filed by the MWA approximately one year after the initial lawsuit. The cross-complaint requested that the Court declare the native natural water supply of the Mojave Basin inadequate to meet the demands of cumulative water production within the basin, as well as to determine individual water production rights of producers of whatever nature throughout the entire Mojave Basin Area. This action included both water producers upstream and downstream of the City of Barstow.

During the following two years, negotiations resulted in a proposed Stipulated Judgment that: 1) formed a minimal class of producers using 10 acre-feet or less per year who were dismissed from the litigation, and 2) offered a physical solution (an equitable remedy designed to alleviate overdrafts in a basin, consistent with the constitutional mandate to prevent waste and unreasonable water use and to maximize the beneficial use of the limited resource) for water production by the remaining producers. The Riverside Superior Court bound the stipulating

[6] MWA Watermaster Report Water Year 2019-20, pg. 36
[7] 2014 Mojave Regional Integrated Regional Water Management Plan, Appendix B.1, http://www.mywaterplan.com/irwm-plan-documents.html or https://www.mojavewater.org/planning.html

parties to the Stipulated Judgment in September 1993, and further bound the non-stipulating parties to the terms of the Stipulated Judgment in January 1996 following trial. The Court appointed MWA as Watermaster of the Mojave Basin Area.

A cross-complaint was also filed by Arc Las Flores Limited Partnership which requested that their appropriative, overlying and riparian rights be determined to be prior and paramount to any rights of the plaintiffs and any other water producers within the Basin.

Due to the magnitude and complexity of the case, the numerous water producers named as parties to the lawsuit agreed to conduct good faith negotiations. Discussion proceeded beginning in early 1992, with the objective of devising an equitable solution to the Basin Area's water supply problems and avoiding extensive and expensive litigation. During the next 18 months a committee of attorneys, engineers, and other individuals that were generally representative of all types of producers and all Subareas of the Basin Area conducted intense negotiations that resulted in a proposed settlement in the form of a Stipulated Judgment. The Stipulated Judgment set forth a proposed physical solution to the overdraft occurring in the Mojave Basin Area. The proposed Stipulated Judgment also created a class of minimal producers (that is, water producers using 10 AF of water per year or less) who were dismissed from the case. It directed that MWA create and administrate a procedure, acceptable to the Court, by which minimal producers could participate fairly in the physical solution.

Over 75 percent of the parties agreed to the Stipulated Judgment which was entered by the Court on September 22, 1993, binding all stipulating parties. After entry of the Stipulated Judgment, additional parties agreed to its terms. These parties represented over 80 percent of the verified water production in the Basin. A trial of the claims of the non-stipulating parties began on February 6, 1995, and was completed on March 21, 1995. Final Judgment was entered on January 10, 1996, adopting the physical solution set forth in the Stipulated Judgment.

Nine non-stipulating parties referred to as the "Cardozo Group" appealed the Judgment entered by the Superior Court and the Appellate Court issued its final opinion on June 1, 1998. The final opinion of the Appellate Court held the stipulating parties to the terms of the Stipulated Judgment, but excluded the appealing parties, with the exception of one appellant who sought a revised water production right under the Judgment. MWA requested the California Supreme Court to review the Appellate Court's decision in July 1998. The Supreme Court affirmed the Appellate Court's decision in August 2000, regarding the Stipulated Judgment and the exclusion of the appealing parties from the Judgment, but overturned the decision of the Appeals Court as to the one party seeking additional production rights. Since 1996, most of the appealing parties have stipulated to the Judgment.

The MWA board voted in June 1998 to seek California Supreme Court Review of the Appellate Court's decision. A petition for review was filed with the Supreme Court in July 1998 and the Supreme Court granted review of the case on August 26, 1998. Oral arguments were heard by the Supreme Court on June 5, 2000, and its opinion was issued on August 21, 2000.

The Supreme Court's opinion affirmed in part and reversed in part the June 1, 1998 opinion of the Fourth District Court of Appeal. The Supreme Court affirmed the Court of Appeal's decision

"in all respects," except it reversed the Court of Appeal decision as to the Jess Ranch Water Company. The Court of Appeal had affirmed the Judgment as to the stipulating parties but had reversed it as to the Cardozo Appellants and as to Jess Ranch Water Company. The Court of Appeal opinion essentially excluded the Cardozo Appellants from the Stipulated Judgment, including the Judgment's assessment provisions. Further, the Court of Appeal granted Judgment to the Cardozo Appellants in the form of injunctive relief to protect their riparian and overlying water rights to the current and prospective reasonable and beneficial need for water on their respective properties.

Effective August 6, 2002, the Cardozo appellants and MWA, on behalf of the stipulating parties, reached agreement regarding the Cardozo appellants' water rights. Consistent with the ruling from the California Supreme Court in this case, Cardozo Group's right to pump water from the ground underneath their respective lands for the current and prospective reasonable and beneficial need for water on their respective properties was recognized by the Stipulating parties. Further, to settle all outstanding issues in connection with the Cardozo Group water rights, MWA and Cardozo agreed that "if the parties who stipulated to the Judgment are in full compliance with the Judgment there shall be a rebuttable presumption that the Cardozo Appellants' water rights are not being interfered with."

In addition, all remaining water rights issues related to Jess Ranch Water Company and the Stipulating Parties were settled on August 16, 2002. Stipulation for Intervention and Entry of Judgment for Jess Ranch Water Company was filed in Riverside County Superior Court on August 23, 2002.

Summary of the Judgment after Trial

For purposes of defining and implementing a physical solution for management of the Basin, the Mojave Basin Area consists of five distinct but hydrologically interrelated "Subareas". The locations of the five Subareas; 1) Oeste, 2) Este, 3) Alto, 4) Centro and 5) Baja are shown on **Figure 6-1**. The Subarea boundaries are generally based on hydrologic divisions defined in previous studies (DWR, 1967), evolving over time based on a combination of hydrologic, geologic, engineering and political considerations. Also for the purposes of implementing the Judgment, the northern part of the Alto Subarea was defined as a sub-management unit – the Alto Transition Zone; this zone was created to acknowledge local geology and to better understand the water flow from Alto to Centro.

Each Subarea was found to be in overdraft to some extent due to the use of water by all of the producers in that Subarea. In addition, some Subareas were found to historically have received at least a part of their natural water supply as water flowing to them from upstream Subareas either on the surface or as subsurface flow. To maintain that historical relationship, the average annual obligation of any Subarea to another is set equal to the estimated average annual natural flow (excluding storm flow) between the Subareas over the 60-year period 1930-31 through 1989-90. If the Subarea obligation is not met, producers of water in the upstream Subarea must provide Makeup Water to the downstream Subarea.

The Mojave Basin Judgment assigned Base Annual Production (BAP) rights to each producer using 10 AF or more, based on historical production during the period 1986-1990. Parties to the Judgment are assigned a variable FPA, which is a percentage of the BAP set for each Subarea each year by the Watermaster. The BAP is reduced or "ramped-down" over time until FPA comes within 5 percent of the Production Safe Yield (PSY) as defined by the Judgment.

In 2018, an update to the Production Safe Yield (PSY) and Consumptive Use for each subarea was completed at the court's request. Previously, PSY was updated in August 2000.

The FPA was set for each Subarea for water years 2020-2021 and 2021-2022 as follows:

	2020-21	2021-22
Alto Subarea	65% of BAP for Agriculture	60% of BAP for Agriculture
Alto Subarea	55% of BAP for M&I	55% of BAP for M&I
Oeste Subarea	65% of BAP	60% of BAP
Este Subarea	70% of BAP	65% of BAP
Centro Subarea	70% of BAP	65% of BAP
Baja Subarea	25% of BAP	20% of BAP

The Watermaster's 27th Annual Report, Water Year 2019-20 (May 1, 2021) has recommended that the FPA in the Alto Subarea remains unchanged for M&I since the FPA is within 5 percent of the PSY. While FPA is only 1.3 percent (percentage of BAP) greater than the estimated PSY, additional rampdown in Alto could be made if conditions warranted. Water levels in some wells show a continuing downward trend in response to locally drier than average water supply during the past nine years. Sustained periods of below average inflow will cause continued water level declines, not a result of over-pumping.

Conservation, importation of SWP water, MWA's Regional Recharge and Recovery Project (R3 or R-Cubed), and implementation of the Judgment have resulted in hydrologic balance in the Alto Subarea. The purpose of percentage rampdown is not to cause a reduction in pumping but a reduction in FPA to cause imported water supply to be purchased to offset deficits. However, should drier than average water supply conditions persist, or if localized water level declines result in degraded water quality, poor well performance or well failure or harm to riparian habitat, the Watermaster will re-visit rampdown recommendations in the Alto Subbasin.

Any Producer that pumps more than their FPA must purchase Replacement Water from the Watermaster equal to the amount of production in excess of their total available FPA, or transfer unused FPA from another party within their Subarea. Funds collected for Replacement Water are then used by the MWA for purchase of SWP supplies and recharged into the Subarea they were produced from.

All Producers in each Subarea are allowed to produce as much water as they need annually to meet their requirements, subject to compliance with the Physical Solution set forth in the Judgment. An underlying assumption of the Judgment is that sufficient water will be made available to meet the needs of the Basin in the future from a combination of natural supply, imported water, water conservation, water reuse and transfers of FPA among Producers.

Special provisions for environmental protection are included in the Judgment, including the creation of a Biological Resources Trust Fund. The funds are provided to secure a water supply in the event that groundwater levels within specific areas are not maintained sufficient to support existing riparian vegetation.

6.2.2.3 Basin Overdraft Conditions

Basin Overdraft Conditions

The Mojave River Groundwater Basin combines 31 smaller groundwater basins and sub basins along the Mojave River. DWR's California Groundwater Bulletin 118 Updated 2003 and Bulletin 160, and The California Water Plan Update 2018, state that the Mojave Groundwater Basin has experienced overdraft[8] since the early 1950s.[9] In an effort to eliminate long-term overdraft conditions, the Mojave Basin Judgment directed MWA to manage conservation and recharge the basin with supplemental water. MWA has reduced allotments to purveyors each year and has recharged the Mojave River Basin in an effort to eliminate overdraft.

As generally described in the Water Year 2019/20 Mojave Watermaster Report[10], water levels within the Alto Subarea in which Adelanto lies, are segregated for reference purposes, into three geographic areas as follows: 1) Western portion, which is generally west of the Mojave River (the river is included in the western portion); 2) Eastern portion, which is generally east of the Mojave River; and 3) the Alto Transition Zone. Alto water levels near the river are relatively stable exhibiting seasonal variation, rising in winter and falling in summer. Wells near the river also indicate rising and falling water levels, which is consistent with available recharge from storms. Under current pumping conditions and long term precipitation, it is expected that wells near the river will remain stable. Water levels in the western portion of Alto have exhibited declines consistent with locally heavy pumping and limited local recharge. Water levels in the eastern portion of Alto indicate similar trends although to a lesser extent; most likely due to limited pumping in the regional aquifer east of the river. Continued pumping in depleted areas of the regional system may result in long local negative impacts such as declining yields and water quality problems. However, the Watermaster is not aware of any widespread problems in the regional system due to the falling water table. The relative stability of near river water levels and water levels in the Transition Zone indicate hydrologic stability in the relationship between Alto and the downstream Subareas.

Rising and falling water levels within the Basin Area are indications of changes in storage over time. While the amount of water level data collected and maintained by MWA is extensive, it is not sufficient to determine changes in storage in each Subarea by using changes in water levels.

[8] Overdraft means the condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.
[9] The California Water Plan Update 2018 is available on DWR's website at: https://water.ca.gov/Programs/California-Water-Plan/Update-2018; references to groundwater challenges can be found in the Volume 3 Regional Update for the South Lahonton Region
[10] 27th Annual Report of the Mojave Basin Area Water Master, Water Year 2019/20; report available at: http://www.mojavewater.org/annual_report.html

However, the data is sufficient to make generalizations about the conditions in each Subarea.

Basin Management Strategies

Since the Mojave Basin Judgment, MWA has invested in groundwater banking, groundwater replenishment system (recharge) facilities, and groundwater monitoring to effectively manage the basin.

- **Groundwater Storage and Banking Programs:** With recent developments in conjunctive use and groundwater banking, significant opportunities exist to improve water supply reliability for MWA. Conjunctive use is the coordinated operation of multiple water supplies to achieve improved supply reliability. Most conjunctive use concepts are based on storing surface water supplies in a local groundwater basin during times of surplus for use during dry periods when surface water supplies would likely be reduced.

  Groundwater banking programs involve storing available SWP surface water supplies during wet years in groundwater basins. Water would be stored either directly by surface spreading or injection, or indirectly by supplying surface water to farmers for use in lieu of their intended groundwater pumping. During water shortages, the stored water could be extracted and conveyed through the California Aqueduct to MWA as the banking partner, or used by the farmers in exchange for their surface water allocations. Several conjunctive use and groundwater banking opportunities are available to MWA.

  MWA has its own conjunctive use program to take advantage of the fact that the available MWA SWP supply on average is still greater than the demand in the service area. MWA is able to store this water for future use when SWP supplies are not available. This activity also allows MWA to take advantage of wet year supplies because of the abundant groundwater storage available in the Basins.

  Table 6-3 shows the storage available in MWA's existing banked account for the Alto Subarea as of September 2020.[11] Unless otherwise noted, the water was all excess SWP water that MWA has purchased over the past years and stored in various groundwater basins for use when SWP is limited or there are groundwater shortages. MWA continues to make such purchases when available to ensure the supply of water to their retailers.

Table 6-3: Status of MWA Groundwater Storage Account in the Alto Subarea

	Total Stored Water (AF)*
Alto Subarea	141,219

* MWA's banked groundwater storage accounts as of September 2020.

  In July 2011, MWA entered into an agreement to amend and extend the 2003 water storage program with the Metropolitan Water District of Southern California (Metropolitan). The amended agreement allows up to 390,000 AF of Metropolitan entitlement water from the State Water Project (SWP) to be stored in the Mojave Basin. Metropolitan has until December 31, 2035 to take return delivery of the water, through exchange of MWA entitlement from

[11] Mojave Water Agency 2020 UWMP, Table 3-8.

the SWP for delivery to Metropolitan. Roughly 60,000 AF was delivered and stored within the Mojave Basin under the amended storage agreement and will be eventually returned via entitlement exchange to Metropolitan. MWA has returned 29,000 AF to Metropolitan. This program provides a benefit to the region by recharging groundwater basins at a relatively low cost to MWA using SWP water from Metropolitan's entitlement, and allowing the water to be returned to Metropolitan via MWA's unused SWP entitlement at no cost to MWA.

- **Groundwater Replenishment System:** Groundwater is recharged by natural storm water flows, infiltration of the Mojave river and tributaries, SWP imported water, wastewater imports, and irrigation and wastewater return flow. Two water projects were developed to deliver much needed supply to additional locations in MWA's service area from the SWP. The Morongo Basin Pipeline was completed in 1995 and supplies more than 60,000 people in Morongo Basin. The Mojave River Pipeline completed in 2006 provides critical recharge of Mojave River Basin groundwater delivering up to 45,000 AFY to the area to help offset dwindling supplies from regional growth and pumping of groundwater. The pipeline runs approximately 76 miles from the California Aqueduct to MWA's recharge sites. MWA currently operates four recharge sites located at Hodge, Lenwood, Daggett/Yermo, and Newberry Springs, in addition to a connection at High Desert Power Project in Victorville. These sites provide the ability to recharge SWP water into subareas where replacement water is purchased, directly into the higher percolation area of the river floodplain. They also provide MWA with the ability to bank excess SWP Water.[12]

  The Deep Creek/Rock Springs recharge facility delivers water from the SWP directly to the Mojave Riverbed. This floodplain zone has high percolation rates allowing water to recharge the aquifer directly upstream of the area with the highest groundwater pumping demand in MWA's service area. The facility includes a pipeline which extends south along the river from the Morongo Basin Pipeline, a flow control facility and outlet. It can recharge a maximum of approximately 40,000 AFY.

  MWA also owns and operates the Oro Grande Wash Pipeline to deliver water to the Mojave Basin at Amethyst Basin. The Amethyst Basin facility, completed in 2019, delivers SWP water to recharge the Oro Grande Wash in Victorville just east of Sycamore Street and Amethyst Road in Victorville. It provides flood control and allows recharge through a series of dikes and recharge ponds. Water from the SWP is delivered to the recharge ponds through a pipeline that connects to the California Aqueduct at the Highway 395 turnout. Recharge capacity is about 8,000 AFY. The Oro Grande Wash Recharge Project supports groundwater pumping in the western part of the Alto Subarea.

- **Regional Recharge and Recovery Project (R^3 Project):** The R^3 Project is a conjunctive use project constructed by MWA as a basin management tool that imports and recharges SWP water to be stored underground in the local aquifer and later recovers and distributes water to local retail water purveyors in lieu of pumping water from production wells. R^3 is part of a comprehensive solution developed by MWA and the region's stakeholders to manage a sustainable water supply for the region. MWA maintains three Mojave River recharge sites

[12] Draft MWA 2015 UWMP, May 9, 2015, Section 3.2.4

in the upper Alto Subarea, all upstream of the six R3 Wells that were constructed for the project. The MWA-owned production wells are on either side of the Mojave River located immediately downstream of the recharge area recover and deliver the water through pipelines directly to retail water agencies in lieu of retail agencies utilizing some of their own production wells, which allows the pumping depressions some recovery.

Water pumped is billed through the Watermaster and any water pumped in excess of the retailers FPA is billed as Replacement Obligation and met through MWA's groundwater storage account. This method of water basin management targets the specific local well pumping depressions for the wells the retail agencies would normally use so they can reduce or eliminate pumping from them while taking R^3 water.

The R^3 Project provides access to an alternative delivery system for the major water providers in the Mojave Basin and partially offsets their need to continue pumping within the local regional aquifer system. Water providers that benefit from the R^3 Project include Liberty Utilities (Apple Valley Ranchos Water) Corp., City of Adelanto, City of Hesperia, Golden State Water Company, San Bernardino County Service Area 64 and the Victorville Water District.

Phase 1 of the project was constructed to allow delivery of 15,000 AFY of imported SWP supply previously recharged. The Phase 1 facilities were completed and began operating in 2013. In May 2019, the design phase of a pipeline extension for R3 began and construction commenced in September 2020. The extension will provide for delivery locations farther west in the Alto Subarea.

Watermaster reports the amount of R3 water delivered to specific stipulating parties. The total amount of deliveries for the 2019-20 Water Year was 4,220 AF. Operational water associated with the project is the responsibility of MWA.

The R3 facilities also have a separate Emergency Response Plan (ERP).[13] This ERP identifies emergency procedures, response actions, and responsible personnel that would be activated in the event of an emergency with the R3 facilities. Specifically, the ERP addresses responses to leaks or service interruptions, low pressure, power outage, contamination, and physical destruction of the R3 facilities. Accordingly, MWA's R3 ERP provides an additional buffer against emergency and catastrophic outage that may impact Statewide, regional, or local water distribution and treatment facilities.

- **Treated Wastewater Recharging** – Treated wastewater imports from outside MWA are also recharged into the Mojave River Groundwater Basin. Wastewater imports from the Crestline Sanitation District and Lake Arrowhead Community Services District are imported to the Alto Subarea, and effluent from the Big Bear Area Regional Wastewater Agency is imported to the Este Subarea. These wastewater imports comprise a relatively small volume in comparison to the total water used within the MWA service area.

- **Groundwater Monitoring** – The MWA maintains a comprehensive groundwater monitoring program consisting of approximately 850 wells. The Watermaster tracks water production

[13] R3 System Emergency /Disaster Response Plan Update 2019, Mojave Water Agency.

within each of the five Subareas in the Mojave Basin Area as part of the Watermaster's investigation into Subarea conditions and recommendations on groundwater pumping amounts. The Watermaster relies on MWA's groundwater level monitoring program along with production records to make recommendations regarding the sustainability for each of the Subareas.

Alto Subarea water levels near the Mojave River are relatively stable exhibiting seasonal fluctuations with rising levels in winter and declining levels in summer. It's noted that variability showing lower lows and lower highs is an indication of extractions exceeding recharge over time. Water levels in the western portion of Alto in the regional aquifer exhibit declines consistent with locally heavy pumping and limited local recharge. Water levels in the eastern portion of Alto indicate similar trends although to a lesser extent, most likely due to limited pumping in the regional aquifer east of the river. Continued pumping in depleted areas of the regional system may result in long-term local negative impacts

6.2.2.4 Groundwater Management Plan

Assembly Bill 3030 (AB 3030) passed by the California legislature in 1992 allows local agencies to develop Groundwater Management Plans (GWMPs). AB 3030 declares groundwater to be a valuable resource that should be carefully managed to ensure its safe production and quality. The legislation also encourages local agencies to work cooperatively to manage groundwater resources within their jurisdiction. Senate Bill 1938 (SB 1938) was passed by the Legislature September 16, 2002, and made changes and additions to sections of the Water Code created by AB 3030.

MWA's 2004 Regional Water Management Plan (RWMP), adopted on February 24, 2005 by Resolution 798-05, also serves as MWA's GWMP as it contains all the relevant components related to Groundwater Management Plans in California Water Code Sections 10750-10753.10, as well as the components recommended by DWR in California's Groundwater, Bulletin 118 (DWR, 2003).[14] The 2004 RWMP Update both complements and formalizes a number of existing water supply and water resource planning and management activities in the MWA service area that overlies several groundwater basins, as defined by DWR in Bulletin 118.

An update of the 2004 RWMP was published in 2014, as part of the Mojave Region IRWM Plan. The 2014 IRWM plan later was finalized and amended in May 2018 after the IRWM Plan Standards were updated with Proposition 1 2016 IRWM Guidelines.[15] [16]

In 2014, the RWMP update included revisions to Section 1 – Introduction of the RWMP. A full update was deferred until the Sustainable Groundwater Management Act (SGMA) was fully in

[14] Bulletin 118 can be found on DWR's website at: http://www.water.ca.gov/groundwater/bulletin118/update2003.cfm

[15] MWA IRWM 2018 Amendment Text: https://www.mywaterplan.com/files/MWA-IRWM-2018-Addendum_Final-Draft.pdf

[16] MWA Draft 2014 Groundwater Management Plan - http://www.mywaterplan.com/files/mwa_gmp_draft_toc_sect1.pdf

place. SGMA passed in 2014 and was amended in 2015 creating a framework for sustainable, local groundwater management in California. SGMA directed DWR to identify and prioritize groundwater basins for the purpose of implementing SGMA and requires the creation of groundwater sustainability agencies (GSAs), and that groundwater sustainability plans (GSPs or Alternative GSPs) be completed for critically over drafted basins no later than 2020 and for medium and high priority basins no later than 2022. The Mojave IRWM Regional Water Management Group plans to continue with the update of the GWMP that will consider criteria laid out in the new SGMA Regulations. The majority of the Mojave IRWM Plan Region is part of an adjudicated basin pursuant to: (1) Stipulated Judgment in City of Barstow, et. al., vs. City of Adelanto, et al. Riverside County Superior Court Case No. 2018568 and (2) Hi-Desert Water District vs. Yucca Valley Water Company Ltd, San Bernardino County Court Case No. 172103. SGMA does not apply to these adjudicated areas. However, there are "fringe areas" adjacent to and just outside of the adjudicated areas.[17]

Until the GWMP is updated, MWA utilizes the 2014 IRWM Plan as an update to the 2004 RWMP, its 2020 UWMP, and Watermaster reports to manage the basin.

As part of the 2004 RWMP Update, the following Basin Management Objectives (BMO) were established to plan water supplies through 2020:

- Balance future water demands with available supplies recognizing the need to:
  - Stabilize the groundwater basin storage balance over long-term hydrologic cycles;
  - Protect and restore riparian habitat areas as identified in the Mojave Basin Area Judgment and the Department of Fish & Game Habitat Water Supply Management Plan;
  - Limit the potential for well dewatering, land subsidence, and migration of poor quality water;
  - Maintain a sustainable water supply through extended drought periods; and
  - Select projects with the highest likelihood of being implemented.
- Maximize the overall beneficial use of water throughout MWA by:
  - Supplying water in quantity and of quality suitable to the various beneficial uses;
  - Addressing issues throughout the MWA service area recognizing the interconnection and interaction between different areas;
  - Distributing benefits that can be provided by MWA in an equitable and fair manner;
  - Ensuring that costs incurred to meet beneficial uses provide the greatest potential return to beneficiaries of the project(s);
  - Avoiding redirected impacts; and
  - Identifying sustainable funding sources including consideration of affordability.

Balancing future water demands with available supplies will increase water supply reliability by preventing continued overdraft of the groundwater. With groundwater storage stabilized, there will be groundwater available during surface water supply shortages and delivery interruptions.

[17] https://www.mywaterplan.com/files/MWA-IRWM-2018-Addendum_Final-Draft.pdf

With a balanced basin, groundwater elevations will be relatively stable. This will reduce the potential for land subsidence and associated aquifer compaction.

The adopted 2004 RWMP and GWMP also identified several water supply projects and management actions to provide a means to achieve the BMOs. Management actions can be grouped into the following seven major elements:

1. Monitoring regional groundwater quantity and quality;
2. Improve characterization of the basin;
3. Continue long-term planning;
4. Groundwater protection;
5. Construction and implementation;
6. Financing; and
7. Public participation

In addition to conducting regional groundwater management, in 1990 MWA entered into a joint agreement with the U.S. Geological Survey (USGS) to develop and fund the Cooperative Water Resources Program (CWRP). The CWRP provides funding for a) groundwater level measurement and groundwater quality sampling activities across the Mojave River and Morongo groundwater basins; b) stream gage maintenance and continuous flow monitoring of the Mojave River; c) continuous and discrete sampling of Mojave River water quality; and d) review and uploading of data collected under the CWRP and other MWA groundwater monitoring programs to the publicly available USGS National Water Information System (NWIS) website. Using these data, MWA tracks water level trends and fluctuations throughout the service area. Groundwater production in the Mojave Basin is monitored and managed by the Watermaster.

As part of basin characterization activities, six groundwater models have been developed in the MWA service area to aid in management of groundwater. MWA continues to apply and refine these models in key management areas to better manage water quantity and quality.

6.2.3 SURFACE WATER

At the time of preparation of the 2020 UWMP, and consistent with previous UWMPs, the City does not use surface water as part of its water supply.

6.2.4 STORMWATER

Through 2020 and consistent with previous UWMPs, the City does not use stormwater as part of its water supply. However, the City collects stormwater in recharge basins throughout the City, which helps to recharge the groundwater subbasins, but this recharge is not included in the City's supply calculations.

6.3 WASTEWATER AND RECYCLED WATER

The Southern California region generates large quantities of treated wastewater on a daily basis. This treated wastewater is considered a reliable and drought-proof water source and could

greatly reduce both the region and City's reliance on the use of limited groundwater supplies. As technological improvements continue to reduce treatment costs, and as public perception and acceptance continue to improve, numerous reuse opportunities should develop. Recycled water is a critical part of the California water picture because of the region's high likelihood of drought. As treatment technology continues to improve, demand for recycled water will also increase.

Municipal recycled water is municipal wastewater that has been treated to a specified quality to enable it to be used again for a beneficial purpose. The term "recycled water" is defined in the CWC more broadly than "municipal recycled water." For purposes of the UWMP, "recycled water" means only municipal recycled water, that is, water that has been treated and discharged from a municipal wastewater facility.

6.3.1 Wastewater and Recycled Water Coordination

The Adelanto Public Utilities Authority (City) is the sole agency for collecting, treating and discharging wastewater within its service area through the Adelanto Wastewater Treatment Facility.

The City of Adelanto does not currently use recycled water. In 2008, the City contracted with a firm to upgrade its wastewater treatment facility. The upgrade included an increase of treatment capacity from 1.5 MGD to 4.0 MGD. The upgraded facility was to produce treated effluent suitable for landscape irrigation and other beneficial uses. Upon completion, the upgraded facility did not successfully treat the City's wastewater to a quality suitable for reuse and could not reliably treat the increased capacity of 4.0 MGD. Subsequently, the City terminated the existing contract, solicited for a firm to provide the needed improvements, and entered into an agreement with a second firm to upgrade the facility. The second firm designed an upgrade to the facility that included the increased capacity of 4.0 MGD, as well as the capability to utilize the existing sand filters and chlorine disinfection system to produce effluent suitable for landscape irrigation and other beneficial uses. While the system now has the capability of producing treated water for irrigation, the City still needs to build a recycled water storage tank and distribution lines.

Ultimately, the upgraded plant will produce treated water meeting California's Title 22 requirements, which can be used for irrigation of lawns, public parks and other greenbelt areas, as well as for construction and dust control and other beneficial uses. Ultimately, according to the City's 2007 Sewer Master Plan, the wastewater treatment plant will be upgraded to a capacity of 8.0 MGD when the City nears build-out. Additionally, two sub-regional wastewater treatment plants (6.0 MGD and 3.0 MGD) are proposed to be constructed in incremental capacities.

Since the City relies on groundwater for 100 percent of its water supply and is not currently using recycled water, the City supports the efforts of the regional water management agencies to utilize recycled water in the High Desert region of San Bernardino County. The Victor Valley Wastewater Reclamation Authority (VVWRA) generates approximately 14.5 MGD of tertiary treated water at its treatment plant and, along with VWD, uses recycled water regionally for composting, dust control and fire protection and additionally serves a local golf course. In 2010,

use of recycled water began at the VVWRA for the High Desert Power Plant cooling system and for irrigation at the Green Tree Golf Course. VVWRA is planning to utilize the recycled water produced at its two new water reclamation facilities for irrigation water. However, since the Mojave Basin is a closed basin, the remaining wastewater effluent is percolated to the groundwater basin, where it is eventually reused as groundwater, benefiting water supply for all regional water agencies.

When water supplies are extracted from the groundwater basins, a portion of the water pumped is consumed and another portion of the extracted water is returned to the groundwater aquifer and becomes part of the available water supply. This "return flow" is an important component of the MWA service area's managed groundwater. For example, nearly all indoor water use is assumed to be returned to the basin either by percolation from septic tanks or treated wastewater effluent produced by municipal wastewater facilities.[18]

6.3.2 Wastewater Collection, Treatment, and Disposal Within the City's Service Area

The City of Adelanto provides water and wastewater services to nearly 36,000 people within its 53-square mile service area. Wastewater from Adelanto's water service area is collected and treated at the City-owned 4.0 MGD activated sludge wastewater treatment facility through an operations and maintenance contract with the PERC Water Corporation.

The City also operates and maintains the localized sewer collection pipelines that feed into the wastewater treatment plant. The City's sewer system includes over 87 miles of gravity sewer lines, one lift station, associated force mains and an existing 3.0 MGD wastewater treatment plant. The wastewater treatment facility effluent, secondary treated wastewater, is discharged to four operable evaporation ponds in northern Adelanto. The beneficial reuse of treated wastewater is groundwater recharge.

There are also approximately 775 septic tank systems in the northern end of the City's service area. These septic systems could be connected to the City sewer system in the future.

Municipal wastewater is generated in City's service area from a combination of residential, commercial, and industrial sources. The quantities of wastewater generated are generally proportional to the population and water usage in the service area. It is estimated that City's customers generate wastewater roughly proportional to 60 to 70 percent of the City's water demand. **Table 6-4** shows the total metered wastewater volume (2.679 MGD shown in AF) collected and treated for the City in 2020.[19]

[18]Mojave Water Agency 2020 UWMP, May 2020, Section 3,2,4
[19] Adelanto Flow Meter Data for 2020, PERC Water Corporation, June 2021.

Table 6-4*: Wastewater Collected Within Service Area in 2020						
100%	Percentage of 2020 service area covered by wastewater collection system					
90%	Percentage of 2020 service area population covered by wastewater collection system					
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected in 2020 (AF)	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party?
Adelanto Public Utilities Authority	Metered	3,001	City of Adelanto	Adelanto Wastewater Treatment Facility	Yes	Yes
NOTES: WWTP third party contractor is PERC Water Corporation. *DWR Submittal Table 6-2.						

Table 6-5 identifies the volume (2.679 MGD shown in AF) of treated wastewater discharged within the service area, which is consistent with Table 6-4.

Table 6-5*: Wastewater Treatment and Discharge Within Service Area in 2020							
Wastewater Treatment Plant Name	Discharge Location Description	Wastewater Discharge ID Number	Method of Disposal	Treatment Level	Wastewater Treated (AF)	Discharged Treated Wastewater (AF)	Recycled Water (AF)
Adelanto Wastewater Treatment Facility	North end of City, cross streets Jonathan and Auburn	6B369805001	Percolation Ponds	Secondary, Undisinfected	3,001	3,001	0
NOTES: *DWR Submittal Table 6-3.							

Table 6-6 shows projected wastewater flows generated within the City's service area through 2045. The estimates included in **Table 6-6** compare favorably with similar estimates in the City of Adelanto Sewer Master Plan (December 2007).

Table 6-6: City of Adelanto 2020 and Projected Wastewater Collection to 2045 (AF)						
	Actual	Projected at 65%				
	2020	2025	2030	2035	2040	2045
Potable Water Demand	4,647	4,996	5,260	5,426	5,584	5,766
Est. Volume of Wastewater Collected	3,001	3,247	3,419	3,527	3,630	3,748
NOTE: 2020 is actual demand from Table 4-1 and actual wastewater collected from Table 6-4. Projected wastewater collected is assumed equal approximately 65% of potable water demand based on the City's Sewer Master Plan (December 2007).						

6.3.3 Recycled Water Beneficial Uses

The planned recycled water infrastructure improvements – recycled water storage tanks and transmission lines to provide non-potable water for irrigation, construction and other beneficial uses throughout the City has not yet been completed. While a portion of the recycled water system has been constructed, it is not fully complete to treat wastewater to tertiary levels and no transmission lines have been constructed.

However, recycled water capacity is being developed and is anticipated for distribution and use for irrigation purposes by 2025. The City may be able to provide energy reporting for wastewater and recycled water in its 2025 UWMP Update. At that time, due to the local nature of the City's recycled water program, the energy requirements will include the collection of wastewater, the treatment process, and the distribution of recycled water throughout the service area.

The City's recycled water use is expected to begin by 2025 and make small increases through 2045 for landscape irrigation purposes as shown in **Table 6-7**.

Table 6-7* Retail: Recycled Water Direct Beneficial Uses Within Service Area, 2020-2045 (AF)								
Beneficial Use Type	General Description of 2020 Uses	Level of Treatment	2020	2025	2030	2035	2040	2045
Landscape Irrigation	None in 2020; Projections - City-Owned Parks, Sport Fields, Schools, Greenbelts	Tertiary	0	20	23	25	25	27
NOTES: *DWR Submittal Table 6-4								

Table 6-8 shows the planned versus actual use of recycled water in AF from the 2015 UWMP for the year 2020.

Table 6-8*: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual (AF)		
Use Type	**2015 Projection for 2020**	**2020 Actual Use**
Landscape irrigation (excludes golf courses)	0	0
NOTES: The planned recycled water infrastructure improvements, such as recycled water storage tanks and transmission lines, to provide non-potable water for irrigation was not completed as anticipated. *DWR Submittal Table 6-5.		

6.3.4 Actions to Encourage and Optimize Future Recycled Water Use

In addition to the City's on-going efforts, other regional studies of water recycling opportunities throughout Southern California provide a context for promoting the development of water recycling plans. It is recognized that broad public acceptance of recycled water requires continued education and public involvement.

Public Education

The City continues to participate in MWA's public education and school education programs, which include learning programs on water recycling. MWA staff reaches out to area residents including those in the City, through a variety of public information programs. These programs include information on present and future water supplies, demands for a suitable quantity and quality of water, including recycled water, and the importance of implementing water efficient techniques and behaviors. Through MWA, water education programs have reached area students with grade-specific programs including information on recycled water.

Financial Incentives

The implementation of recycled water projects involves a substantial upfront capital investment for planning studies, environmental impact reports, engineering design and construction before there is any recycled water to market. For some water agencies, these capital costs exceed the short-term expense of purchasing additional water supplies.

The establishment of new supplemental funding sources through federal and state programs can provide significant financial incentives for local agencies to develop and make use of recycled water. Potential sources of funding include federal and state funding opportunities. These funding sources include the United States Bureau of Reclamation, State Water Bond funds, and the State Revolving Fund. These funding opportunities may be sought by the City or possibly more appropriately by regional agencies. The City will continue to support seeking funding for regional water recycling projects and programs.

Potential Uses

As previously noted, the majority of recycled water in the High Desert is used for recharging the Basin, with some landscape and golf course irrigation. However, future recycled water use can increase by requiring dual piping in new developments, retrofitting existing landscaped areas and constructing recycled water pumping stations and transmission mains to reach areas far from the treatment plants, pending the availability of funding. The City is planning for reuse predominantly

in landscape irrigation in schools and parks, with further consideration of commercial use, golf courses and cemeteries, and highways and medians.

Many agencies in the High Desert region, including the City, are in the beginning planning stages and plan to produce recycled water, but not yet at the planning level to actually have a developed customer list. Based on known land and water consumption data, it is assumed potential recycled water customers are ample once the recycled water is available.

Current constraints, as discussed previously, involves the upgraded wastewater facility in 2008 unable to successfully treat the City's wastewater to a quality suitable for reuse and could not reliably treat the increased capacity of 4.0 MGD. Subsequently, the City contracted with a second firm to upgrade the facility - designed an upgrade that included the increased capacity of 4.0 MGD, as well as the capability to utilize the existing sand filters and chlorine disinfection system to produce effluent suitable for landscape irrigation and other beneficial uses. Additional rehabilitation, safety, and electrical work is needed to treat to a Title 22 level. While the system now has the capability of producing treated wastewater for irrigation, the City is working to identify opportunities to utilize the recycled water. As users are identified and enter into contracts for recycled water use, the City will build the necessary recycled water storage tank and distribution lines. **Table 6-9** shows the potential methods or actions to expand future recycled water use.

Table 6-9*: Methods to Expand Future Recycled Water Use

Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use (AF)
Wastewater Retooling and Conveyance	Wastewater plant retooling for tertiary treatment and building the conveyance pipelines	2025	20
New City Parks	System Expansion	2030	3
New City Parks	System Expansion	2035	2
New City Parks	System Expansion	2045	2
		Total	**27**

NOTES: *DWR Submittal Table 6-6.

6.4 DESALINATED WATER OPPORTUNITIES

The California UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631[i]). The City's service area is not located near the ocean, so ocean desalination is not a practical or economically feasible source of water for the City. In addition, MWA has evaluated potential options for developing desalination projects and has

determined none of the opportunities are practical or economically feasible at this time for MWA, and MWA has no current plans to pursue them.[20]

Brackish Water / Groundwater Desalination. Groundwater supplies in the City and MWA service areas are not considered brackish in nature, and desalination is not required. There are brackish supplies near the dry lakes, but it is not practical to pump, treat and potentially induce migration of better quality water to the dry lake areas. However, MWA and its retail water purveyors could partner with other SWP contractors and provide financial assistance in construction of other regional groundwater desalination facilities in exchange for SWP supplies. The desalinated water would be supplied to users in communities near the desalination plant, and a similar amount of SWP supplies would be exchanged and allocated to MWA from the SWP contractor. In addition, should an opportunity emerge with a local agency other than an SWP contractor, an exchange of SWP deliveries would most likely involve a third party, such as Metropolitan Water District of Southern California. Most local groundwater desalination facilities would be projects implemented by retailers of SWP contractors and, if an exchange program were implemented, would involve coordination and wheeling of water through the contractor's facilities to MWA.[21]

Seawater Desalination. Since the City's service area is not in a coastal area, it is neither practical nor economically feasible to implement a seawater desalination program. However, similar to the brackish water and groundwater desalination opportunities described above, MWA has indicated it could provide financial assistance to other SWP contractors in the construction of their seawater desalination facilities in exchange for SWP supplies. The City would support this effort as economically feasible for the benefit of the regional water supply.

6.5 WATER EXCHANGES AND TRANSFERS

During normal operation of the water system and the Basin FPA is high, there are no transfers or exchanges of water within the City's service area. However, as described in Section 6.2, the City's water system has two available interties with VWD, which have been consistently used over the past five years due to a reduced FPA. The City now has an intertie with MWA, which will be used in future years in place of the VWD intertie.

Over the last several years, transfers into the City represent approximately 19 percent of the total demand. Assuming the FPA remains constant through 2045, transfers would represent between 43 to 50 percent of total demand as shown in **Table 6-12**.

The interties also provide an additional source of water in case of a shortage or emergency. However, the water is also obtained from local groundwater, and thus its reliability is also tied directly to the reliability of the groundwater supply.

Because the City is entirely dependent on the local groundwater supply, to improve future reliability, the City is considering future projects that would allow direct purchase of wholesale imported water, such as from the Barstow Pipeline Treatment Plant, described in Section 6.7.

[20] Mojave Water Agency 2020 UWMP, May 2021
[21] Ibid

6.6 FUTURE WATER PROJECTS

City of Adelanto Projects

The City continually reviews practices that will provide its customers with adequate and reliable supplies. Trained staff provide safe reliable water, which meets present and future needs in an environmentally and economically responsible manner. The City also works closely with MWA in regional water supply issues as well as water shortage contingency planning.

The City anticipates water demands within its service area will increase over the next 25 years mainly due to population increases within the City's service area. Water use efficiency measures (demand management measures) described in Chapter 9 and recycled water use described in Section 6.3 of this plan have the potential to reduce overall demand on potable water thereby reducing overall per capita usage.

In 2015, the City identified a number of wells for rehabilitation; however, since that time it was determined due to the age and condition of the wells they should be abandoned or become monitoring wells. Therefore, the City is currently focusing on a new production well. **Table 6-10** lists only potable water projects. Recycled water projects are listed in **Table 6-9**.

The following are the two projects that would improve the City's water supply and its reliability:

1. New Production Well: The new production well is being developed for 2,200 GPM and will produce approximately 2,000 AF at maximum flow.

2. Water Reclamation Pipeline and Storage Project – As discussed in further detail in Section 6.3 and shown in **Table 6-9** above, the City has been working toward construction of a recycled water system as an alternative source of water for irrigation and other non-potable uses. This project involves the design and development a wastewater effluent reclamation facility capable of storing and distributing recycled water as well as construction of a recycled water distribution system with connections to parks and streetscape irrigation. Total design and construction costs for this project have been estimated at $4.5 million. *Status:* A portion of the recycled water system has been constructed; however, further construction is needed to treat wastewater to tertiary levels for recycled use and transmission pipelines must be constructed.

Table 6-10*: Expected Future Water Supply Projects and Programs - Potable

Name of Future Project	Joint Project with Other Suppliers	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply (AF)
New Production Well	No	2022	All Year Types	2,000
Notes: *DWR Submittal Table 6-7.				

Regional Agency Projects and Programs

Planned projects and programs implemented by MWA to secure water supplies and effectively recharge the groundwater supply in the Mojave River Basin directly affect the reliability of the City's water supply.

Basin Management Strategies. To account for the variability of available SWP water and to prevent shortages during dry years, MWA banks SWP storage water when possible. Although there can be a large variability in available SWP supplies, MWA's available SWP supply on average is greater than the demand within their service area. MWA takes advantage of this by storing the excess water in various groundwater basins for future use when SWP supplies are not available.

To enhance the long-term reliability of the water supply, MWA is currently exploring opportunities to purchase water supplies from other water agencies and sources, in addition to SWP water supplies. MWA has made short term transfers with the Metropolitan Water District of Southern California and the Sonoma County Water Agency. Although these exchange programs were short-term, they represent the types of exchange opportunities that MWA and other SWP contractors have to maximize utilization of available water supplies from the SWP.

MWA has supply enhancement projects planned to prevent groundwater overdraft in the future and improve supply reliability. The MWA 2020 UWMP includes a list of basin management strategy projects that will improve water reliability within the Mojave Basin Area. The following basin management strategies details in the MWA 2020 UWMP: Groundwater storage and banking programs

1. Groundwater replenishment system, including Oro Grande Wash Recharge Project
2. Regional Rehabilitation and Recovery Project (R3 Project) (also discussed in this UWMP in Section 6.2.2.3)
3. Treated wastewater recharging
4. Groundwater monitoring

6.7 SUMMARY OF EXISTING AND PLANNED SOURCES OF WATER

The City's groundwater supply combined with supplemental groundwater water from intertie with Victorville Water District has been sufficient to meet the City's historical demands. **Table 6-11** summarizes the total amount of groundwater pumped in 2020.

Table 6-11: Water Supplies – 2020 Actual

Water Supply	Additional Detail on Water Supply	2020	
		Actual Volume	Water Quality
Groundwater	Potable	3,787	Drinking Water
Victorville Water District Supplemental Water	Potable Groundwater	862	
Recycled Water	Non-Potable	0	Recycled Water
Total		**4,647**	

Projected water supply available through 2045 is shown in **Table 6-12**. The City intends to continue to use groundwater as the sole source of potable supply combined with supplemental water through the intertie with MWA. The City's projected supply is the available FPA, which is currently 2,851 AFY, which may be adjusted annual by the Watermaster. Transfers between MWA and the City is also from groundwater; future year projections are determined based on the difference between available FPA and forecasted demand, although more would be available as needed. Recycled water will begin delivery for irrigation uses by 2025, increasing through 2045.

Table 6-12: Water Supplies – Projected to 2045

Water Supply	Additional Detail on Water Supply	Projected Water Supply Reasonably Available Volume (AF)				
		2025	2030	2035	2040	2045
Safe Yield of Alto Subarea						
Alto Subarea	Production Safe Yield[1]	64,406	64,406	64,406	64,406	64,406
Reasonably Available Volume						
City of Adelanto	FPA of Safe Yield	2,851	2,851	2,851	2,851	2,851
Mojave Water Agency	Intertie with MWA	2,145	2,409	2,575	2,733	2,915
Recycled Water	Non-Potable	20	23	25	25	27
	Totals	**5,016**	**5,283**	**5,451**	**5,609**	**5,793**

NOTES: *DWR Submittal Table 6-9.
[1] MWA Watermaster Report Water Year 2019-20, May 2021, Table 5-1

6.8 SPECIAL CONDITIONS

Numerous special conditions may affect water supply availability, such as climate change, regulatory, and other local conditions. The following considers reasonable assertions about climate change impacts on water supply in the region, the Mojave River Groundwater Basin, and the Alto Subbasin.

6.8.1 Climate Change Impacts on Water Supply

Weather is the behavior of the atmosphere over short periods, such as days and weeks. Climate is the long-term behavior of the atmosphere, and it is almost always expressed in averages—for example, average annual temperature, average monthly rainfall, or average water equivalent of mountain snowpack at a given time of year. Climate projections cannot predict what will happen on a given date in the future, but they can indicate what to expect from the future climate in general. Climate projections also forecast the likelihood of increasing or decreasing frequencies of extreme events such as heat waves and heavy rainfall. However, they cannot predict when those events will actually occur.

Changes in precipitation natural variability combined with a warming trend may impact water demand in addition to supply. Increased temperatures are predicted to lengthen the growing

season for agricultural crops, but crop irrigation water requirements is expected to vary. This change could increase agricultural water demand if farming practices are able to adapt to the opportunity by planting more crop cycles per growing season. In general increases in minimum and maximum temperatures, length of heat waves, and length of frost free season suggest increases in demand for water and electric power.

While the California Water Code does not prescribe specific climate change planning and management measures for water suppliers, it does emphasize that climate change is appropriate to consider when assessing drought risk assessment, water conservation and use efficiency, and demand management and supply – both in an historical and future-projection context.

To help managed water balance in the Basin, MWA's primary climate change concern involves its capability of providing imported SWP water for groundwater recharge.[22] MWA uses DWR's 2019 State Water Project Delivery Capability Report (DCR)[23] to assess current and future reliability of SWP Contract Table A supplies. The 2019 DCR modified the normal year reliability of Table A Annual Amounts from 62% to 58% by incorporating, among other things, climate change. In addition, the 2019 DCR used a 7% supply reliability number for a single dry year.

MWA has tapered its long-term SWP projections to a 52% reliability by 2040 to account for climatic variability consistent with the 2019 DCR future climate change scenario. MWA also used the driest year on record with the lowest Table A percentage allocation of 5% to characterize both the single dry year supply availability as well as two of the five years in the 5-year drought scenario. Finally, MWA also considered the driest year on record to reflect its Table A Carryover supplies that may be available in order to best consider climatological variability. Accordingly, MWA's conservative approach to capture supply availability captures future unpredictable climatological issues that may impact water supply reliability.

The Mojave IRWM Plan identifies a series of climate change water-related issues and conflicts to water demand, water supply, water quality, sea level rise, flooding, ecosystem and habitat, and hydropower. The IRWM Plan lists the following water supply vulnerabilities:

- SWP Imported Water
    - Supply - SWP water is an important portion of the water resources available to the region. Potential impacts on SWP water availability resulting from climate change directly affect the amount of imported water supply delivered to the region.
    - Quality - For sources derived from the Delta, sea-level rise could result in increases in chloride and bromide (a disinfection by-product (DBP) or DBP precursor), potentially requiring changes in treatment for drinking water. Increased temperature could result in an increase in algal blooms, taste and odor events, and a general increase in DBP formation.

[22] Mojave Water Agency, 2020 UWMP, May 2021, Chapter 3
[23] State Water Project Delivery Capability Report (DCR), California Department of Water Resources (DWR), August 2020

- Regional Groundwater
    - Supply - Changes in local hydrology could affect natural recharge to the local groundwater aquifers and the quantity of groundwater that could be pumped sustainably over the long-term in the region. Decreased inflow from more flashy or more intense runoff, increased evaporative losses, warmer and shorter winter seasons can alter natural recharge of groundwater. Reductions in imported SWP supply due to climate change would lead to less water supply available for managed recharge of local groundwater basins and increased stresses on local supplies.
    - Quality - Increased temperature could result in lower dissolved oxygen in streams forming anoxic conditions and algal blooms. Decrease in annual precipitation could result in higher concentrations of contaminants in streams during droughts or in association with flushing rain events. Increased wildfire events and flashier storms could also increase turbidity loads to riparian systems.
- Regional Surface Water
    - Although future projections suggest that small changes in total annual precipitation over the region will not change much, there may be changes in timing with reductions in the spring and more intense rainfall in the winter.

For long-term water supply planning, coping with variability is a challenge. With potential additional changes imposed by climate change, there will be a heightened need to evaluate and respond to increased water supply variability. The water supply impacts of climate change are a key issue in the Mojave Region. Task 1 of the USBR Climate Report focuses entirely on impacts on surface water supply for MWA, including local surface water and imported SWP supplies. The Mojave 2014 IRWM Plan, Section 12.4.3 and Appendix G of the IRWM Plan, presents results of that analysis.

Water supplies in the Mojave Region are comprised of natural surface water flows, wastewater imports from outside the Region, SWP imports and return flow from pumped groundwater not consumptively used. SWP supplies derive from Sierra Nevada snowmelt and the Sacramento-San Joaquin Delta are subject to climate variability at those sources. Almost all of the water use within the Mojave Region is supplied by pumped groundwater replenished by native surface supply, return flow and SWP imports recharge.

For the Mojave Region, the prioritization of vulnerability area leads with water supply as the greatest vulnerability to climate change, followed by water demand, and then water quality, flooding, ecosystem and habitat, and hydro power all tied in level of vulnerability.

Mitigation and Adaptation Strategies[24]

There are two main strategies to deal with climate change – mitigation strategies and adaptation strategies. Mitigation strategies combat climate change by directly reducing GHG emissions or

[24] Mojave 2014 IRWM Plan, June 2014, Section 12,5,1

minimize increases in GHG emissions while adaptation strategies generally refer to efforts that deal with the impacts of climate change.

Regional Mitigation Strategies. Task 3 of the USBR Climate Report was to evaluate GHG emissions for the MWA service area from 1990 through 2050. Overall, it can be concluded that while reducing local and imported water demands could contribute to reducing GHG emissions, a combination of measures will likely be necessary to achieve GHG emission reduction and water conservation targets mandated by California's legislation. These statewide targets are specifically laid out in AB 32 and Senate Bill 7 of Special Extended Session 7 (SBX7-7). AB 32 requires every major financial sector in California, including water, to reduce GHG emissions to 1990 levels by 2020. Further, it aims to reduce GHG emissions to 80 percent below 1990 levels by 2050. SBX7-7 sets a target of 20 percent per capita reduction in urban water use statewide by 2020. The USBR has developed a GHG Emissions Calculator to help assess GHG emissions in relation to water supply alternatives. The analysis conducted in the USBR Climate Report evaluated whether water conservation measures alone would be enough to meet AB 32 GHG emission reduction targets in the MWA service area. Results showed that meeting AB 32 emission targets will require water use reductions beyond 20 percent by 2020, as prescribed by SBX7-7. More specifically, meeting AB 32 emission targets with water conservation alone would require reducing water use by 44 percent to meet the 2020 emissions target and significant additional water conservation in subsequent years. These water savings and their relation to emission reductions are described below for the MWA service area.

Chapter 5 of this UWMP demonstrates the City has surpassed its 2020 target GPCD, contributing a 42 percent reduction in water use per capita.

Adaptation Strategies. The 2012 California Climate Adaptation Planning Guide (APG) provides guidance to support regional and local communities in proactively addressing the unavoidable consequences of climate change. The APG provides a step-by-step process for local and regional climate vulnerability assessment and adaptation strategy development (CalEMA and CNRA 2012).

Potential adaptation strategies have been identified for each watershed characteristic, starting with the highest priorities developed in the climate change vulnerability area analysis. This list of strategies will allow the stakeholders in the IRWM region, including the City, to incorporate climate change adaptation in development projects.

Water supply. Climate change projections suggest continued highly variable annual precipitation with slightly drier climate in the Sierra Nevada Mountains by mid-century. The overall impact will include reductions in imported water from the SWP and possibly greater reliance on groundwater supplies. Suggested regional adaptation strategies to address potential reductions in water supply include the following:

- Expand water storage and conjunctive management of surface and groundwater resources.
- Address the State policy goal of reducing reliance on the Delta by promoting and investing in projects and programs that allow the Region to meet water demands with alternative

sources of supply and/or demand management actions during times when imported supplies from the Delta are reduced or unavailable due to dry years, droughts, system outages, environmental and regulatory restrictions, or other reasons.

- Enhance use of recycled water for appropriate uses as a drought-proof water supply.
- Enhance practices of water exchanges and water banking outside the region to supplement water supply.
- Encourage local agencies to develop and implement AB 3030 GWMPs or SGWPs.
- Develop plans for local agencies to monitor the elevation of their groundwater basins.
- Encourage cities and the county agencies in the region to adopt local ordinances that protect the natural functioning of groundwater recharge areas.

Water Quality. Climate change projections suggest increased temperature and continued highly variable annual precipitation with slightly drier climate by mid-century that could degrade water quality.

Suggested regional adaptation strategies to address potential water quality impacts include the following:

- Support DWR strategies that protect or enhance water quality delivered by the SWP.
- Consider water quality improvements associated with water transfers and water banking on regional water supply.
- Consider riparian forest projects that provide cooling for habitat (see Ecosystem Health and Habitat).
- Encourage projects that improve water quality of contaminated groundwater sources.
- Increase implementation of low impact development (LID) techniques to improve stormwater management.
- Comply with National Pollutant Discharge Elimination System permits to ensure water quality protection.

6.9 ENERGY INTENSITY

New to 2020 UWMPs, water suppliers must include information that could be used to calculate the energy intensity of their water service, as included in Water Code Section 10631.2(a).

Specifically, water suppliers are encouraged to include energy information, readily obtainable, for any of the following operational processes for the same 12-month period of water use reported in Chapter 4:

- To extract or divert water supplies;
- To convey water supplies to the water treatment plants or distribution system;
- To treat water supplies;
- To distribute water supplies through its distribution systems;

- For treated water supplies in comparison to the amount used for nontreated water supplies;
- To place water into or withdraw from storage; and
- Any other energy-related information deemed appropriate.

In DWR's methodology of energy usage, they define operational energy intensity as the total amount of energy expended by the urban water supplier on a per-acre-foot basis to take water from the location where the urban water supplier acquires the water to its point of delivery. The methodology continues to clarify by adding that urban water suppliers are only expected to report the energy use information associated within the suppliers' operational control and any energy embedded in water supplies by an upstream water supplier or wholesaler is not intended to be included within the energy intensity report. As discussed in Section 6.2.1, the City is currently 100 percent reliant on groundwater. Therefore, there are no upstream water suppliers or wholesalers to include in the energy analysis.

6.9.1 WATER DISTRIBUTION ENERGY

The methodology utilized by DWR provides strict definitions of the various water management processes. Based on these definitions 100 percent of the City's power demands on its drinking water system are classified as part of the "Distribution" process.

As discussed in Chapter 3, the City's water system delivers water to three pressure zones and consists of wells, transmission and distribution pipelines, booster stations and reservoirs. Total energy consumed includes energy usage for the City's active wells and booster pump stations. The City does not have any self-generating energy sources.

City facilities that use energy include

- Seven active potable water wells with a total pumping capacity of 4,728 gpm.
- Four booster stations which pump water from lower to upper pressure zones.

Table 6-13 presents the total system energy intensity. Energy intensity is a function of volume of water entering the system (AF) and the energy consumed (kWh), resulting in energy intensity (kWh/AF).

Table 6-13: Potable Deliveries Energy – Total Utility

Potable Water	Distribution
Volume of Water Entering Process (AF)	4,647
Energy Consumed (kWh)	4,811,626
Energy Intensity (kWh/AF)	1,035

Appendix G includes the detailed energy consumption for 2020 by month.

6.9.2 WASTEWATER AND RECYCLED WATER ENERGY

Currently, the City does not serve recycled water for customer use. However, recycled water capacity is being developed and is anticipated for distribution and use for irrigation purposes by 2025. The City may be able to provide energy reporting for wastewater and recycled water in its 2025 UWMP Update.

At that time, due to the local nature of the City's recycled water program, the energy requirements will include the collection of wastewater, the treatment process, and the distribution of recycled water throughout the service area.

7.0 WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

This chapter provides the City's water system reliability findings as required under Water Code Section 10635 and provides reliability information the City may use in completing an annual supply and demand assessment under Water Code Section 10632.1.

Water service reliability addresses the capability of the water supply to meet water demand during long-term droughts and emergency events in normal (average) existing conditions. The drought risk assessment in this chapter compares water service reliability during a normal year, a single dry year, and a five consecutive year drought.

During the 20th century, California experienced three significant historical statewide droughts: the six-year event of 1929 to 1934, the two-year event of 1976 to 1977, and the six-year event of 1987 to 1992. Since 2000, most years have experienced less than average annual rainfall. The statewide drought of 2007 to 2009 was soon followed by the statewide drought of 2012 to 2016. The 2007 to 2009 drought marked the first time that a statewide proclamation of emergency was issued because of drought impacts. A statewide proclamation was repeated with the 2012 to 2016 drought (DWR, 2020).

Notably, during the 2012 to 2016 drought, the State mandated that urban water suppliers reduce water use by retailer-specific percentages compared to a retailer's baseline 2013 usage. With coordination and cooperation by the City's customers, the City achieved its required reduction by aggressively implementing its Water Shortage Contingency Plan (Chapter 8 and **Appendix I**) and expanding and implementing its demand management measures (Chapter 9) to customers. Collectively, these actions ensured the City maintained water service reliability.

This chapter describes the City's ability to meet retail customer water demands by analyzing a variety of factors that affect the City's water supply. The CWC requires an assessment of the City's water service reliability during average years, single dry years, and during a five consecutive year drought period to meet the water needs of its customers. This chapter also includes the discussion of a Drought Risk Assessment, a new UWMP requirement, which provides a mechanism for the City to evaluate the risk to its water supply under a drought lasting for the next five consecutive years (2021-2025).

7.1 WATER SERVICE RELIABILITY ASSESSMENT

The Mojave 2014 IRWM Plan (amended 2018) replaces the 2007 GWMP as a critical source document for MWA's groundwater management since the City since relies 100 percent on the Alto Subarea for its drinking water supply. More specifically, MWA has expressly stated, "MWA has reliable water supplies to meet retail demands within its service area."[1]

[1] Mojave Water Agency 2020 UWMP, May 2021, Chapter 5

MWA aggregates the regional water supplies and demands in this 2020 UWMP through its roles as a wholesale water purveyor of SWP supplies, Watermaster of the Mojave Basin Area Adjudication, and administrator for the Warren Valley Basin Judgment. These efforts necessitate examination of water supplies at a region-wide level in order to ensure supply reliability among the numerous regional retail purveyors, including the City, and others that depend upon the regional water resources.

MWA utilized regional water demands tied to population projections. Water demands in the future show a reduction from 2015 projections due in large part to adjusted population projections, and also reflects successful water conservation and water efficiency efforts by MWA, the City and all retail agencies throughout the MWA service area. Similarly, MWA considered the average reliability of SWP supplies that are used for groundwater replenishment utilizing the DWR Delivery Capability Report.[2] Reliability of SWP supplies are projected to decrease from 62 percent in 2015 to a low of 52 percent reliability by 2040.

Despite these long-term changes in SWP supply availability, MWA can demonstrate that the region has reliable water supplies available to meet the regional water demands through 2065.

MWA can demonstrate that the region has reliable water supplies available to meet the regional water demands through 2065. Therefore, the City's water supplies are projected to meet full-service demands now and into the future.

As presented in Chapter 6, the City is developing local recycled water to meet non-potable landscape irrigation demands. However, the City will continue to rely on groundwater to provide future potable water supply to meet the projected water demands in all hydrologic scenarios. The City and its customers benefit from investments in groundwater supply reliability.

There are various factors that may impact reliability of supplies such as legal, environmental, water quality, and climatic variables, as discussed below. The City's water supplies are projected to meet full-service demands now and into the future.

Groundwater

The City provides water service to the entire community through the operation of seven active potable groundwater wells. The wells have a combined total pumping capacity of about 4,728 gallons per minute (gpm). One new production well is being developed for 2,200 gpm to increase capacity and reliability. Some of the current inactive wells may be returned to service in future years, although most may be abandoned or become monitoring wells. All wells are located within the City of Adelanto accessing the Mojave River Groundwater Basin, Alto Subarea.

The City is limited to the amount it can pump from the Alto Subarea based on the annual FPA established by the Watermaster for each Subarea. However, the City is able to access supplemental water through interties with other agencies. In the past, the intertie with VWD has

[2] The Final State Water Project Delivery Capability Report, DWR, August 2020.

provided supplemental water (also groundwater), although the City now has an intertie with MWA, which will be used instead of the VWD intertie.

The City's projected supply is the available FPA, which is currently 2,851 AFY, which may be adjusted annual by the Watermaster. Transfers between MWA and the City is also from groundwater. Future year projections are determined based on the difference between available FPA and forecasted demand, although more would be available as needed. Recycled water will begin delivery for irrigation uses by 2025, increasing through 2045.

Since the City relies on groundwater supplies from the Alto Subarea of the Mojave River Groundwater Basin, managed by MWA, the City's water service reliability assessment is largely driven by the actions of the MWA working collaboratively with overlying agencies to maximize the development and reliability of groundwater supplies. MWA manages the basin's water budget. The water budget provides an accounting and assessment of the total annual volume of surface water and groundwater entering and leaving the basin, including historical, current, and projected water budget conditions and the change in the volume of groundwater in storage. In other words, the water budget is an inventory of surface water and groundwater inflows and outflows from the Basin and Subareas.

Recycled Water

Recycled water has proven to be an effective "drought-resilient" supply of local water that the City is currently developing. The City will directly produce, store, and distribute recycled water for landscape irrigation, parks, and schools. The use of recycled water will offset the use of potable groundwater supplies.

7.1.1 Constraints on Water Sources

Several factors that could potentially disrupt the City's groundwater supply include earthquakes, water quality impacts, regulatory changes, and other emergency supply shortage conditions. The City's response to these potential supply disruptions are discussed in the City's Emergency Operations Plan (EOP). The City's EOP is discussed in more detail in Chapter 8. There are no potential legal factors that could impact the City's access to a reliable water supply.

Climate Change and Groundwater Storage

Changes in climate can affect water supply and water quality through modifications in the timing, amount, and form of precipitation. The seasonal variability of water demand and evapotranspiration (ETo) is projected to increase with climate change as droughts become more common and more severe. Changing climate patterns are expected to alter precipitation patterns and affect water supply availability, as discussed in Chapters 3 and 6. Unpredictable weather patterns will make water supply planning more challenging.

Surface water sources are more vulnerable to drought events. Because the City can fully rely on groundwater from its own wells and through MWA, it is somewhat less susceptible to drought impacts. However, surface and imported waters recharge the aquifers; thus, the City could be vulnerable to a particularly severe and prolonged drought.

Areas of concern related to water supply and quality in California that climate change and prolonged drought periods will impact, including the following (sea-level rise and seawater intrusion indirectly impact supplies to the region):

- Reduction in Sierra Nevada Mountain snowpack.
- Anticipated changes in rain patterns and intensity adding to the uncertainty of water supply.
- Potential impacts from sea-level rise and storm surges on coastal aquatic resources and water infrastructure.
- Exacerbation in saltwater intrusion in groundwater basins from sea-level rise.
- Anticipate increase in number and severity of wildfire events, with subsequent erosion and water quality problems.
- Potential increase in flooding.
- Water supply problems associated with water quality impairments, particularly with nitrates and seawater intrusion.
- Problems with water storage and conveyance infrastructure (inadequate, leaky, or otherwise defective water systems).
- Overconsumption/overdraft, specifically for irrigation and municipal supplies, including landscaping.
- Unreliable water supply in certain areas, particularly in small communities.

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

- Changes in urban and agricultural demand levels and patterns.
- Increased evapotranspiration from higher temperatures.
- Impacts to human health from water-borne pathogens and water quality degradation.
- Declines in ecosystem health and function.
- Alterations to power generation and pumping regime.

The following are needs to offset climate change impacts:

- Increased water conservation, including gray water reuse and rainwater catchment.
- Increased environmental water, including fisheries and wildlife.
- Greater drought management.
- Increased public education about water supply issues.

An emphasis on storage is needed in California to offset impacts from risks and uncertainties from a variety of sources, including water quality, climate change, regulatory and operational changes, project construction and implementation issues, infrastructure reliability and maintenance, and demographic and growth uncertainty.

Any of these risks and uncertainties, should they occur individually or collectively, may result in a negative impact to water supply reliability. While it is impossible to know how much risk and uncertainty to guard against, the region's reliability will be more secure with a long-term plan that recognizes risk and provides resource development to offset that risk.

Water supply adaptation strategies are discussed in Chapter 6, which includes the following:

- Expand water storage and conjunctive management of surface and groundwater resources.
- Address the State policy goal of reducing reliance on the Delta.
- Enhance use of recycled water as a drought-proof water supply.
- Enhance practices of water exchanges and water banking.
- Encourage local agencies to develop and implement AB 3030 GWMPs or SGWPs.
- Develop plans for local agencies to monitor the elevation of their groundwater basins.
- Encourage agencies in the region to adopt local ordinances that protect the natural functioning of groundwater recharge areas.

Water Quality of Groundwater

Water quality is a critically important consideration in the MWA and City service area. All consumer water supplies are derived from groundwater extractions that blend many sources of water. MWA provides imported SWP water supplies to the groundwater basins in its service area. MWA has committed significant resources to maintain water quality in its service area in order to prevent any future degradation.

The goal of groundwater protection activities is to maintain the groundwater and the aquifer to ensure a reliable high quality water supply. Activities to meet this goal include continued and increased monitoring, data sharing, education and coordination with other agencies that have local or regional authority or programs. The current MWA groundwater monitoring program includes groundwater quality data collected by MWA and the USGS through their cooperative water resources program and through the Drinking Water Program directed by the SWRCB.

MWA has developed and actively maintains a Key Well program to support ongoing groundwater management activities, including monitoring of groundwater levels and water quality within the MWA service area. Wells in the Key Well program include a combination of dedicated monitoring wells, scientific investigation wells, domestic water supply wells, and agricultural irrigation wells.

There are a range of groundwater contamination sites across the region. These sites are regulated by the Lahontan and Colorado River Basin Regional Water Quality Control Boards (RWQCB) and are not a major concern regarding a detriment to water supply on a regional basis at this time.[3]

The area's water sources are generally of good quality, and no insurmountable problems resulting from industrial or agricultural contamination are foreseen. If contamination did result from a toxic spill or similar problematic event, the contamination would be isolated and should not significantly impact the total water supply in the region. In addition, such an event would be addressed in the retailers' emergency response plan (ERP) as well as the R3 ERP.[4]

[3] Mojave Water Agency 2020 UWMP, May 2021, Section 3.3.3
[4] Mojave Water Agency 2020 UWMP, May 2021, Section 6.3.3

Water Quality of Recycled Water

Recycled water has higher total dissolved solids (TDS) than groundwater as a function of the water treatment process. The higher concentration of salts in recycled water can have negative impacts to sensitive plants or landscapes suffering multiple year droughts that do not receive natural rainfall to flush salts down past the root zone. The City is monitoring development of the 2018 water conservation legislation (AB 1668/SB 606) that may have the effect of diminishing indoor water use, thereby reducing wastewater volumes. This may have the deleterious effect of increasing TDS concentrations, which may have costly impacts to the end-users (replacement of landscaping) or the City (enhanced treatment).

Emergency Supply Shortages

In the event of an emergency supply shortage, the City would rely on its Water Shortage Contingency Plan (Chapter 8 and **Appendix I**) and its Emergency Operations Plan to guide the City's response and actions.

Specifically, if a major earthquake on the San Andreas Fault occurs, it may be damaging to the regions' water systems and disrupt groundwater supplies for a period of time. The region may impose a water use reduction ranging from 10 to 25 percent until the system is repaired.

7.1.2 Reliability by Type of Year

In California, water supply reliability is largely driven by hydrologic conditions. The UWMP water supply reliability assessment requires a water supplier to define its available water supply into three hydrologic year types: (1) normal supply, (2) single-dry year supply, and (3) multiple-dry five-year supply.

While the MWA service area has four sources of water supply – SWP imported water, natural surface water flow, return flow from pumped groundwater not consumptively used, and wastewater imports from outside the MWA service area, almost all of the water use within MWA is supplied by pumped groundwater. Native surface supply and SWP imports recharge the groundwater basins and are not supplied directly to any of MWA retail agencies, with the exception of two power plants. While SWP supplies on a long-term average only provides 62% of Table A amounts (allocations) for an average year, 7% for a single dry year, and 26% for multiple dry years (1987-1992),[5] MWA has indicated that groundwater supplies are available in sufficient quantity to meet demands in its service area during average, single-dry, and multiple-dry years.

The City's recycled water supply, once in use, will be 100 percent reliable during all hydrologic year types, based on prevalent analysis of recycled water supplies.

This section discusses the type of years considered when evaluating water supply reliability. The conditions are as follows:

[5] Mojave Water Agency 2020 UWMP, May 2021, Table 3-2

- **Average Water Year** – The average water year is a year that represents the median runoff levels from precipitation, as well as the same general pattern of runoff. The supply quantities would be similar to historical average supplies.
- **Single Dry Year** – The single dry year is defined as the individual year with the lowest usable water supply. This condition can be derived as the year with the lowest annual supply.
- **Multiple Dry Years** – Multiple dry years are defined as the five consecutive years with the lowest usable water supply. The multiple dry years are detrimental to the water supply system because of their adverse effect on the levels of local and statewide reservoirs, as well as groundwater levels. Available supply for these conditions is constituted as the minimum historical yields for a running average of five years.

Table 7-1 shows the basis of water year data used to predict drought supply availability. Data is based on MWA's base years and reliability in the region and for the Mojave Basin.

Table 7-1: Basis of Water Year Data (Reliability Assessment)

Year Type	Base Year	Percent of Average Supply (%)
Average Year	1922-2003	100%
Single-Dry Year	1977, 2014	100%
Consecutive Dry Years 1st Year	1931-1934	100%
Consecutive Dry Years 2nd Year	1931-1934	100%
Consecutive Dry Years 3rd Year	1931-1934	100%
Consecutive Dry Years 4th Year	1931-1934	100%
Consecutive Dry Years 5th Year	1931-1934	100%
Notes: MWA has indicated it has adequate supplies to meet demands during average, single-dry, and multiple-dry years throughout the 25-year planning period (MWA 2020 UWMP, May 2021).		

The following sections provide water supply and demand projections from 2025 to 2045 for normal, single dry, and multiple dry years (five consecutive years). Projections include both potable and recycled water supplies combined for results in this section.

7.1.3 Water Service Reliability – Normal Year, Single Dry Year, and Five Consecutive Dry Years

MWA has stated that it has adequate supplies to meet demands during average, single-dry, and multiple-dry years throughout the 25-year planning period. The following sections present the City's supply and demand assessment/comparison in average, single-dry, and multiple-dry years through 2045. The assessment makes the best determination of the reliability of the City's water supply based upon the information that was reasonably available at the time the 2020 UWMP was prepared.

Information utilized includes known information about the City's service area as well as the Mojave Basin region, water sources, water supply reliability, and water demand projections determined by MWA.

MWA's 2020 UWMP forecasts supply availability during all single dry years occurring over the next 25 years with supplies at 100 percent of normal year supplies in average, single dry and multiple-dry water years. These projections support MWA's finding that it has adequate supplies to meet demands during average, single-dry, and multiple-dry years throughout the 25-year planning period.

The Mojave Basin provides a normal year water supply of 156,580 AFY, with a safe yield 64,406 AFY for the Alto Subarea. [6] The Alto Subarea is characterized by general stability, and even during multiple dry years, the groundwater table was marginally lower.

The City's sustainable groundwater yield plus available supplemental supply from MWA from the groundwater basin exceeds projected demands during average, single-dry, and five consecutive dry water year periods. Therefore, the City's water supply is 100 percent reliable in all hydrologic conditions.

Table 7-2 shows normal year supply and demand comparisons for potable and recycled water through the year 2045.

Table 7-2: Normal Year Supply and Demand Comparison (AF)

	2025	2030	2035	2040	2045
Supply Totals	64,426	64,429	64,155	64,431	64,433
Demand Totals	5,016	5,283	5,451	5,609	5,793
Difference	59,410	59,146	58,704	58,822	58.640

NOTES: Supply Totals include Alto Subarea supplies and recycled water supply projections. Demand totals include potable and recycled water.

Table 7-3 shows single dry year supply and demand comparisons for potable water and recycled water through 2045. For the single dry year, a one percent increase has been applied to normal demands, consistent with the estimated increase in demand that the City experienced in 2012, the first year of the most recent five-year drought (2012–2016). Subsequently, the City experienced a significant drop in demand by 2015 (14%), assumed to result from customer conservation measures.

[6] MWA Watermaster Report Water Year 2019-20, May 2021, Table 5-1

Table 7-3: Single Dry Year Supply and Demand Comparison (AF)					
	2025	2030	2035	2040	2045
Supply Totals	64,426	64,429	64,155	64,431	64,433
Demand Totals	5,066	5,336	5,505	5,665	5,824
Difference	59,360	59,093	58,650	58,766	58,582
NOTES: Supply Totals include Alto Subarea supplies and recycled water supply projections. Demand totals include potable and recycled water.					

Multiple dry years are defined as five consecutive year drought periods. As stated above, the City's sustainable groundwater yield exceeds projected demands during average, single-dry, and five consecutive dry year periods. Therefore, the City's water supply is 100 percent reliable in multiple-dry year conditions through 2045.

For projected potable demand, the drought experience of 2012–2016 informs multiple-dry year demand year-over-year changes. The single-dry year scenario used in **Table 7-3** of a one percent increase in demand is used again for the first year in this scenario. The subsequent years used a five percent annual decrease in demand. While the City experienced an actual decrease of between one and 14 percent (average 3.7% decrease) in demand during the subsequent years of the 2012–2015 drought, to create a conservative water reliability assessment, demand decrease was held at five percent per year. **Table 7-4** provides the five consecutive dry year supply and demand projections through 2045.

Table 7-4: Multiple Dry Years Supply and Demand Comparison (AF)						
		2025	2030	2035	2040	2045
First Year	Supply Totals	64,426	64,429	64,155	64,431	64,433
	Demand Totals	5,066	5,336	5,505	5,665	5,824
	Difference	59,360	59,093	58,650	58,766	58,582
Second Year	Supply Totals	64,426	64,429	64,155	64,431	64,433
	Demand Totals	4,766	5,020	5,180	5,330	5,505
	Difference	59,660	59,409	58,975	59,101	58,928
Third Year	Supply Totals	64,426	64,429	64,155	64,431	64,433
	Demand Totals	4,529	4,770	4,922	5,065	5,231
	Difference	59,897	59,659	59,233	59,366	59,202
Fourth Year	Supply Totals	64,426	64,429	64,155	64,431	64,433
	Demand Totals	4,303	4,533	4,677	4,813	4,971
	Difference	60,123	59,896	59,478	59,618	59,462
Fifth Year	Supply Totals	64,426	64,429	64,155	64,431	64,433
	Demand Totals	4,089	4,307	4,445	4,573	4,723
	Difference	60,337	60,122	59,710	59,858	59,710

7.1.4 Description of Management Tools and Options

The City is committed to developing locally reliable potable and non-potable supplies to meet the City's future demands (see **Table 6-10** Future Water Supply Projects and Programs). The City is developing a new well to ensure supply reliability and sufficiency, and development of its recycled water distribution system. Projects to increased groundwater reliability and capacity are important to the City, working collaboratively with MWA, as well as continuing to implement effective and innovative demand management measures (Chapter 9).

While the City's water service reliability assessments conclude that the City can meet 100 percent of projected demands in all hydrologic scenarios, the intent is to show the City is reasonably prepared for the unexpected. To that extent, the City has developed a comprehensive Water Shortage Contingency Plan (Chapter 8 and **Appendix I**) that lays out a framework for how the City can best manage water supply shortages.

7.2 DROUGHT RISK ASSESSMENT

Every urban water supplier is required to include a Drought Risk Assessment (DRA) as part of its 2020 UWMP. The CWC requires that a DRA be based on the driest five-year historical sequence for the supplier while also considering plausible changes to projected water supply and demand due to climate change or regulatory changes. Specifically, a DRA evaluates whether a water shortage condition due to extended drought is expected to occur over the next five consecutive years (2021 to 2025). This DRA is designed to work in conjunction with the Water Service Reliability Assessment (Section 7.1) and Water Shortage Contingency Plan (Chapter 8 and **Appendix I**) to present a comprehensive view of the City's water reliability, preparedness, and water shortage response actions for drought.

7.2.1 Data, Methods, and Basis for Water Shortage Conditions

The City's DRA is conducted using the same methodology as the multiple dry year analysis in the Water Service Reliability Assessment in Section 7.1.3 for the potable and non-potable water systems. For the purposes of this UWMP narrative, the DRA is shown for only the potable water system since non-potable supplies cannot supplement potable water in emergencies, and they are 100 percent reliable in drought scenarios, although vulnerable to emergencies, such as earthquakes and power outages. However, as is required when submitting the requisite UWMP standardized tables to DWR, a combined DRA of both water systems is provided and included in **Appendix M**.

Potable Water

The five driest hydrologic years selected to define the DRA are the years 1989–1993. The 1989–1993 dry hydrologic conditions were applied to years 2021–2025 to assess chronic dry year supplies available to the City. The City's experience from the most recent consecutive five-year drought period of 2012–2016 informs how demands are forecasted for this DRA. The City's unconstrained potable water demand from 2020 (4,647 AF) is used as a baseline to project

multiple dry year demands for 2021 through 2025. The potable water demand percentage decreases/increases used in the water service reliability for multiple dry years analysis were again used in this DRA. Year 1 (2021) demand increases by one percent, while subsequent years decrease by five percent each year. Demands in the latter four years decline because of regional and statewide drought messaging, which helps to suppress demand at the local level.

7.2.2 DRA Water Source Reliability

The City's potable water service reliability for near-term drought conditions is 100 percent. Shown in the Reliability Assessment, the City's sustainable groundwater yield exceeds projected demands during average, single dry, and five consecutive dry water year periods. Therefore, the City's available water supply over the next five years if a drought persists is projected to exceed expected demands.

7.2.3 Total Water Supply and Use Comparison

The City's potable water service reliability is 100 percent in all years during a hypothetical consecutive five-year drought. This is attributable to the anticipated available groundwater supply, which exceeds the City's projected demands. This water supply surplus is from a well-managed basin largely driven by the actions of the MWA working collaboratively with overlying agencies to maximize the development and reliability of groundwater supplies. In addition, the City has been proactive with respect to improving and developing its water supply system and will continue to construct new wells in advance of demand.

While the DRA does not indicate as such, the City would still maintain and refine its water use efficiency program offerings to its customers to manage demand in future years, regardless of the hydrologic scenario.

Table 7-5 demonstrates the City's potable water service reliability of 100 percent in a near-term drought scenario that extends from 2021 through 2025.

Non-Potable (Recycled) Water

The City's recycled water service will be 100 percent reliable in all years during a hypothetical consecutive five-year drought. This is attributable to the City's current investments in production capacity of recycled water at the Adelanto Wastewater Treatment Facility and operational flexibility.

Table 7-5: Five-year Drought Risk Assessment – Potable (AF)	
2021	**Total AF**
Gross Water Use	4,693
Total Supplies	64,406
Surplus/Shortall without WSCP Action	59,713
Planned WSCP Actions – supply augmentation benefit	
Planned WSCP Action – use reduction savings benefit	
Revised Surplus/Shortfall	59,713
Resulting % Use Reduction from WSCP Action	0%
2022	**Total AF**
Gross Water Use	4,415
Total Supplies	64,406
Surplus/Shortall without WSCP Action	59,991
Planned WSCP Actions – supply augmentation benefit	
Planned WSCP Action – use reduction savings benefit	
Revised Surplus/Shortfall	59,991
Resulting % Use Reduction from WSCP Action	0%
2023	**Total AF**
Gross Water Use	4,182
Total Supplies	64,406
Surplus/Shortall without WSCP Action	60,224
Planned WSCP Actions – supply augmentation benefit	
Planned WSCP Action – use reduction savings benefit	
Revised Surplus/Shortfall	60,224
Resulting % Use Reduction from WSCP Action	0%
2024	**Total AF**
Gross Water Use	3,950
Total Supplies	64,406
Surplus/Shortall without WSCP Action	60,456
Planned WSCP Actions – supply augmentation benefit	
Planned WSCP Action – use reduction savings benefit	
Revised Surplus/Shortfall	60,456
Resulting % Use Reduction from WSCP Action	0%
2025	**Total AF**
Gross Water Use	3,718
Total Supplies	64,406
Surplus/Shortall without WSCP Action	60,688
Planned WSCP Actions – supply augmentation benefit	
Planned WSCP Action – use reduction savings benefit	
Revised Surplus/Shortfall	60,688
Resulting % Use Reduction from WSCP Action	0%

8.0 WATER SHORTAGE CONTINGENCY PLAN

The City is responsible for conserving the available water supply, protecting the integrity of water supply facilities (infrastructure), and implementing a contingency plan in times of drought, supply reductions, failure of water distribution systems or emergencies. Particular emphasis is placed on use of domestic (potable) water, sanitation, fire protection, and preserving public health, welfare, and safety, in addition to minimizing the adverse impacts of water supply shortage or other water supply emergency conditions that do not include recycled water.

The City has updated its Water Shortage Contingency Plan (WSC Plan) in accordance with CWC Section 10632, which is part of the Urban Water Management Planning Act regulatory requirements. A copy of the WSC Plan is in **Appendix I**.

In 2018, as a response to California's drought of 2012-2016 and some urban water suppliers experiencing water reliability challenges, the State legislature updated Section 10632, as a result of Senate Bill 606, to require that all urban water suppliers develop and adopt a WSC Plan as part of the 2020 UWMP. Water Code Section 10632 now requires several prescriptive elements that suppliers must address. These requirements are listed below in Section 8.1.

The WSC Plan provides the strategic responses the City may take if a water shortage is declared to conserve and manage precious water resources that are essential to maintain public health and community vitality. While the WSC Plan is included as an appendix to this 2020 UWMP as required by the Water Code, the WSC Plan is a separate document from the City's 2020 UWMP and can be amended, as needed, without amending the 2020 UWMP.

The WSC Plan supports and builds on the City's Water Conservation Plan (Chapter 8.20 City of Adelanto Code) and the City's Landscaping/Water Conservation Ordinance (Chapter 17.60, Ordinance 528, City of Adelanto Code) to meet the CWC requirements. The WSC Plan, the Water Conservation Plan, and the Landscaping/Water Conservation Ordinance will be informed and enacted through the annual water supply and demand assessment.

Additionally, the WSC Plan outlines the shortage response actions the City may take to balance demand with constrained supplies. The Mandatory Water Conservation Regulations establish the regulatory authority and policies with respect to water conservation and the declaration of a water supply shortage.

The City's WSC Plan also builds on the lessons learned in successfully meeting the challenges of the most recent drought (2012-2017). While the UWMP functions as a long-term planning document, the WSC Plan serves as a short-term planning tool designed to be utilized on an annual basis to determine if there will be a water shortage and, if so, what actions will be taken to remedy the shortage.

The City works with the community to implement the requirements of the WSC Plan to conserve water resources during times of drought and water shortages. Equally, the City works in partnership with the Mojave Water Agency and other water agency partners to ensure regional water reliability.

8.1 OVERVIEW OF THE WATER SHORTAGE CONTINGENCY PLAN

The WSC Plan serves as the operating plan that the City will use to prevent catastrophic water service disruptions through proactive, rather than reactive, mitigation of water shortages. The WSC Plan includes the processes and procedures that will be deployed when shortage conditions arise. These procedures set the foundation for the City Council, City management, and staff to easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate to the degree of water shortage anticipated.

The WSC Plan's purpose is to provide a plan of action to be followed at the various levels of a water shortage to balance demand with constrained supplies. The WSC Plan includes the steps to assess if a water shortage is occurring, and what level of demand reduction actions to trigger the most appropriate response to the water shortage conditions. The WSC Plan outlines the shortage response actions that will be implemented, as discussed in Section **Error! Reference source not found.** below.

The WSC Plan prescriptive elements include the following:

- Water Supply Reliability Analysis
- Annual Water Supply and Demand Assessment Procedures
- Water Shortage Levels
- Shortage Response Actions
- Seismic Risk Assessment
- Communication Protocols
- Compliance and Enforcement
- Legal Authorities
- Financial Consequences of WSC Plan Activation
- Monitoring and Reporting
- WSC Plan Refinement Procedures
- Special Water Feature Distinction
- Plan Adoption, Submittal, and Availability

8.2 SUMMARY OF WATER SHORTAGE RESPONSE STRATEGY

The WSC Plan is organized into 12 sections in compliance with the CWC Section 16032 requirements.

Section 1: Overview and Intention – Introduction and overview of the WSC Plan, the Plan's purpose and principles, how it builds on the City's Municipal Code on Water Conservation Regulations, how it meets the requirements of the CWC, and coordination with regional water management groups.

Section 2: Water Supply Reliability Analysis and Annual Assessment Process – The CWC requires two analyses to be conducted on a regular basis to evaluate supply reliability: a Water Supply

Reliability Assessment and a Drought Risk Assessment. This section details how the City will perform these analyses along with regional partners.

Section 3: Water Supply Shortage Levels – One of the major changes to the WSC Plan was requiring water suppliers to standardize shortage levels into six levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50 percent shortages. The water shortage levels and the triggering mechanisms (supply conditions) to determine the appropriate shortage level are presented.

Section 4: Water Shortage Response Actions – Details the permanent water conservation best management practices that the City promotes for customers, operational best practices utilized by the City, and required shortage response actions at each water shortage level. This section also presents the process for declaring an emergency or catastrophic water supply shortage, establishing the necessary and appropriate conservation actions, and the process for initiating or terminating a water shortage level. The procedure for requesting a variance is also presented, along with a copy of the variance form, in the WSC Plan (**Appendix I**).

Section 5: Communication Protocols – In the event of a water shortage, timely and effective communication is a critical element. This section details the communication protocols and procedures in place to inform the community of any current or predicted shortages, along with required actions. Topics discussed include coordination; key audience, stakeholders and partners; customer outreach and engagement tools; communication objectives; communication protocol for declaring a water shortage; communication strategies for water shortage levels; and crisis communication.

Section 6: Local Hazard Mitigation Plan and Seismic Risk Assessment – The City's Local Hazard Mitigation Plan (**Appendix H**) is presented with a focus on a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of the City's water system and mitigate those vulnerabilities. This section also includes planning and mitigation for catastrophic supply interruption and coordination with the City's Emergency Operations Plan.

Section 7: Compliance and Enforcement – Since the CWC requires water suppliers to penalize excessive use, this section details the methods of enforcement available to the City. This includes warnings, penalties, and variances, as well as exclusively applying enforcement revenues to City water conservation programs.

Section 8: Legal Authorities – Describes the legal authority that the City has to implement and enforce its WSC Plan. Specifically, the California Constitution Article X – Water Section 2 and CWC Section 100 view that conservation should be exercised toward the reasonable and beneficial use in the interest of the people and public welfare. In addition, City's Municipal Code, Chapters 8.20 and 17.60 prohibit the waste of water and imposes water conservation requirements on customers.

Section 9: Financial Impacts – The City's volume-based rate structure is designed and intended to be an ongoing and active water demand management tool that proportionately recovers the cost of providing water service within the City's service area. This section reviews the impacts

that consumption reduction will have on the revenues and expenditures of the City. Specifically explained are the City's rate structure and billing process; the impact on the Water Enterprise fund; the temporary use of the City's Water Reserves to manage rate volatility; and the possibility of temporary rate increases for long-term drought conditions.

Section 10: Monitoring, Reporting and Refinement – To perform accurate assessments, accurate data is required. This section details how the City will monitor pertinent water supply data under normal monitoring procedures and under each water shortage level, and to perform the requisite analyses to determine if the shortage response actions are effective. Procedures to refine the WSC Plan are presented.

Section 11: Special Water Feature Distinction – The CWC requires suppliers to define any regulations covering special water features that are artificially supplied with water, such as ponds, fountains, lakes, etc., separately from swimming pools and spas. This section defines Decorative Water Features and Recreational Water Features, and the restrictions for each.

Section 12: WSC Plan Adoption, Submittal, and Availability – Establishes the procedures for the City to adopt and submit the WSC Plan to DWR, the California State Library, the County of San Bernardino, and how the WSC Plan will be available to the public.

8.3 WATER SHORTAGE CONTINGENCY PLAN LEVELS

The WSC Plan outlines the shortage response actions (WSC Plan Section 4.3.7) that will be implemented by the City in the event of water supply shortages due to catastrophic events, drought, etc. The WSC Plan's purpose is to provide a plan of action to be followed at the various levels of a water supply shortage in order to balance demand with constrained supplies.

The WSC Plan is based on detailed demand reduction measures that are structured to match varying levels of water shortage. This will help the City's water customers understand what to expect during a water shortage situation.

The City does not anticipate development of supply augmentation actions given that it is 100 percent dependent on a reliable source of groundwater and recycled water is still being developed. Supply augmentations represent short-term management objectives triggered by the WSC Plan and do not overlap with the long-term new water supply development or supply reliability enhancement projects. The groundwater supply available to the City in all levels of water shortage is anticipated to satisfy the demands of the City's customers even if demand reduction actions were limited.

The shortage response actions/demand reduction actions that align with each shortage level are described in **Table 8-1**. In the WSC Plan, *Table 4-3 Shortage Response Actions and Shortage Gap Reductions* also estimates the extent to which each action will reduce the gap between supplies and demands. This demonstrates that choosing a suite of shortage response actions can be expected to deliver the outcomes necessary to meet the requirements of a given shortage level.

Table 8-1: Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions**
1	Up to 10%	• Increase public awareness of water supply situation • Encourage voluntary outdoor water use efficiency • Encourage diligent repair of water leaks within 72 hours • Reinforce permanent water conservation BMPs
2	Up to 20%	• Shortage Level 1 response actions remain in effect • Voluntary reduction of up to 20%
3	Up to 30%	• Shortage Levels 1 &2 response actions remain in effect • Irrigation limits to watering days: Existing Landscapes - 2 days/ week • Swimming pools/spas initial filling prohibited; draining / refilling permitted only if repair needed; must be covered • Industrial/commercial water use reduction encouraged; compliance with outdoor water use required; use from unmetered fire hydrants prohibited, except by City personnel • Non-commercial washing of vehicles and mobile equipment permitted on assigned landscape watering days • Use of potable water for dust control reduced as possible
4	Up to 40%	• Shortage Levels 1, 2 & 3 Response Actions remain in effect or are revised • Reduction of water use by any means is encouraged • City Council may establish mandatory use reduction targets, if needed
5	Up to 50%	• Shortage Levels 1, 2, 3 & 4 Response Actions remain in effect or are revised • Landscape watering with potable water is prohibited • Swimming pools/spas – all filling and draining/refilling prohibited; must be covered to avoid evaporation • Non-commercial washing of vehicles and mobile equipment is prohibited; only commercial facilities with water recycling systems permitted • Industrial/commercial water use reduction encouraged; City Council may establish mandatory use reduction targets; compliance with outdoor water use required; use from unmetered fire hydrants prohibited, except by City personnel • City Council may establish mandatory construction water budgets
6	>50%	• Shortage Levels 1, 2, 3, 4 & 5 Response Actions remain in effect or are revised • Emergency Public Outreach • Elimination of all turf irrigation with potable supplies;

Table 8-1: Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions**
		restrict watering to shrubs and trees by hand or drip irrigation only • Shut-off of dedicated landscape irrigation meters • Elimination of water served in food service establishments unless requested • Elimination of the issuance of construction meters • Moratorium on provision of new supply meters • Other mandatory restrictions and enforcement, as necessary

9.0 DEMAND MANAGEMENT MEASURES

California Water Code Section 10631(e)(1) requires that the UWMP provide a description of the supplier's water demand management measures (DMMs) that are used to achieve water use targets. This chapter provides a description of the City's DMMs and their effectiveness.

Demand management is an integral part of sustainably managing water resources in California. A growing population typically increases the demand for water. Without mitigation, increased water demand, coupled with reduced supplies or shifts in supplies related to climate change and other factors, can jeopardize water reliability. DMMs, also known as best management practices (BMP), are important mitigation measures that reduce demand, improve water service reliability, and help meet state and regional water conservation goals. Reducing demand can also benefit the City through reduced energy costs.

In 2014, the legislature enacted streamlined retail agency requirements into six general requirements plus an "other" category, from the original 14 specific measures. "Other" programs are those that have a significant impact on water use as measured in GPCD, including innovative measures and rebate programs, if implemented. Urban water suppliers can choose to follow the six general requirements or report by type of DMM.

Table 9-1 shows the six general DMM requirement categories for reporting.

Table 9-1 Demand Management Measure Reporting
2015 DMM Reporting
Six General DMM Categories
1. Water Waste Prevention Ordinance
2. Metering
3. Conservation Pricing
4. Public Education and Outreach
5. Programs to Assess and Manage Distribution System Real Loss
6. Water Conservation Program Coordination and Staffing Support
Other – Programs with a significant impact on water use as measured in GPCD

The City's UWMP presents its DMM efforts by the six general categories and the "other" category. Each category includes a description of planned efforts, past and current, by the City in implementing DMMs.

MWA Implements DMMs on Behalf of the City. MWA implements many of the urban water conservation DMMs on behalf of its purveyors, including the City of Adelanto. DMM descriptions that follow include activities performed by MWA on behalf of the City.

9.1 EXISTING AND PLANNED DEMAND MANAGEMENT MEASURES

The City's DMMs that have been or are being implemented within the City's water service area, by the City, MWA, or with assistance from AWAC, are discussed below following the six general categories, as allowed by the CWC. MWA's Final 2020 UWMP should be referred to for more detailed information on the regional DMMs program and each individual DMM that are being implemented on behalf of the City.

9.1.1 WATER WASTE PREVENTION ORDINANCES

The City's water waste ordinance explicitly states that the waste of water is to be prohibited. The ordinance prohibits specific actions that waste water, such as excessive runoff from landscape irrigation, or use of a hose outdoors without a shut off nozzle at all times and is not dependent upon a water shortage for implementation.

Chapter 8 of this UWMP presents the City's Water Shortage Contingency Plan (**Appendix I**) with reference to water waste prohibition included in the City's Water Conservation Plan. Chapter 8.20 (**Appendix D**) of Adelanto's Municipal Code entitled "Water Conservation Plan" sets forth the rules and regulations governing the use of water in the City, even during non-drought times. The City's Code also requires adherence to the City's Landscape Water Conservation Ordinance contained within Section 17.60 of the Municipal Code (Adopted by Ordinance No. 441-**Appendix D**). This section of the City's Municipal Code specifically requires all water users to abide by the following water conservation measures at all times:

1. The use of water for any purpose shall not result in flooding or unnecessary runoff in gutters, driveways, streets or adjacent lands.
2. Lawns, trees, shrubs, and other landscaping shall not be watered beyond what they need for growth and to sustain life and water shall not be permitted to pool or to run off property onto streets or adjacent land. Watering of lawns, grass, shrubbery, ground cover or other landscaping shall only be done on set watering days. The Water Conservation Plan specifies the watering days based on address, with the exception of no outdoor landscape watering on Mondays and weekends.
3. Sidewalks, walkways, driveways, parking areas, patios, porches or verandas or any other like area shall not be washed off with water from hoses or by any other means. The exception to this shall be the washing of flammable or other similar dangerous substances that require direct hose flushing using recognized safety control measures for the benefit of the public health and safety. Notification to the City of such wash down is required.
4. Water, sprinkling, aerial watering or irrigating of any landscaped or vegetated areas, including lawns, trees, shrubs, grass, ground cover, plants, vines, gardens, vegetables, flowers, or other landscaping shall not occur between the hours of 9:00 a.m. and 6:00 p.m. during the months of April through September; provided, however, that these restrictions shall not apply to hand-held hose or drip irrigation systems or to establishment of new lawns, landscaping, or gardens.

5. Non-commercial washing of privately owned vehicles, trailers, motor homes, buses, boats and mobile homes is prohibited except from a bucket, and except that a hose equipped with an automatic shut-off nozzle may be used for a quick rinse.
6. Water shall not be used to clean, fill, operate or maintain levels in decorative fountains unless such water is for replenishment of a recycling system.
7. Water lines, faucets, and other facilities shall be maintained so that they do not leak water. Existing leaks shall be repaired in a timely manner.
8. Restaurants, other food establishments, or other public places where food is served, shall not routinely provide glasses of drinking water to customers unless specifically requested by the customer.
9. Water for construction purposes including, but not limited to, debrushing of vacant land, compaction of fills and pads, trench backfill, and other construction uses, shall be used in an efficient manner. The use of aerial type sprinklers is not recommended but, if used, shall not be operated between the hours of 9:00 a.m. and 6:00 p.m.
10. All new residential, commercial and industrial construction shall be equipped with low-flush toilets and low-flow showers and faucets.
11. Water used for cooling systems must be recycled to the extent possible.
12. Evaporation resistant covers are required for all new swimming pools and hot tubs and are encouraged to be installed for existing pools. The covers required by this Chapter shall, at the time of purchase, installation and all subsequent maintenance, meet or exceed current standards and specifications for swimming pool, spa and hot tub covers adopted by the American Society for Testing and Materials (ASTM).
13. Hotels/motels are required to post a notice in substantially the form provided by the City urging guests to conserve water.
14. All current and future water customers are encouraged to install flow restrictors or pressure reducers and to install toilet tank displacement devices (dams, bottles or bags), and as appliances or fixtures wear out, replace them with water saving models.
15. Parks, schools, golf courses, cemeteries, school grounds and all public use lands shall not irrigate between the hours of 9:00 a.m. and 6:00 p.m. during the months of April through September inclusive and are encouraged to use water conservation irrigation equipment.
16. The use of drought tolerant or native plant material is encouraged for exterior landscaping in all new residential construction, and required for new commercial and industrial construction.
17. The use of low precipitation sprinkler heads, bubblers, drip irrigation and timing devices are required in the exterior landscaping in all new residential, commercial and industrial construction.
18. At least fifty percent (50%) of all new model homes shall include as a part of the exterior landscape development low water use, drought-tolerant or native plants.

19. Projects, including Commercial and Planned Unit Developments, which utilize recycled water from sewage treatment or agricultural operations, may receive an exemption from Subsections 15 through 18 of this Section by approval of the City Council.

9.1.2 METERING

All service connections within the City's water service area are provided with water meters. Standard Conditions of Approval for new development include a requirement to install water meters prior to the issuance of building permits.

There are no unmetered water service connections within the service area. The City's meters are classified into four sectors including residential (combining both single and multi-family), commercial (including institutional), industrial and irrigation (combining both agricultural and non-agricultural). Any unmetered use generally occurs at fire hydrants or from distribution system breaks.

The City performs meter reading, repair, replacement and calibration on a routine basis and when specifically reported by City customers. The City continues to budget and schedule annual meter replacements for older meters as part of its Meter Replacement Program. Routine tests on existing meters is performed for accuracy and reliability. Meter repair, replacement, and calibration activities help to ensure that customers are paying for all of the water they consume, which results in water conservation.

The City bills each customer based on the volume of water used on a tiered rate structure. Further details on the rate structure are discussed below in Conservation Pricing.

9.1.3 CONSERVATION PRICING

Conservation pricing sends a signal to customers regarding their water use. A common model of conservation pricing is a tiered rate structure, where efficient water use is billed at a low price and higher water use billed at progressively higher prices.

In 2009, after eight years with no increases in water rates, the City adopted a tiered rate structure, which encourages water conservation. The tiered commodity rates were phased in over a four year period, beginning in 2009 and completed in 2013. Specific information on the City's 2020 rate structure is presented in **Table 9-2.**

Table 9-2 City of Adelanto Base Monthly Rates and Tiered Water Usage Rates					
Meter Size	**Base Monthly Water Service Rate**	**Tier 1 Usage (units)[1, 2]**	**Tier 1 Water Usage Rate**	**Tier 2 Usage (units)**	**Tier 2 Water Usage Rate**
Residential up to 1"	$31.43	1-15	$2.82	16 and up	$5.18
Commercial up to 1"	$52.23				
1-½"	$104.47				
2"	$167.15				
3"	$313.40				
4"	$522.33				
Senior Low Income Residential	$15.82				
Low Income Residential	$20.38				

[1] Units are billed in hundred cubic feet (CCF) which is approximately 748 gallons.
[2] All commercial and industrial properties are charged at Tier 1 rates for all water used.

9.1.4 PUBLIC EDUCTION AND OUTREACH

Public Communication Measures

The City works collaboratively with MWA and the Alliance for Water Awareness and Conservation (AWAC)[1] to provide outreach, educational and informational materials and literature, and water use efficiency programs. Program and support include:

- Conservation and water use efficiency information promoted on the following websites:
  - City of Adelanto: http://www.ci.adelanto.ca.us, then Water Efficiency
  - MWA: http://www.mojavewater.org/why-save-water-.html
  - AWAC: http://www.hdawac.org/

Alliance for Water Awareness and Conservation. In addition to the DMM assistance the City receives from MWA, the City is also a member of the AWAC. AWAC is a collaborative group of over 20 agencies committed to achieving water conservation goals within the 4,900-square-mile service area of MWA. AWAC's mission is "to promote the efficient use of water and increase awareness of conservation as an important tool to ensure an adequate water supply." AWAC's vision is "to be a collaborative alliance providing leadership, education, resources, support, ideas and solutions to agencies region-wide to conserve and protect our water supplies."

AWAC Goals include:

- Serve as a network to assist agencies in educating the public on water conservation.
- Provide resources with a consistent message to help agencies meet their respective conservation goals.
- Maintain current gallons per capita per day (GPCD) or lower and continue to position agencies for meeting future conservation needs.

[1] Information on AWAC can be found on their website at: http://www.hdawac.org/

- Exchange ideas between agencies, especially at quarterly meetings.

Strategic Partners Program. MWA values its partnerships with the local communities, and attributes the region's conservation success to collaborative efforts, funding community projects that promote water resource education and water conservation projects through a set-aside in its conservation budget. Working through AWAC, MWA regularly extends its Strategic Partners Program to other groups and agencies. Previously funded projects included the following:

- Demonstration Gardens designed to teach the public about native plants and water-wise gardening
- Scholarships for water-related classes
- Wildlife and ecosystem restoration projects
- Water saving projects
- Other water conservation projects

One of the key achievements of this program is the funding of the Water Management Academy in conjunction with Victor Valley College. This program is training future water managers in proper conservation and water resource management. In addition to funding, MWA assists with curriculum development and provides speakers for this program.

MWA and AWAC continue the regional conservation slogan and campaign "Save Water: Live Like a Desert Native", which reminds citizens that living in a desert region requires continual conservation. The message focuses on learning how to efficiently use water resources by taking tips from the native plants that not only survive but thrive in the arid, desert region. MWA and AWAC have invested heavily in this campaign, placing billboards, signs, and flyers, as well as making public presentations.

City and Other Regional Programs

- The City maintains a kiosk in the lobby of City Hall to provide information on water conservation and efficiency. Citizens can explore the kiosk and gain valuable information.
- Host community events annually to distribute conservation and water use efficiency information, as well as free conservation devices, including faucet aerators, showerheads, and hose nozzles; see Community Event information below.
- Large Landscape Rebates Program: The Cash for Grass program provides $1.00 per foot of turf converted to desert adaptive landscaping with 25 percent canopy coverage for lot sizes ranging from 20,000 square feet to 500,000 square feet. More than 2 million square feet of turf has been removed between June 2015 and June 2018, resulting in nearly 337 AFY of water savings. The program targets ornamental turf — grass that only serves an aesthetic purpose.
- Public Information and Education Programs:
  - Host and staff workshops on conservation, and sponsor and hosts public events and booths at community functions.
  - Outreach, educational, informational materials and literature, public service announcements, and paid advertisements promoting water conservation to the

public throughout its service area, including articles in newsletters, Chamber of Commerce publications and regional newspapers.

- Provide the City with flyers and bill inserts, and other promotional materials, which Adelanto provides to its customers. Bill inserts are distributed several times annually to all water services customers and as bill inserts, up to 500 fact sheets, brochures, and other literature are placed at and distributed through community locations such as the senior center, community center, police station, and key stores.
- Partner with the school districts to educate students and parents on water conservation and water use efficiency. Future plans include production of information videos with the schools on water conservation and efficiency with the students as the problem solvers. The City partners with nine (9) schools reaching an average of 800 students per school through two (2) programs. This results to reaching 7,200 students twice annually with water awareness education.
- AWAC also prepares and distributes various outreach materials including information on its website and through the following booklets, pamphlets, and handouts:
  - A Guide to High Desert Landscaping
  - A Complete Guide to High Desert Water Conservation
  - High Desert Vegetable Planting Guide
  - Water Efficient and Native Plants Lists
  - Water Efficient Irrigation
  - Water Efficient Landscaping
  - Water Smart Landscaping

Community Events

City staff continues to participate in six to eight community events annually, one that lasts a total of three days. Events include the annual Adelanto Community Water Awareness Festival as well as other regional events promoted by AWAC, including the San Bernardino County Fair and Home and Garden Trade Show at the County Fair Grounds in Victorville and the Desert Communities Water Awareness Expo, which promotes water awareness at regional trade shows and Valley Mall. Information is provided in both English and Spanish, and includes a guide to High Desert Landscape, numerous plant brochures and a recommended plant list, calendars with key water conservation information, fact sheets on how to check for water leaks, how to read a meter, winterizing, and drip irrigation.

Free conservation devices are also distributed at community events to each person stopping by the booth and speaking with a conservation specialist. Devices include faucet aerators, showerheads, and hose nozzles. Children also receive fun and informative items including coloring books, rulers, bracelets, and stuffed toys.

Each community event draws from 500 to 15,000 people, reaching upwards to 30,000 people annually.

School Education Program

The City participates in school water conservation education programs in cooperation with MWA and the Mojave Environmental Education Consortium (MEEC).[2] MEEC improves the environmental literacy of students, teachers, and communities of the Mojave Desert Region by actively providing free educational resources.

MWA provides literature, staff support and in-kind services to support teacher training workshops funded through the Project Wet Foundation. These training courses on water education curriculum are done in collaboration with MWA retailers, including the City, and MEEC. Additionally, AWAC works with local school districts and community colleges and prepares and distributes the outreach materials.

Water Association Education and Outreach

City staff also participates in the High Desert Mountain Water Association, which provides a forum for water resource education on local, state and federal issues and regulations and the exchange of ideas, education, and mutual support of its membership. The mission of the High Desert Mountain Water Association[3] is "to provide a venue for those involved in the waterworks industry located in the greater Victor Valley and Mountain communities. The Association's goal is to educate its members on local, state and federal issues and regulations, and to provide a forum for the exchange of ideas, education, and mutual support of its membership."

In normal years, City staff participates in the Association meetings held on the 4th Wednesday of February, April, June, August, October (pending Holidays) with a Christmas Dinner Event in early December. In 2020, challenges of the pandemic deferred the in-person meetings, which continued into 2021.

High Desert Regional Energy Leader Partnership with SCE – Energy Efficiency

Local governments within the Greater High Desert Region are coming together to enhance the lives of their residents and provide sustainable communities. This is made possible with the assistance of the High Desert Regional Energy Leader Partnership (HDR). Launched in collaboration with Southern California Edison (SCE), The Clean Energy Organization and local energy champions, the Partnership promotes energy efficiency in the community.

In November 2014, the cities of Victorville and Hesperia, along with the town of Apple Valley, joined Barstow and Adelanto in the Partnership, who has been a partner since 2008. Adelanto led the initiative and received more than $300,000 in incentive funds for energy efficiency modifications.

The Partnership encourages municipalities to promote energy efficiency and regional sustainability goals in the region, which promotion of SCE rebates to residents. This includes

[2] https://meeconline.com/
[3] https://www.hdmwa.com/

rebates for: 1) Hybrid Electric Heat Pump Water Heater; and Variable Speed Pool Pump and Motor. The City provides information about and online links to the SCE rebates program.

9.1.5 PROGRAMS TO ASSESS AND MANAGE DISTRIBUTION SYSTEM REAL LOSS

As presented in Section 4.4, reporting of system losses in the UWMP is required by the CWC. System water loss is the difference between water production and water consumption and represents "lost" water. AWWA categorizes distribution system losses as Apparent Losses and Real Losses, which are defined as follows:

- **Apparent Losses:** Unauthorized consumption, metering inaccuracies, and systematic data handling errors. Apparent Losses include all types of inaccuracies associated with customer metering (worn meters and improperly sized meters or wrong type of meter for the water usage profile) and systematic data handling errors (meter reading, billing, archiving and reporting), plus unauthorized consumption (theft or illegal use).
- **Real Losses:** Physical water losses from the pressurized system (water mains and customer service connections) and storage tanks, up to the point of customer consumption (customer meter). The annual volume lost through all types of leaks, breaks, and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks, and overflows.

AWWA also defines Non-Revenue Water, which is the sum of Apparent Losses + Real Losses + Unbilled Metered Consumption + Unbilled Unmetered Consumption. This is water that does not provide revenue potential to the City. Unbilled consumption is defined as follows:

- **Unbilled Authorized Consumption:** All consumption that is unbilled but still authorized by the District. Includes both unbilled metered and unmetered consumption typically in non-account uses, including water for firefighting and training, flushing of water mains and sewers, street cleaning, watering of municipal gardens, public fountains, or similar public-minded uses. Occasionally, these uses may be metered and billed (or charged a flat fee), but usually, they are unmetered and unbilled.

AWWA has formally abandoned the concept of unaccounted-for-water as an effective tool for managing system losses due to its unreliable application and inconsistent definition, citing all volumes of water, including water losses, can be accounted for.

The City currently conducts routine and planned system maintenance to prevent losses. The City's current quantity of water suggests that un-calibrated water meters, service line breaks, leaking pipes, and other unusual events may be a factor within the City's water system.

The City will continue to focus on its water loss control program to reduce the amount of water loss. Understanding and controlling water loss from a distribution system is an effective way for the City to achieve regulatory standards and manage its existing resources.

City staff anticipates that current practices and future capital improvement projects will help to reduce the quantity of system water loss. The City will also utilize the methodology presenting in

the AWWA "Manual of Water Supply Practices, Water Audits and Leak Detection" to help reduce water lost to leaks. In addition, MWA provides technical support to its retailers for addressing the new AWWA requirements for System Water Audit implementation. While many of the recommendations noted in the manual are currently integrated into the City's regular operations and maintenance procedures, the City will collaborate with MWA to improve its procedure.

9.1.6 WATER CONSERVATION PROGRAM COORDINATION AND STAFFING SUPPORT

The City's Customer Service Supervisor is responsible for coordination of water conservation and water use efficiency activities and programs for the benefit of the City's residents and businesses, as well as conservation ordinances and plans. In addition, the Customer Service Supervisor works in collaboration with and is supported by programs and information from MWA and AWAC, as described above in Section 9.1.4 – Public Education and Outreach.

9.1.7 OTHER DEMAND MANAGEMENT MEASURES WITH SIGNIFICANT IMPACT ON WATER USE EFFICIENCY

The City works in collaboration with MWA to offer free and rebate programs to residents across its service area. The following provides an overview of the programs available:

1. **Free Programs**
   a. MWA offers free low-flow shower heads, faucet aerators, and leak detection dye tablets to the City's customers.
   b. In collaboration with MWA, the City conducts periodic giveaway and support programs.
      i. The City has held a toilet giveaway resulting in distribution of 600 ultra-low flow toilets (ULFT) in 30 days to apartments, mobile home parks, and other residents through the community.
      ii. The City replaced toilets in all City buildings with high-efficiency toilets (HET) (1.28 gallons per flush or less).
      iii. The City replaced all 48 toilets and urinals at Heritage Field at Maverick Stadium in October 2015 with HETs and high-efficiency urinals. Heritage Field at Maverick Stadium is primarily used for baseball and is the home field of the High Desert Mavericks minor league baseball team. It holds 3,808 people.
   c. The City coordinates with MWA and AWAC to encourage the use of EPA WaterSense certified HETs, using only 1.28 gallons per flush, as well as high-efficiency clothes washers, turf replacement, commercial conservation programs, and other water conservation actions.
2. **Rebate Programs**
   a. Statewide Rebates: Encourage residents to visit www.saveourwaterrebates.com to access statewide water rebate programs on such water-saving devices as low-flow toilets and turf replacement.
   b. Turf: MWA offers large landscape rebates at $1.00 per square foot of turf converted to

desert adaptive landscaping with 25 percent canopy coverage for lot sizes ranging from 20,000 square feet to 500,000 square feet. MWA offered a similar program for small landscapes (residential) through the end of 2015, and will consider offering a similar program in the future. AWAC turf replacement incentives for both residential and commercial users, and was instrumental in drafting the compliant water efficiency landscape ordinance template for AB 1881.[4]

c. High-Efficiency Clothes Washers (HECW): In recent years, MWA offered rebates of $175 to residential customers who purchase a HECW with a minimum water use efficiency, or water factor. Approximately 250 applications were processed for a total of 20.14 AFY of water savings. The program has concluded at this time, although the City, MWA and AWAC continue to promote the use of HECWs.

d. High-Efficiency Toilets: In recent years, MWA offered rebates of $165 for each HET installed to both single family and multi-family residential customers to encourage them to replace older, high volume toilets with new, high-efficiency models. This program has concluded, although installation of HETs is continuing to be encouraged.

3. **Assistance**

a. MWA provides city and school districts with assistance with turf replacement, installation of new weather-based irrigation controllers, use of efficiency spray nozzles, as well as assistance with developing landscape and water conservation programs.

b. MWA and AWAC are promoting conservation and other programs that offer rebates as an incentive to upgrade to commercial, industrial and institutional accounts more efficient equipment.

9.2 IMPLEMENTATION OF DEMAND MANAGEMENT MEASURES, PAST FIVE YEARS

The narrative in Section 9.1 above provides both the nature and extent of the DMMs implemented over the last five years. As required by the 2020 UWMP Guidebook, a summary of the extent of the DMMs is provided in Table 9-1.

Table 9-3: Extent of Demand Management Measures Since 2015

Demand Management Measure	Extent of Implementation
Water Waste Prevention Ordinances	Maintain Ordinance Chapter 8.2 Water Conservation Plan and Ordinance Chapter 17.60 Landscape Conservation (2013)
Metering – All Service Connections Except Fire Have Dedicated Meter	All service connections are metered except fire
Conservation Pricing – Tiered Rate Schedule	Tier 1: 0 to 15 CCF Tier 2: 16 CCF and up

[4] A copy of AB 1881 (the Model Efficiency Landscape Ordinance) can be found here: http://www.water.ca.gov/wateruseefficiency/docs/ab_1881_bill.pdf

Table 9-3: Extent of Demand Management Measures Since 2015	
Demand Management Measure	**Extent of Implementation**
Public Education and Outreach	Partnership with MWA and AWAC Regional Conservation Slogan City Conservation Webpage Kiosk in City Hall Flyers, Water Bill Inserts, and Other Notices Community and School Events/Programs Free Devices, Incentives and Rebates Programs Complementary Education Programs Water Awareness Kits
Programs to Assess and Manage Distribution System Real Loss	AWWA Annual Water Loss Audits; Water loss control program, including routine and planned system maintenance
Water Conservation Program Coordination and Staffing Support	Customer Service Supervisor

9.3 WATER USE OBJECTIVES

On May 31, 2018, two long-term water use efficiency bills were signed into law that will require urban water providers throughout California to set new permanent water use objectives for their service areas by 2022. The objectives are for the water supplier, not individual users. Senate Bill 606 and Assembly Bill 1668 provide a framework for setting water use objectives, as well as implementing and enforcing the new water use requirements.

CWC Section 10609 establishes new standards, practices and objectives as follows:

- Indoor residential water use of 55 gallons per capita (person) per day (GPCD) – dropping incrementally to 52.5 GPCD beginning in 2025, then 50 GPC in 2030 and thereafter.
- Outdoor residential water use based on a community's climate and the amount of landscape area. Amount to be determined (TBD).
- CII water use – commercial water users, industrial water users, institutional water users, and large landscape water users. Amount TBD.
- Water loss due to leaks in the water system pipes. Amount TBD.
- Other unique local uses and situations, i.e., livestock water use. Amount TBD.
- Credit for recycled water use.

The code further specifies that:

- Local urban retail water suppliers should have primary responsibility for meeting standards-based water use targets, and they shall retain the flexibility to develop their water supply portfolios, design and implement water conservation strategies, educate their customers, and enforce their rules.
- Long-term standards and urban water use objectives should advance the State's goals to mitigate and adapt to climate change.

- Long-term standards and urban water use objectives should acknowledge the shade, air quality, and heat-island reduction benefits provided to communities by trees through the support of water-efficient irrigation practices that keep trees healthy.

Water use objectives and reporting will begin in 2023. DWR will propose and implement methodologies for tracking and reporting indoor residential water for 2023. The City will prepare for such reporting and is confident that the community's commitment to water conservation and DMMs will ensure that indoor residential water use will meet the legislated water use objectives.

Until DWR determines how indoor use will be calculated in 2023, the City will monitor winter monthly water use closely as an indicator of indoor water use and will review the effectiveness of existing DMMs. Outdoor water use is lowest in winter months, although ongoing droughts dampen this effect.

More information can be found at the following links:

https://www.mojavewater.org/files/new-water-requirements.pdf

https://www.mojavewater.org/files/Framework_FAQ_CalWEP.pdf

10.0 PLAN ADOPTION AND SUBMITTAL

This chapter provides information required by the California Water Code related to notification of updating, adoption, and submittal of the 2020 UWMP and the WSC Plan to DWR. This chapter also discusses making the plans available for public review and the process of amending the plans, if required.

10.1 INCLUSION OF ALL 2020 DATA

Data provided in this 2020 UWMP reflects data in calendar years beginning January 1. Data utilized is current through December 31, 2020. This 2020 UWMP serves as an update to the City's 2015 UWMP. The City has prepared the 2020 UWMP Checklist (**Appendix A**) to confirm that the UWMP addresses the requirements of the California Water Code.

The City currently relies on groundwater to meet 100 percent of the retail demand; therefore, the City does not provide demand projections to a wholesaler. The City does works closely with the Mojave Water Agency for projections of groundwater conditions and supply availability to meet projected demands over the next 25 years. This information was used to update the City's UWMP.

10.2 NOTICE TO CITIES AND COUNTIES – 60-DAY NOTICE AND PUBLIC HEARING

Consistent with Sections 2.4.2 and 2.4.3 in Chapter 2, **Table 10-1** lists the agencies and the public that the City provided notification to on the update and development of this 2020 UWMP, the WSC Plan Update, and the required public hearing.

The 60-day notice letter was sent to the County of San Bernardino and appropriate agencies on March 26, 2021, to inform these agencies that the City was in the process of reviewing its 2015 UWMP and considering changes or amendments needed in the preparation of its 2020 UWMP. The letter also included information that the City was reviewing and updating its WSC Plan concurrently with the UWMP update to meet the new legislative requirements. This letter was required to be sent at least 60 days prior to the public hearing. A second letter was also sent to inform the same agencies of the public hearing to adopt the plans. Copies of the letters are included in **Appendix K.**

Table 10-1: Notification to Cities and Counties, Other Agencies, Community Groups, and the General Public

Agency	Sent 60-Day Notice Letter	Sent Notice Of Public Hearing
City Agencies		
APUA		√
City Planning Department		√
City Clerk		
County		
County of San Bernardino	√	√

Table 10-1: Notification to Cities and Counties, Other Agencies, Community Groups, and the General Public		
Agency	**Sent 60-Day Notice Letter**	**Sent Notice Of Public Hearing**
Other Agencies and General Public		
Mojave Water Agency	√	√
Victorville Water District (City of Victorville)	√	√
General Public		√

10.3 NOTICE OF PUBLIC HEARING

The City encouraged community and public interest involvement in the UWMP update through inspection of the Draft UWMP and the Draft WSC Plan and through participation in the public hearing.

Copies of Draft 2020 UWMP and Draft WSC Plan were posted on the City's website (https://www.ci.adelanto.ca.us/) and at the Adelanto Governmental Center City Council Chambers to make them available for public inspection. The public hearing notifications were published in local newspapers within the City's service area pursuant to Section 6066 of the Government Code.[1] The City also notified the cities and County and other interested parties listed in **Table 10-1** of the time and place of the public hearing as required by CWC Section 10642. Copies of the published Notice of Public Hearing are included in **Appendix L.**

10.4 PUBLIC HEARING AND UWMP AND WSC PLAN ADOPTION

A public hearing was held on August 25, 2021, during a regularly scheduled meeting of the Adelanto Public Utilities Authority of the City of Adelanto to present the 2020 UWMP and the WSC Plan Update. A staff report and presentation preceded the public hearing to review the legislative requirements, planning process, and key elements of each plan. The public hearing was opened, where all comments were recorded, providing residents and other community members in the service area the opportunity to learn and ask questions and provide input and consider the economic impacts of the plans.

Upon close of the public hearing, adoption of the 2020 UWMP and the WSC Plan Update was considered by the Board of Directors at the same August 25, 2021, meeting. The Board of Directors considered any modifications necessary to the plans in response to public input, then formally adopted the 2020 UWMP and the WSC Plan Update by resolution. Resolution No. 21-05 is included in **Appendix M.**

[1] Government Code Section 6066 – Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

10.5 PLAN SUBMITTAL

The City's adopted 2020 UWMP and related DWR standardized submittal data tables (Excel files, **Appendix N**), along with the WSC Plan Update, were submitted electronically to DWR through its online Water Use Efficiency Data (WUE Data) Portal (https://wuedata.water.ca.gov/). Electronic copies of the 2020 UWMP and the WSC Plan were also provided to the California State Library (a CD was provided), the Victorville Water District, the County of San Bernardino, and other agencies in accordance with the Urban Water Management Planning Act no later than 30 days after adoption.

10.6 PUBLIC AVAILABILITY

The Final 2020 UWMP and WSC Plan Update were made available for public review on the City's website no later than 30 days after submitting the plans to DWR.[2] The plans can also be viewed by visiting the Adelanto Governmental Center (City Hall).

10.7 AMENDING THE ADOPED UWMP OR WSC PLAN

Upon submittal of the 2020 UWMP, DWR will conduct a review of the UWMP utilizing the Checklist in **Appendix A**. DWR will determine if the UWMP addresses the requirements of the California Water Code, and a letter will be sent to the City.

If DWR determines that necessary corrections are minor and do not require the UWMP to be amended, an Errata Sheet may be prepared and submitted to DWR, then included with the 2020 UWMP. If DWR determines that the necessary corrections require the UWMP to be amended, then the City will make the amendments and follow each of the steps for notification, public hearing, adoption, and submittal for adopting the amended 2020 UWMP.

The City may amend the adopted 2020 UWMP or WSC Plan at any time, although it must follow the same process for notification, public hearing, adoption, and submittal to DWR.

[2] The plans can be found at https://ci.adelanto.ca.us/documentcenter/ .