2015
URBAN WATER MANAGEMENT PLAN

City of ADELANTO

June 22, 2016

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City of Adelanto
2015 Urban Water Management Plan

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ACRONYMS and ABBREVIATIONS

AB	Assembly Bill
AF	Acre Feet
AFY	Acre Feet per Year
APUA	Adelanto Public Utilities Authority
ARRA	American Recovery and Reinvestment Act of 2009
ASCE	American Society of Civil Engineers
AWAC	Alliance for Water Awareness and Conservation
AWWA	American Water Works Association
BAP	Base Annual Production
BDCP	Bay Delta Conservation Plan
BMO	Best Management Objective
BMP	Best Management Practice
CALSIM	California Water Allocation and Reservoir Operations Model
CAWCD	Central Arizona Water Conservation District
CCF	Hundred Cubic Feet
CCR	Consumer Confidence Report
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CFS	Cubic Feet Per Second
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CMP	Conservation Master Plan
CPUC	California Public Utilities Commission
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVWD	Coachella Valley Water District
DBP	Disinfection Byproducts
DCR	2015 DWR State Water Project Delivery Capability Report
D/DBP	Disinfectants and Disinfection Byproducts
DMM	Demand Management Measure
DOE	Department of Energy
DOF	Department of Finance
DRR	Delivery Reliability Report

DWR	Department of Water Resources
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
ERR	Emergency Response and Recovery
ESA	Endangered Species Act
ET	Evapotranspiration
ETc	Evapotranspiration for a specific crop
ETo	Evapotranspiration for a standardized grass surface
ETr	Evapotranspiration for a standardized alfalfa surface
FPA	Free Production Allowance
FY	Fiscal Year
GAC	Granular Activated Carbon
GAFB	George Air Force Base (Now Southern California Logistics Airport
GIS	Geographic Information System
GPCD	Gallons Per Capita Per Day
GPF	Gallons Per Flush
GPM	Gallons Per Minute
HAA	Haloacetic Acids
HCD	California Department of Housing and Community Development
HELP	High Efficiency Living Program
HET	High Efficiency Toilets
HEWM	High-Efficiency Washing Machines
IRWMP	Integrated Regional Water Management Plan
Kc	Crop Coefficient
MAF	Million Acre Feet
MCL	Maximum Contaminant Level
MG	Million Gallons
MEEC	Mojave Environmental Education Consortium
MGD	Million Gallons per Day
MG/L	Milligrams per liter
MOU	Memorandum of Understanding
MTBE	Methyl Tertiary Butyl Ether
MWA	Mojave Water Agency
NDMA	N-Nitrosodimethylamine
ng/L	Parts per Trillion
NIMS	National Incident Management System

NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
OEHHA	Office of Environmental Health Hazard Assessment
PAC	Project Advisory Committee
pCi/L	picocuries per liter
PCE	Tetrachloroethylene
PHG	Public Health Goal
PPCPs	Pharmaceutical and Personal Care Products
psi	Pounds per square inch
PSP	Proposal Solicitation Package
PSY	Production Safe Yield
PVID	Palo Verde Irrigation District
QSA	Quantification Settlement Agreement
RHNA	Regional Housing Needs Assessment
RUWMP	Regional Urban Water Management Plan
RWMP	MWA's Regional Water Management Plan
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition System
SCAG	Southern California Association of Government
SCWA	Sonoma County Water Agency
SEMS	State Emergency Management System
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	Thousand Acre Feet
TCE	Trichloroethylene
TDML	Total Daily Maximum Loads
TDS	Total Dissolved Solids
THM	Trihalomethane
TOC	Total Organic Carbon
µg/L	Micrograms Per Liter
ULF	Ultra Low Flush
ULFT	Ultra Low Flush Toilet
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey

UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
VVWRA	Victor Valley Wastewater Reclamation Authority
VWD	Victorville Water District
WAS	Water Augmentation Study
WQPP	Water Quality Protection Plan
WRCC	Western Regional Climate Center

EXECUTIVE SUMMARY

CHAPTER 1 - Introduction and Overview: Importance and extent of the City's water management planning efforts

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 California Urban Water Management Planning Act of 1983 (Act), there were no specific requirements that water agencies conduct long-term resource planning. The Act provided the foundation for the development of Urban Water Management Plan (UWMP) that 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. A long-term reliable supply of water is essential to protect the productivity of the City's and California's businesses and economic climate.

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. This Plan, along with other City planning documents, will be used by City staff to guide water use and management efforts through the year 2020, when the UWMP is required to be updated.

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

The Act, as amended, requires urban water suppliers with 3,000 or more service connections or supplying 3,000 or more acre-feet of water per year (AFY) to develop or update its UWMP at least once every five years on or before December 31, in the years ending in five and zero. However, a recent amendment to the Act provides that each urban water supplier shall update and submit its 2015 plan to the DWR by July 1, 2016.

Development of the UWMP was led by the Adelanto Water Department through the Adelanto Public Utilities Authority (APUA). 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.

The intent of this UWMP is to focus on specific issues unique to the City's water service area. While some regional UWMP issues are introduced in this plan, more comprehensive regional information is presented in MWA's 2015 UWMP and the 2014 Mojave Region Integrated Regional Water Management (IRWM) Plan.

As the urban water supplier to the City of Adelanto service area, the City provided a 60-day notification (60 days prior to the public hearing on the plan) to the City of Victorville, County of San Bernardino, and the Mojave Water Agency (MWA) that it was reviewing the 2010 UWMP and considering amendments or changes to the plan.

CHAPTER 3 - System Description

Incorporated in 1970, the City of Adelanto is located in California's High Desert in southwestern San Bernardino County, encompassing approximately 53.8 square miles and an additional 3.6 square miles that may be annexed into the City, with a 77 square mile sphere of influence. The Adelanto Public Utility Authority, formed by the City in 1996 for the purpose of wastewater and water operations, is an integral part of the reporting entity of the City. The City Council is the governing board over the operations of the Authority.

The City's climate includes a broad range of temperature fluctuations between summer and winter, as well as between day and night. With average humidity of 42 percent and strong winds that blow in a northeasterly direction, it is not unusual to experience winds of 30-40 mph or higher. Average annual rainfall in Adelanto is just 5.52" and average maximum and minimum temperatures are 77.5°F and 43.9°F, respectively.

The City's water supply comes solely from groundwater production from 15 potable wells in three pressure zones, transmission and distribution pipelines, booster stations and reservoirs. The City is currently approximately only 15 percent built out, with land use of a combination of residential, commercial, manufacturing/industrial, airport park, airport development district, public/semi-public open space, and specific plan area. It is expected that single family residential will continue to account for the majority of new growth during the planning horizon, with associated commercial/industrial developments.

In 2015, 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. Beacon Economics was hired to prepare the population forecasts using the appropriate 2010 Census data. Population projections refine what was depicted in the City's 2010 UWMP to more closely correlate with population trends in the surrounding area.

Table ES-1: Population - Current and Projected

	2015	2020	2025	2030	2035	2040
Population Served	33,080	35,476	38,453	42,221	46,311	50,182

Source: Beacon Economics, Mojave Water Agency Population Forecast, December 2015

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

System water use addresses the City's water demand, identifying the level of treatment when delivered – potable, raw or recycled. Currently, the City only uses potable water.

Table ES-2 shows total water demand by water source type for 2015 actual use and for 2020 through 2040 projections.

Table ES-2: Total Water Demand by Water Type						
	2015	**2020**	**2025**	**2030**	**2035**	**2040**
Potable and Raw Water [a]	4,049	4,578	4,872	5,292	5,737	6,195
Recycled Water Demand	0	0	0	0	0	0
TOTAL WATER DEMAND	**4,049**	**4,578**	**4,872**	**5,292**	**5,737**	**6,195**

Reporting of system losses is required by the CWC for the first time 2015 UWMPs. System water loss is the difference between water production and water consumption and represents "lost" water. The City recently transitioned to a new water billing system and is currently unable to obtain water use data by customer type. While the City continues to work on this issue, it is not possible to identify an absolute accurate percentage of water loss for the most recent 12 months representing calendar year 2015. However, the City completed the AWWA Water Audit WAS v5.0 based on best available information. The Audit showed an 18.9 percent water loss for the year 2015. The City intends to conduct performance measures to lower its water losses to at least 10 percent in future years, an acceptable rate as defined by AWWA.

Low-income households are those that make less than 80 percent of the median income. In 2010, the City of Adelanto had 7,040 lower income housing units in its service area. The City used Southern California Association of Government (SCAG) housing analyses to determine projected housing units for low-income households. The result is a total of 7,587 low-income housing units. Water supply and demand analysis shows that total estimated water use for low-income housing, as included in the City's total projected water demands, is sustainable by the sufficient amount of water supply projected over the UWMP's planning horizon.

CHAPTER 5 - Baselines and Targets: Describes the City's methodology for calculating its baseline and target water consumption, demonstration of achieving its 2015 interim water use target, and plans for achieving its 2020 water use target

To comply with the SBX7-7 water conservation legislation, 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. The City applied Method 1 – per capita daily use equals 80 percent of the City's baseline per capita water usage (in gallons per capita per day – GPCD).

In the 2015 UWMP, the City must update its population data using 2010 Census data, and as a result, update its baseline and target information, and lastly, demonstrate compliance with its established water use target for the year 2015. This also demonstrates whether or not the City is currently on track to achieve its 2020 target. Table ES-3 shows the comparison between required 2010 GPCD baseline and target data and 2015 revised GPCD baseline and target data.

The City's actual 2015 Interim 109 GPCD is significantly below the 2015 Interim Target 252 GPCD. Further, it is also significantly below the Confirmed 2020 Target GPCD of 192. This demonstrates the City is not only making excellent progress toward meeting its 2020 water use target, but is using substantially less water than projected.

Table ES-3: Baselines and Targets Summary (GPCD)

Baseline Period	2010 UWMP GPCD	2015 UWMP GPCD
10-Year Average Baseline	322	311
5-Year Minimum Baseline	215	202
Calculated 2020 Target (80% of Average)	257	249
Confirmed 2020 Target (95% of Minimum)	204	**192**
2015 Interim Target	263	**252**
2015 Actual Interim		**109**

CHAPTER 6 - System Supplies: Describes and quantifies the current and projected sources available to the City, including water volumes for average year conditions, origin of water supply, water quality, and issues unique to the supply, and management actions and projects that are anticipated to meet future water demand

The City obtains all of its water supply from local groundwater in the Mojave River Groundwater Basin. 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 as Watermaster of the Mojave Basin Area.

In the 2015 water year, the City pumped 94 percent of its water supply from groundwater wells accessing the Mojave River Groundwater Basin. The balance of supply was purchased from the Victorville Water District through its intertie, which is also sourced from groundwater. Current and projected water supplies are shown in Table ES-4.

Table ES-4: City of Adelanto – Current and Planned Sources of Water (AFY)

Water Supply Source	Actual	Projected				
	2015	2020	2025	2030	2035	2040
Groundwater Production	3,787	9,300	10,444	11,581	12,640	13,750
Groundwater Transfer - Intertie with VWD[1]	262	0	0	0	0	0
Total Groundwater Supplies	4,049	9,300	10,444	11,581	12,640	13,750

[1] Transfers between VWD and the City is also from groundwater; future year projections are determined annually and cannot be projected.

During normal years, the City obtains all of its water supply from the local groundwater aquifer through its wells. The City does not have any surface water or stormwater diversion facilities or desalination facilities, and is working to improve its recycled water facilities. Since the City is not located near the ocean, desalination is not a practical or economically feasible source of water.

As required by the Safe Drinking Water Act, which was reauthorized in 1996, the City provides annual Water Quality Reports to its customers; also known as Consumer Confidence Reports (CCR). This mandate is governed by the Environmental Protection Agency (EPA) and the California Department of Public Health (CDPH) to inform customers of their drinking water quality. In accordance with the Safe Drinking Water Act, the City monitors a number of regulated and unregulated compounds in its water supply, as noted in the City's most recent (2014) CCR.

CHAPTER 7 - Water Supply Reliability: Describes the reliability of the City's water supply and projects reliability for a 25-year planning horizon for normal, single dry years and multiple dry years

Water supply reliability describes the long-term reliability of the City's water supplies. Shorter term reliability planning that may require immediate action, such as drought or a catastrophic supply interruption, is addressed in Chapter 8, Water Shortage Contingency Planning.

Reliability is a measure of a water system's expected success in meeting water demands both in normal years and in years of water shortages. Chapter 7 provides a description of the City's efforts in maintaining an adequate and reliable water supply and MWA's efforts in maintaining the region's groundwater supply in the Mojave Basin Area. In normal years, the City obtains all of its water supply from local groundwater aquifer. Given the City's total reliance on groundwater, the reliability of the City's water supply is thus entirely dependent on the reliability of the groundwater in the Mojave River Basin managed by MWA. Based on MWA's analysis, MWA has adequate supplies to meet demands during average, single-dry, and multiple-dry years throughout the 25-year planning period.

The available supplies and water demands for the City's service area were analyzed to assess the region's ability to satisfy demands during the three hydrologic conditions: average water year, single-dry year, and multiple-dry years. Table ES-5 demonstrate results of the analysis shows supplies are expected to exceed demand in all hydrologic conditions. Note Single-Dry Year and first year of Multiple-Dry Year are the same as for a Normal Year.

Table ES-5: Water Supply Reliability Analysis Summary

Water Year	Projected				
	2020	2025	2030	2035	2040
Normal Year Supply	9,300	10,444	11,581	12,640	13,750
Normal Year Demand	4,578	4,872	5,292	5,737	6,195
Normal Year Surplus	**4,722**	**5,572**	**6,289**	**6,903**	**7,555**
Single-Dry Year Surplus	**4,722**	**5,572**	**6,289**	**6,903**	**7,555**

Table ES-5: Water Supply Reliability Analysis Summary					
Water Year	**Projected**				
	2020	**2025**	**2030**	**2035**	**2040**
Multiple-Dry Year Supply	9,300	10,444	11,581	12,640	13,750
1st Multiple-Dry Year Surplus	**4,722**	**5,572**	**6,289**	**6,903**	**7,555**
2nd Multiple-Dry Year Demand	4,696	5,040	5,470	5,921	6,291
2nd Multiple-Dry Year Surplus	**4,604**	**5,404**	**6,111**	**6,719**	**7,459**
3rd Multiple-Dry Year Demand	4,755	5,124	5,559	6,013	6,387
3rd Multiple Dry Year Surplus	**4,545**	**5,320**	**6,022**	**6,627**	**7,363**
4th Multiple-Dry Year Demand	4,814	5,208	5,648	6,105	6,483
4th Multiple-Dry Year Surplus	**4,486**	**5,236**	**5,933**	**6,535**	**7,267**

CHAPTER 8 - Water Shortage Contingency Planning: Describes the City's staged plan for dealing with water shortages, including a catastrophic supply interruption

On June 24, 2015, the City adopted a revised Water Conservation Plan (same as Water Shortage Contingency Plan) to respond to the Governor's Proclamation declaring a drought State of Emergency to exist in California due to severe drought conditions.

The January 2014 Governor's Proclamation finds that dry conditions and lack of precipitation present urgent problems to drinking water supplies and cultivation of crops, which put farmers long-term investments at risk. The conditions also threaten the survival of animals and plants that rely on California's rivers, including many species in danger of extinction. The January 2014 Proclamation called on all Californians to reduce their water usage by 20 percent. As the drought continued, on April 25, 2014 the Governor's signed a Proclamation declaring a drought State of Emergency to exist in California due to severe drought conditions and signed an Executive Order to redouble drought actions.

Chapter 8.20 (Appendix L) of Adelanto's Municipal Code entitled "Water Conservation Plan" proposes a four-stage plan of action for implementation in the event of a long-term drought or a significant loss of supply, including losses of up to 50 percent of the water supply. The Plan sets forth the rules and regulations governing the use of water in the City, even during non-drought times.

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 City of Adelanto recognizes water use efficiency as an integral component of current and future water strategy in its service area. Demand management measures (DMM) refer to policies, programs, rules, regulation and ordinances, and the use of devices, equipment and facilities that, over the long term, have been generally justified and accepted by the industry as providing the means to achieve a "reliable" reduction in water demand. This means providing education, tools, and incentives to help residents and businesses reduce the amount of water used on their property. Demand management is as important to ensuring water supply reliability as is providing a new water supply. The City has aggressively pursued conservation

in an effort to reduce demand and stretch existing water supplies.

The Urban Water Management Planning Act originally required implementation of 14 DMMs; also known as best management practices (BMP). In 2014, the section of the California Water Code addressing DMMs was significantly modified based on recommendations from the Independent Technical Panel (ITP) to the legislature. The ITP recommended that the UWMP Act should be amended to simplify, clarify, and update the DMM reporting requirements, streamlining the 14 specific measures to six more general requirements plus an "other" category. Urban water suppliers can choose to follow the six general requirements or report by type of DMM.

The City has reported on the six general and "other" categories. 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 Alliance for Water Awareness and Conservation (AWAC), are detailed in Chapter 9. MWA's Final 2015 UWMP should be referred to for more detailed information on the regional BMPs program and each individual BMP that are being implemented on behalf of the City.

CHAPTER 10 - Plan Adoption, Submittal, and Implementation: Describes the City's actions taken to provide notification to agencies, adopt and submit the UWMP, make it available to the public, and plans to implement elements of the UWMP

The City notified the County of San Bernardino, Mojave Water Agency and City of Victorville (Victorville Water District) on April 18, 2016 that it was reviewing its 2010 UWMP and considering amendments to the Plan. The notification letter included the UWMP revision schedule, contact information, and where the Final Draft 2015 UWMP could be viewed once it is available. This occurred within the required 60-day notification period prior to the public hearing.

In accordance with Government Code 6066, the City noticed the public hearing in the Daily Press, a local newspaper in the Victorville/San Bernardino County area, which included the time and place of the hearing, as well as the location where the Plan is available for public inspection. In addition, the City again notified the County of San Bernardino, Mojave Water Agency and Victorville Water District on June 6, 2016 that it would be holding a public hearing on June 22, 2016 to review its 2015 UWMP and considering amendments to the Plan.

The 2015 UWMP Update was adopted by resolution of the Adelanto Public Utilities Authority (APUA) on June 22, 2016, following a public hearing at the same meeting. The public hearing included a presentation on the City's baseline values, water use targets, and implementation plan of the 2015 UWMP. The public hearing allowed the public the opportunity to comment on the Plan and further allowed the APUA Board to consider any further modifications of the UWMP in response to public input before adoption.

The Plan was submitted to the DWR electronically by July 1, 2016, a CD copy was submitted to the State Library, Government Publications Section within 30 days of approval of the Plan,

and an electronic copy was provided to the County of San Bernardino within 30 days of approval of the Plan. Finally, copies of the adopted UWMP were also made available to the public within 30 days following City Council adoption. The public can access an electronic copy of the Plan on the City's website and also obtain a copy at City Hall during normal business hours.

1.0 INTRODUCTION AND OVERVIEW

1.1 UWMP 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[1] (Appendix A), 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.

The Urban Water Management Planning 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 (Appendix B). This Act required agencies to establish water use targets for 2015 and 2020 that would result in statewide savings of 20 percent by 2020.

This Urban Water Management Plan (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. A long-term reliable supply of water is essential to protect the productivity of the City's and California's businesses and economic climate.

1.2 California 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

[1] http://www.water.ca.gov/urbanwatermanagement/docs/water_code-10610-10656.pdf

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 actively pursue the efficient use of available supplies.

1.3 UWMP Summary

The UWMP Act requires water agencies to develop an UWMP that provides a framework for long-term water resource planning and informs the public of a supplier's plans to ensure adequate water supplies for existing and future demands. The City's 2015 UWMP has been prepared in compliance with the requirements of the Act, as amended to 2015[2], and included in the California Water Code (CWC). Changes to the CWC since 2010 are shown in Appendix C. The City's UWMP includes discussion of the following:

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

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

Chapter 3 - System Description: Description of the City's water service area, the City's history and organizational structure, the Public Water System, climate, and map of the service area

[2] California Water Code, Division 6, Part 2.6; §10610, et. seq. Established by Assembly Bill 797 (1983); can be at: http://www.water.ca.gov/urbanwatermanagement/docs/water_code-10610-10656.pdf

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

Chapter 5 - Baselines and Targets: Describes the City's methodology for calculating its baseline and target water consumption, demonstration of achieving its 2015 interim water use target, and plans for achieving its 2020 water use target.

Chapter 6 - System Supplies: Describes and quantifies the current and projected sources available to the City, including water volumes for average year conditions, origin of water supply, water quality, and issues unique to the supply, and management actions and projects that are anticipated to meet future water demand.

Chapter 7 - Water Supply Reliability: Describes the reliability of the City's water supply and projects reliability for a 25-year planning horizon for normal, single dry years and multiple dry years.

Chapter 8 - Water Shortage Contingency Planning: Describes the City's staged plan for dealing with water shortages, including a catastrophic supply interruption.

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.

Chapter 10 - Plan Adoption, Submittal, and Implementation: Describes the City's actions taken to provide notification to agencies, adopt and submit the UWMP, make it available to the public, and plans to implement elements of the UWMP.

The sections in this UWMP correspond to the outline of the Act and as recommended in the California Department of Water Resources (DWR) 2015 Guidebook for Urban Water Suppliers. Further, the tables included are required by DWR and in the format presented in the 2015 Guidebook. They are both inclusive in the UWMP and submitted to DWR as a separate Excel file. The DWR Urban Water Management Plan Checklist form from the Guidebook has been completed and is included in Appendix D. This document 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. This Plan, along with other City planning documents, will be used by City staff to guide water use and management efforts through the year 2020, when the UWMP is required to be updated.

Applicable changes to the CWC since 2010 that the 2015 UWMP addresses include:

- Demand Management Measures CWC Section 10631 (f) (1) and (2) Assembly Bill 2067, 2014 (Guidebook Chapter 9)
- Submittal Date CWC Section 10621 (d) Assembly Bill 2067, 2014 (Guidebook Chapter 10)
- Electronic Submittal CWC Section 10644 (a) (2) Senate Bill 1420, 2014 (Guidebook Chapter 10)
- Standardized Forms CWC Section 10644 (a) (2) Senate Bill 1420, 2014 (Guidebook Chapter 10)

- Water Loss CWC Section 10631 (e) (1) (J) and (e) (3) (A) and (B) Senate Bill 1420, 2014 (Guidebook Appendix L)
- Estimating Future Water Savings CWC Section 10631 (e) (4) Senate Bill 1420, 2014 (Guidebook Appendix K)
- Voluntary Reporting of Energy Intensity CWC Section 10631.2 (a) and (b) Senate Bill 1036, 2014 (Guidebook Appendix O)
- Defining Water Features CWC Section 10632 (b) Assembly Bill 2409, 2010 (Guidebook Chapter 4)

In addition, SBX7-7 (2010), the Water Conservation Act of 2009, requires retail urban water suppliers to report in their UWMPs their Base Daily per Capita Water Use (Baseline GPCD), 2015 Interim Urban Water Use Target, 2020 Urban Water Use Target, and Compliance Daily per Capita Water Use. These terms are defined in Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use, DWR 2011 (Methodologies) consistent with SB X7-7 requirements. The Methodologies document can be found online at http://www.water.ca.gov/urbanwatermanagement/uwmp2015.cfm.

Beginning in 2016, retail water suppliers are required to comply with the water conservation requirements in SB X7-7 in order to be eligible for State water grants or loans. Information on the City's compliance with the requirements of SBX7-7 is found in Chapter 5, which shows the City's targets and progress toward decreasing daily per capita urban water use in its service area, which will assist the State in meeting its 20 percent reduction goal by 2020.

The UWMP also incorporates water use efficiency efforts (demand management measures) 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. The City of Adelanto is not currently a signatory of the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU) with the California Urban Water Conservation Council. Therefore, Demand Management Measures are fully discussed in Chapter 9.

2.0 URBAN WATER MANAGEMENT PLAN PREPARATION

2.1 Basis for Preparing a Plan

An "urban water supplier" is defined as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers, applying to water supplied from Public Water Systems.

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. Table 2-1 shows the City's 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 2015	Volume of Water Supplied 2015 (AF)
CA3610001	City of Adelanto	8,165	4,049
	TOTAL	**8,165**	**4,049**

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

The California Water Management Planning Act of 1983 (Act) as amended, requires urban water suppliers with 3,000 or more service connections or supplying 3,000 or more acre-feet of water per year (AFY) to develop or update its UWMP at least once every five years on or before December 31, in the years ending in five and zero. However, a recent amendment to the Act provides that each urban water supplier shall update and submit its 2015 plan to the DWR by July 1, 2016.

The City of Adelanto is an urban water supplier since it provides water for municipal purposed to more than 3,000 customers. Therefore, the City is required to update its UWMP and submit it to the DWR by July 1, 2016. This UWMP includes required standardized forms and tables specified by DWR, including a table to report water use information. Specifically, tables have

been developed to provide information sufficient to assess compliance with 20x2020 conservation targets.

To assist City staff in preparation of the City's 2015 UWMP, consultants to the City for preparation of the UWMP attended a workshop on November 20, 2015 facilitated by DWR.

2.2 Individual Compliance

The City has developed this UWMP that reports solely on its service area and the UWMP addresses all requirements of the CWC for urban water management plans. The City has notified and coordinated with all appropriate regional agencies and stakeholders. Table 2-2, as required, designates this Plan as an Individual UWMP.

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

Development of the UWMP was led by the Adelanto Water Department through the Adelanto Public Utilities Authority (APUA). 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.[3]

[3] References to the water system in this plan as the City of Adelanto (City) or the APUA shall be considered synonymous.

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. While some regional UWMP issues are introduced in this plan, more comprehensive regional information is presented in MWA's 2015 UWMP[4] and the 2014 Mojave Region Integrated Regional Water Management (IRWM) Plan[5].

In preparing the 2015 UWMP, the City also utilized information from the Metropolitan Water District of Southern California Draft 2015 UWMP, March 2016 (a source of information pertaining to the SWP); the California Water Plan Update 2009, and the *"2015 Urban Water Management Plans Guidebook for Urban Water Suppliers", Final March 2016* 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.

Table 2-5 lists the entities that Adelanto coordinated with in the development of the City's 2015 UWMP.

Table 2-5: City of Adelanto 2015 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		√	√		√	
California Department of Water Resources		√				
General Public			√		√	√

[4] Draft 2015 MWA UWMP, May 9, 2015, available at: https://www.mojavewater.org/uwm-plan.html
[5] 2014 Mojave Region IRWM Plan available at: http://www.mywaterplan.com/irwm-plan-documents.html

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 the 2010 UWMP and considering amendments or changes to the plan. Notification was provided on April 18, 2016, within the required 60 days before the public hearing on the plan, which was held on June 22, 2016. Copies of the following 60-day notification letters are included in Appendix E.

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

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3.0 SYSTEM 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 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 of Adelanto 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 service area maps.

Water Utility and System Facilities

The City's water supply comes solely from groundwater production from 15 potable wells. The City's water system delivers water to three pressure zones and consists of the aforementioned wells, transmission and distribution pipelines, booster stations and reservoirs. These facilities include:[6]

- Approximately 113 miles of transmission and distribution mains ranging in diameter from 6- to 24-inches;
- Nine active potable water wells with a total pumping capacity of 4,728 gallons per minute (gpm). The City also has seven 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; and
- Four pressure reducing stations, which transfer water from upper to lower pressure zones.
- Two emergency interties with the Victorville Water District

[6] Water facility information extracted from the City of Adelanto Water Master Plan, December 2007, prepared by So & Associates Engineers, Inc., with some 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.

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.

Significant Water Use

This fluctuation in average daily water usage may be attributed to the variations in yearly precipitation that occurs in the high desert area and also due to an increase in residential

dwellings in Adelanto. Outdoors water use (landscape irrigation), which can account for as much as 70 percent of a typical residential customers usage, varies with temperature and precipitation. This fluctuation in average daily water usage has occurred throughout the Southern California area, and is not unique to Adelanto service area.

3.2 Service Area Boundary Map

Figure 3-1 shows the Mojave Water Agency location in relation to the State of California, which the City of Adelanto 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

Finally, 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 small areas of the City that do not currently have water lines, these residents purchase water from a water fill station located at the City's main Water Service yard. Water sales at the fill station are metered and accounted for in Commercial water use.

3.3 Service Area Climate

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 Tables 3-1 and 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

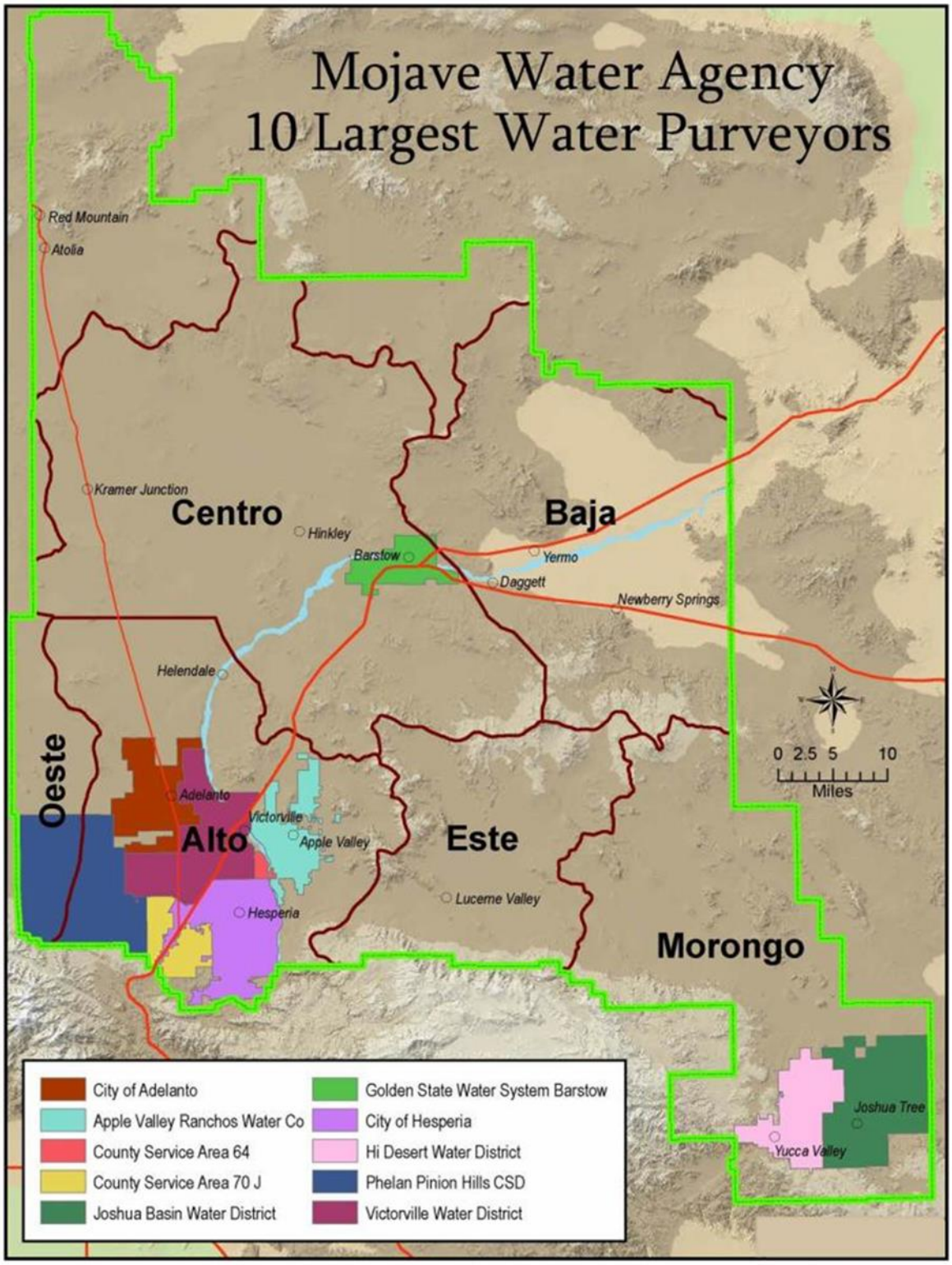

Figure 3.2
Location of City of Adelanto in Mojave Water Agency Area

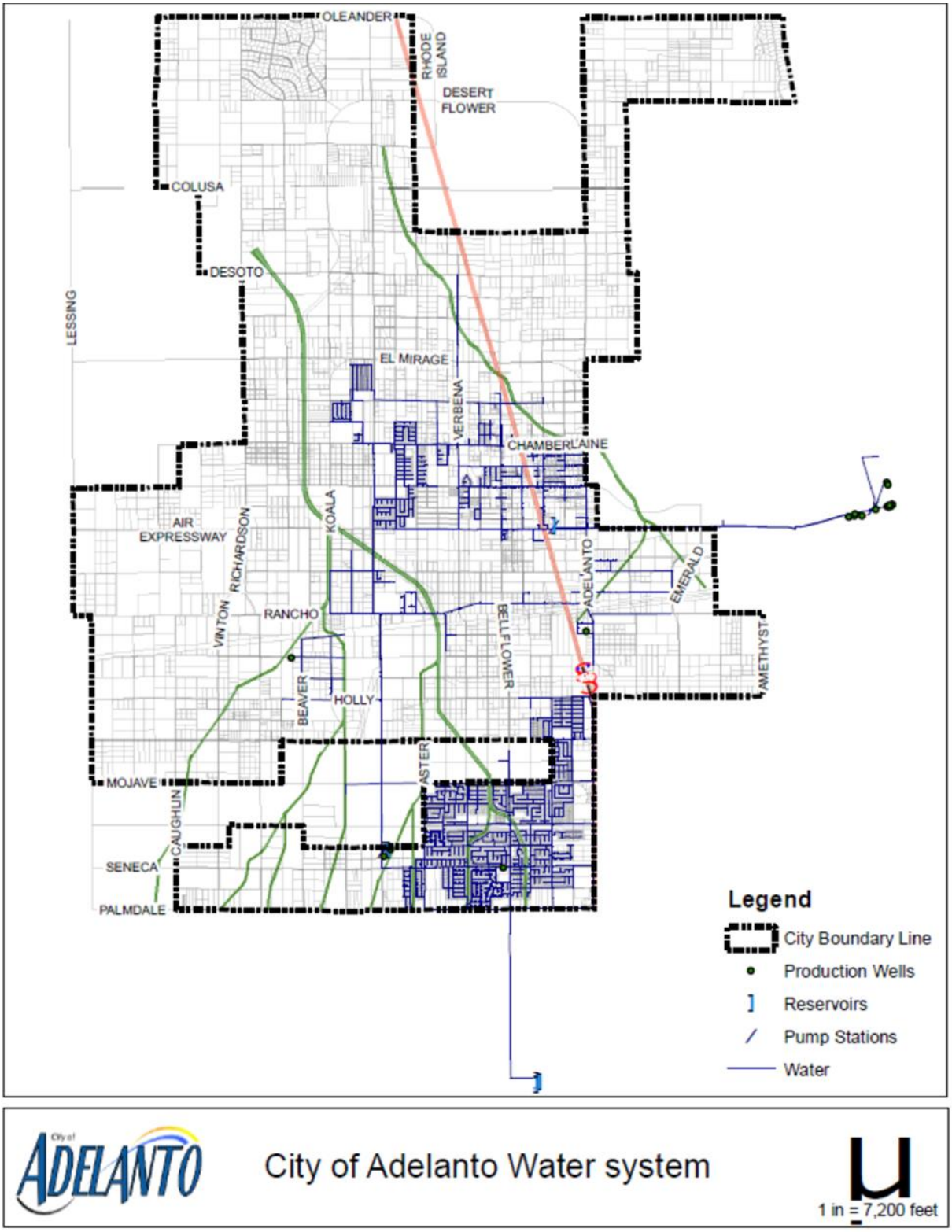

Figure 3.3
City of Adelanto Water Service Area

Table 3-1: City of Adelanto Average Temperatures and Precipitation[7]														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total or Average
Temp (°F)	Max	58.8	62.1	67.0	74.2	82.7	91.6	98.1	97.2	91.3	80.2	67.3	59.4	77.5
	Min	29.8	33.1	36.6	41.5	47.9	54.3	60.8	60.2	54.1	44.4	34.5	29.2	43.9
Rainfall (inches)		0.95	1.05	0.80	0.36	0.13	0.04	0.14	0.21	0.23	0.32	0.50	0.79	5.52
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

[7] Data obtained from Western Regional Climate Center (WRCC), Desert Research Institute, Reno, Nevada http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9325; WRCC program administered by the National Oceanic and Atmospheric Administration (NOAA); data extracted from monitoring Station 049325 at Victorville, California (closest WRCC station to Adelanto with complete data) covering the period January 1, 1917 through January 15, 2015.

estimates of ET under different sets of conditions. Therefore, the idea of a reference crop evapotranspiration 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 (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), which is the closest station to Adelanto (located in Victorville near the intersection of Mojave Fish Hatchery Road and Jacaranda Avenue). This station was activated on February 1, 1994.[8]

Table 3-2: Average Evapotranspiration (ETo) Rates for Adelanto Area[9]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ETo (inches)	2.02	2.61	4.55	6.19	7.30	8.85	9.77	8.99	6.52	4.66	2.68	2.05	66.19

Source: CIIMIS, Victorville – San Bernardino – Station 117

[8] For additional information, refer to the CIMIS website at: http://www.cimis.water.ca.gov/cimis/frontStationDetailInfo.do?stationId=174&src=info

[9] Data based on CIMIS station #117 in Victorville, CA, the closest station to Adelanto (http://www.cimis.water.ca.gov/cimis/monthlyEToReport.do); averages are based on the period this station has been in service, i.e., February 1, 1994 through April 2016.

3.4 Potential Effects of Climate Change

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 the hydrologic cycle.

DWR's California Water Plan Update 2013 (CWP) considers how climate change may affect water availability, water use, water quality, and the ecosystem.[10] Volume 1, Chapter 5 of the California Water Plan, "Managing an Uncertain Future," evaluated how statewide and regional water demands that might change by 2050 in response to uncertainties both gradual and sudden. Gradual or long-term factors include population growth, land use changes, and climate change. Sudden or short-term changes include drought, flooding, earthquakes, the vulnerable condition of the Delta, fire, the economy, accidents, terrorist acts, and changes in policies, regulations, and laws. The uncertainties will play out differently across the regions of California. Each region will need to develop a portfolio of resource management strategies that consider regional water-management challenges and can be implemented to address regional issues.

The effects of climate change may increase the occurrence of droughts and floods. The 2015 Delivery Capability Report[11] was released by the State of California Natural Resources Agency, Department of Water Resources to inform the public about the capabilities and operation of the SWP in the face of such uncertainties. Delta risk management and anticipation of sea level rise are among the policies and planning efforts regarding climate change.

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.

MWA prepared a Climate Change Assessment as part of the Mojave Integrated Regional Water Management Plan, Final June 2014 Report, 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

[10] California Water Plan Update 2013 Investing in Innovation & Infrastructure: Bulletin 160-13.
[11] State Water Project Final Delivery Capability Report, 2015 - State of California Natural Resources Agency, Department of Water Resources

flows and imports; 2) project potential changes in flood frequency; and 3) conduct a greenhouse gas (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.

The State Water Project Final Delivery Capability Report 2013 (DWR 2014) projects a temperature increase for California of about 1.8° to 5.4 °F by the middle of the 21st century and 3.6° to 9.0° F by the end of the 21st century; an increase in temperature projections from the DWR 2011 report. Climate change is anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing total snowpack.

Using historical data and modeling, DWR projects that by 2050 the Sierra snowpack will be reduced from its historical average by 25% to 40% (DWR 2008:4). Increased precipitation falling as rain instead of snow during winter could result in a larger number of "rain-on-snow" events. This would cause the snow to melt earlier in the year and over fewer days than historically, thus adversely affecting availability of water for pumping by the SWP during summer.

Given these changes, water shortages worse than the 1977 drought could occur one out of every six to eight years by the middle of the 21st century and one out of every three to four years by the end of 21st century. This could preclude the SWP from pumping as much water as it would otherwise.

Climate change is also expected to reduce the SWP's median reservoir carryover storage. Carryover water is like a water savings account for water managers to use during shortage periods. Thus, a climate change–generated reduction in the amount of carryover water available to SWP contractors would reduce the system's flexibility during dry and critical water years.

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, much of the available information lacks specific tools on how to apply impacts in the context of addressing climate change impacts on water resources. In addition, far less information is available on subregional or local geographic areas because the spatial resolution of the existing climate change models is still quite low and precipitation projections cannot be easily converted directly into surface runoff and groundwater recharge to connect changes with local water resources planning activities. 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.
A summary of mitigation strategies to vulnerabilities from climate change are included in Section 4.6.

3.5 Service Area Population and Demographics

Population Forecasts

In 2015, 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 hired Beacon Economics[12] out of Los Angeles, California to prepare the population forecasts.

Beacon Economics forecast of the MWA service area and its incorporated cities, sub areas, and water purveyors is based on historic correlations with population trends in their surrounding area. The following provides a summary of their analysis[13] as shown in Appendix F.

A long run driver of future population in the surrounding area was used to forecast population growth out to the year 2060. In the case of the incorporated portions of the MWA service area, historic population trends were correlated with population growth in San Bernardino County overall. In the case of the sub areas and water purveyors in unincorporated regions of the MWA service area, the historical population data was correlated with the nearest incorporated city.

Historical data used in the forecast of the incorporated cities were obtained from the California Department of Finance (DOF), which makes estimates available from 1970 forward on an annual basis. Using this data, an econometric time series model was created to capture the historical correlations with countywide population growth. Future population growth for the incorporated cities of the MWA service area was then estimated using these historic correlations and a long run driver of countywide population growth.

Population projections for San Bernardino County from the DOF were used as the long run drive for the forecasts of incorporated cities. The DOF uses a baseline cohort-component method to produce their population projections out to the calendar year 2060. This method traces people born in a given year throughout their lives. As each year passes, cohorts change due to mortality and migration assumptions. Applying fertility assumptions to women of childbearing age forms new cohorts.

Several sub areas and water purveyors in the MWA service area are closely associated with the boundaries of one or more incorporated cities. In these cases the forecasted population growth rates from the incorporated cities were applied to historical population counts for these areas to produce a forecast of future population. For sub areas or water purveyors in an

[12] www.BeaconEcon.com
[13] Mojave Water Agency Population Forecast, December 2015, Beacon Economics

unincorporated portion of the MWA service area, the historical correlations between the respective area and the nearest incorporated city were used to project future population growth. Due to the long run nature of this forecast, DOF countywide population estimates were the primary driver of the estimates for future population in the MWA service area. Other factors, such as building permits or planned developments, were not used as they represent a very short term outlook and are not a driver of population growth in and of themselves. A forecast of long run population growth carries with it the assumption that there will be sufficient residential development to accommodate future population growth.

It should be noted that long run forecasts of any nature have a greater margin of error the longer the forecast time frame. Forecasts of one to two years can be quite accurate, whereas forecasts of five to ten years into the future are less likely to be as accurate. Several factors, most notably business cycle effects, can have strong impacts on population or other socioeconomic indicators, over the long run. Forecasts are ultimately a "best guess" given current data and assumptions, and forecasts far into the future, such as a ten years plus, can be subject to a very large forecast margin of error.

The MWA service area is anticipated to experience population growth rates over the next several decades that are stronger than those anticipated for San Bernardino County overall. The broader Inland Empire region has seen strong economic and employment growth these last few years, and much of that has been due to its affordability advantage it holds over coastal counties of Southern California.

In similar fashion, the MWA service area is expected to see this kind of growth as well, relative to other parts of the Inland Empire, due to its affordability advantage relative to the broader region. The current data available for the incorporated cities of the MWA service area shows that the region has not yet transitioned to being one of the growth centers for San Bernardino County, but given its clear advantage in terms of home prices, Beacon Economics expects economic and population growth to pick up in the years to come and over the life of this forecast.

Current and projected populations are summarized in Table 3-3, which depicts projections in five-year increments to the year 2040. These population projections refine what was depicted in the City's 2010 UWMP to more closely correlate with population trends in the surrounding area.

Table 3-3: Population - Current and Projected

Population Served	2015	2020	2025	2030	2035	2040
	33,080	35,476	38,453	42,221	46,311	50,182

Source: Beacon Economics, Mojave Water Agency Population Forecast, December 2015
Note: 2000 and 2010 data from US Census Bureau; 2020 and 2035 data from SCAG; Population estimates for 2015, 2025 and 2030 based on linear interpolation between US Census Bureau and SCAG data points.

4.0 SYSTEM WATER USE

System water use addresses the City's water demand, identifying the level of treatment when delivered – potable, raw or recycled. Currently, the City does not use raw or recycled water.

4.1 Water Demand – 2015 Actual

Table 4-1 shows 2015 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 and Raw Water - 2015 Actual

Use Type	2015 Actual		
	Additional Description, as needed	Level of Treatment When Delivered	Volume (AFY)
Single Family		Drinking Water	2,491
Multi-Family		Drinking Water	276
Commercial/Institutional		Drinking Water	417
Industrial		Drinking Water	235
Landscape/Irrigation	Includes agricultural and non-agricultural irrigation	Drinking Water	3
Other		Drinking Water	20
Losses		Drinking Water	607
		TOTAL	**4,049**

4.2 Water Demand By Sector – 2020 – 2040 Projections

Table 4-2 presents projected water demand for the years 2020 through 2040. The projections reflect increasing usage based on the population projections in Table 3-3.

Table 4-2: Demands for Potable and Raw Water - Projected

Use Type	Additional Description	Projected Water Use				
		2020	2025	2030	2035	2040
Single Family		2,982	3,174	3,447	3,737	4,036
Multi-Family		330	351	381	414	447
Commercial		500	532	578	626	676
Industrial		281	299	325	353	381
Landscape		3	3	4	4	4
Other		24	25	28	30	32
Losses	Based on 10% loss	458	487	529	574	620
	TOTAL	**4,578**	**4,872**	**5,292**	**5,737**	**6,195**

Water demand projections by 'use type' were estimated using total demand projections consistent with total projections provided to MWA, then applying the percent of use by 'use type' consistent with percentages from 2010 actual use. This water demand projection methodology was used because the City's billing system is currently being improved after implementing a new system and 2015 actual data by water use type was unavailable. No calculations for passive savings (expected savings from codes, standards, and land use planning) were included in future demands. Distribution system losses are fully described below in section 4.3 Distribution System Water Losses. Water use include as "other" includes fire suppression, hydrant meters, line flushing, leaks, damaged fire hydrants, activities for water quality complaints, and accounting for unauthorized users.

In small areas of the City currently without water lines and service connections, these residents purchase water from a water fill station located at the City's main Water Service yard. Water sales at the fill station are not metered, although accounted for in Commercial water use.

Finally, marijuana cultivation is growing in the region, with 27 operations with approved applications by the City. The City, however, has estimated water use projections for only 15 facilities due to the success rate of these cultivation operations.[14] Based on license information, each facility varies from 5,000 square feet to upwards of 300,000 square feet; however, the State of California will only allow a maximum of 22,000 square feet for each facility and the State will limit the number of these facilities. Therefore, it has been estimated that the average facility will be 15,000 square feet. Each 1,000 square feet will grow 120 plants that will use 45 gallons per day; estimate each 1,000 square feet at 50 gallons per day. Therefore, 15 facilities at 15,000 square feet at 50 gallons per 1,000 square feet per day equals 11,250 gallons per day (12.61 AFY). This water use projections has been included in 'Commercial'.

It is anticipated that 6 to 8 marijuana operations will be operational running by end of 2016. During the Conditional Use Permit process, the City will require all cultivators to use the most efficient form of watering plants (hydroponics) with a recirculating system that filters and reuses the filtered water. This methodology will be reevaluated after several cultivators begin operation.

4.3 Water Demand By Water Type – 2015 Actual, 2020 – 2040 Projections

Table 4-3 provides total water demand by water source type for 2015 actual use and for 2020 through 2040 projections.

Table 4-3: Total Water Demand by Water Type

	2015	2020	2025	2030	2035	2040
Potable and Raw Water [a]	4,049	4,578	4,872	5,292	5,737	6,195
Recycled Water Demand	0	0	0	0	0	0
TOTAL WATER DEMAND	**4,049**	**4,578**	**4,872**	**5,292**	**5,737**	**6,195**

[a] Water use projections were provided to MWA, the City's groundwater manager.

[14] Information and water use data and information was researched and provided by Mark de Manincor, Senior Planner, City of Adelanto, March 3, 2016.

4.4 Distribution System Water Losses

Reporting of system losses is required by the CWC for the first time 2015 UWMPs. System water loss is the difference between water production and water consumption and represents "lost" water. Distribution system losses can include both accounted-for and unaccounted-for losses attributed to unmetered water use, leaking pipes, or other events causing water to be withdrawn from the system and not measured, such as hydrant flushing, street cleaning, new construction line draining and/or filling and draining and flushing, and firefighting.

Accounted-for losses within the City include the following activities that are known although not metered or charged for:

- Hydrant Testing and Flushing – Hydrant testing to monitor the level of fire protection available throughout the City is performed by the San Bernardino County Fire Department. The APUA also performs hydrant flushing to eliminate settled sediment and ensure better water quality water. Water used during hydrant testing and flushing is not metered.
- Firefighting – Water used to fight fires is also not metered.

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. However, for the benefit of contrast to accounted-for losses listed above, the following are identified as unaccounted-for losses that may occur, although can be managed:

- Leakage – Water lost from system leakage from pipes, valves, pumps, and other water system appurtenances.
- Customer Meter Inaccuracies – Meters have an inherent accuracy for a specified flow range; however, flow above or below that range is usually registered at a lower rate. Meters also become less accurate with time due to wear.

The City recently transitioned to a new water billing system and is currently unable to obtain water use data by customer type. While the City continues to work on this issue, it is not possible to identify an absolute accurate percentage of water loss for the most recent 12 months representing calendar year 2015. However, the City has completed the AWWA Water Audit WAS v5.0 (Appendix G) based on best available information. Table 4-4 shows the 12-month water loss audit reporting.

Table 4-4: 12-Month Water Loss Audit Reporting

Reporting Period Start Date (01/2015)	Volume of Water Loss (AF)
1/1/15 - 12/31/15	767
NOTES: The 12-month loss percentage is 18.9%, however, the average over last three calendar years is 15%.	

The water loss for the past 12-month period is 18.9 percent; much higher than the previous reporting period. The City intends to conduct performance measures to lower its water losses to at least 10 percent, an acceptable rate as defined by AWWA. Therefore, for the purposes of this Plan, the water loss percentage projected for the planning horizon is 10 percent projected for the years 2020 through 2040, as shown in Table 4-5. The City is confident that this is within the range of acceptable water loss and is within a small margin of error.

Table 4-5: City of Adelanto System Water Loss 2015 – 2040 (AFY)

Agency	2015	2020	2025	2030	2035	2040
Water Production	4,049	4,578	4,872	5,292	5,737	6,195
Water Consumption	3,282	4,120	4,385	4,763	5,163	5,576
Difference (System Loss)	767	458	487	529	574	620
System Loss Percentage	18.9%	10.0%	10.0%	10.0%	10.0%	10.0%

4.5 Estimating Future Water Savings

In September 2014, two legislative bills amending sections of the Act were approved and chaptered: AB 2067 and SB1420. Key among the changes to existing statutes was the addition of CWC Section 10631(e)(4). This specific addition provides the option for urban water suppliers to reflect its and its customer's efficiency efforts as part of its future demand projection.

According to Appendix K of the DWR UWMP Guidebook, CWC Section 10631(e)(4) is voluntary for water suppliers. However, as required in subsection (B)(ii), water projections not accounting for these factors shall note this fact.

Section 10631(e)(4)(A): If available and applicable to an urban water supplier, water use projections may display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

DWR encourages water suppliers to really understand current and future water demands to enable useful and practical planning. However, DWR recognizes that the variable nature of codes, standards and ordinances will translate to varying interpretations and representations of such in UWMPs. DWR recognizes that an UWMP is a supplier's plan – not DWR's – and will defer to each purveyor's discretion for reflecting the quantitative benefits of applicable codes, standards and ordinances, assuming reasonable citations and basis are provided, as required by CWC 10631(e)(4)(B).

Since limited to no data was available to provide future water savings, water demand projections by 'use type' were estimated using total demand projections consistent with total projections provided to MWA, then applying the percent of use by 'use type' consistent with percentages from 2010 actual use. As mentioned before, this water demand projection methodology was used because the City's billing system is currently being improved after implementing a new system and 2015 actual data by water use type was unavailable. No calculations for passive savings (expected savings from codes, standards, and land use planning) were included in future demands.

4.6 Water Use for Lower Income Households

Low-income households are those that make less than 80 percent of the median income. The median income for a family of four in San Bernardino County is $59,200. As such, households (with four members) making less than $47,350 per year are considered lower income.

In 2010, the City of Adelanto had 7,040 lower income housing units in its service area.[15] The California Department of Housing and Community Development (HCD) determined that the projected housing need for the Southern California region (including the Counties of Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial) was 412,137 new housing units. The Southern California Association of Governments (SCAG) allocated this projected growth to the various cities and unincorporated county areas within the SCAG region, creating the Regional Housing Needs Assessment (RHNA). The RHNA is divided into four categories: very low, low, moderate, and above moderate income. As determined by SCAG, the City of Adelanto's fair share allocation is 2,841 new housing units during this planning cycle, 2013-2021 (see Table 28). To calculate Adelanto's projected housing needs, the City assumed 50 percent of its allocation of housing units for very low-income households should be affordable to extremely low-income households. As a result, from the very low-income need of 633 units and low-Income need of 459 units, the City has a projected a need of 317 units for extremely low-income households and 230 units for low-income households for a total of 547 units. This would result in a total of 7,587 low-income housing.

To meet these needs, the City must ensure that it addresses local constraints that may impede the development, improvement, and conservation of housing for persons of all income levels and for persons with special needs (such as the homeless, disabled, and elderly). Should constraints be identified, the City must demonstrate its efforts in removing or mitigating the constraints, where appropriate and legally possible. Such constraints include: market, development costs, land availability, construction costs, availability of financing, governmental, land use controls, development standards, infrastructure, drainage, wastewater, solid waste,

The City's 1994 General Plan indicates that the City has the capacity to more than accommodate the combined RHNA allocation and in many areas infrastructure either exists or could be extended. It is not anticipated that the provision of water will be a constraint to the development of affordable housing.

Total estimated water use for low-income housing units is shown in Table 4-6, which has been included in the City's total projected Water Demands.

Table 4-6: City of Adelanto Low-Income Water Demands (AFY)

Agency	2010	Additional need	Total Low-Income Housing Need
Low-Income Housing Units	7,040	547	7,587
Water Demands (AFY)[16]	2,520	196	2,716

[15] City of Adelanto 2013-2021 Housing Element 2013-2021, September 25, 2013

[16] Low-income water demand calculation: Utilized the AFY for 2015 residential connections (7,731) applied to 2010 low-income housing units and total housing units needed.

4.7 Mitigation Strategies to Vulnerabilities from Climate Change

As presented in Section 3.4 Potential Effects of Climate Change, according to the USBR Climate Change Report Task 3 – evaluate GHG emissions for the MWA service area from 1990 through 2050, 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. 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.

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 Change Report evaluated whether water conservation measures alone would be enough to meet AB 32 GHG emission reduction targets in the MWA service area. Results show 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.

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 City and other regional stakeholders to incorporate climate change adaptation in projects developed and evaluated as part of the IRWM Plan process, or solely within its own service area.

Adaptation strategies for City consideration related to urban water management to address potential climate change impacts may include the following:

General Mitigation Strategies

- Conduct an Energy and GHG Master Plan to assess energy and carbon footprint, and create an Action Plan of strategies for greater energy efficiency and GHG emission reductions. Fully exploring the Water-Energy-Carbon nexus can identify opportunities for energy savings and GHG emission reductions through water operations, programs, and projects.
- Incorporate climate change adaptation into relevant local plans and projects.
- Help establish and participate in a regional climate change adaptation public outreach and education program.
- Build collaborative relationships between regional entities and neighboring communities to promote complementary adaptation strategy development and regional approaches.

- Establish an ongoing monitoring program to track local climate impacts and adaptation strategy effectiveness.

Water Supply Mitigation Strategies

- 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 opportunity and practices of water exchanges and water banking outside the region to supplement water supply.
- Support development and implementation of an AB 3030 Groundwater Management Plans as a fundamental component of the IRWM Plan.
- Adopt local ordinances that protect the natural functioning of groundwater recharge areas.

Water Demand Mitigation Strategies

- Aggressively increase water use efficiency.
- Encourage agricultural users to adopt efficient water management practices.
- Encourage landscape water users to adopt efficient water management practices.
- Encourage development of more efficient cooling technology.

Water Quality Mitigation Strategies

- Support strategies that protect or enhance imported and groundwater basin water quality.
- Consider water quality improvements associated with water transfers and water banking on regional water supply.
- Consider riparian forest projects that provide cooling for habitat.
- 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.

Ecosystem and Habitat

- Promote water resources management strategies that restore and enhance ecosystem services.
- Provide or enhance connected "migration corridors" for animals and plants to promote increased biodiversity and allow the plants and animals to move to more suitable habitats to avoid serious impacts and support increased biodiversity.
- Consider projects that provide seasonal aquatic habitat in streams and support corridors of native riparian forests that create shaded riverine and terrestrial habitat.

Hydropower Mitigation Strategies

- Support potential solar and wind power options within the SWP service area and the Mojave Region.

4.8 Conservation Effects on Water Usage

Conservation is a key strategy for meeting future demand, especially amidst the current prolonged drought conditions in California.

Governor's Emergency Orders. In 2014, the Governor issued an emergency order requiring mandatory conservation actions statewide to reduce overall residential water consumption by 20 percent, reported as R-GPCD (residential gallons per capita per day). Public water agencies throughout the state have responded with action to the Governor's mandate, reporting monthly to the State Water Resources Control Board, with most agencies having met their specific conservation goals. Table 4-7 reflects the City's initial goal of the Governor's mandate, the revised conservation goal for suppliers after the March 2016 extension of the emergency regulations, and the subsequent revised regulation to allow locally developed conservation standards based upon each agency's specific circumstances.

Table 4-7: SWRCB Conservation Goals – Governor's Regulations

	2014 Original Reduction Goal	March 2016 Revised Reduction Goal[1]	May 2016 SWRCB Revised Regulation[2]
City of Adelanto	20%	16%	Ensure at least a 3-year supply

[1]Urban Water Supplier Conservation Standard for Extended Emergency Regulation Rulemaking – 2016 Supplier Conservation Standards - Effective March 1, 2016. Based on revised R-GPCD, Default Climate Adjustment, and supplier-submitted adjustments.

[2]http://www.swrcb.ca.gov/press_room/press_releases/2016/pr051816_waterconsreg.pdf

On May 18, 2016, the State Water Resources Control Board adopted a statewide water conservation approach that replaces the prior percentage reduction-based water conservation standard with a localized "stress test" approach that mandates urban water suppliers act now to ensure at least a three-year supply of water to their customers under drought conditions.[17]

Recognizing persistent yet less severe drought conditions throughout California, the newly adopted emergency regulation will replace the February 2, 2016 emergency water conservation regulation that set specific water conservation benchmarks at the state level for each urban water supplier. The new regulation will be in effect through January 2017, and requires locally developed conservation standards based upon each agency's specific circumstances.

These standards require local water agencies to ensure a three-year supply assuming three more dry years like the ones the state experienced from 2012 to 2015. Water agencies that would face shortages under three additional dry years will be required to meet a conservation standard equal to the amount of shortage. For example, if a water agency projects it would have a 10 percent supply shortfall, their mandatory conservation standard would be 10 percent.

[17] Proposed text of State Water Resource Control Board emergency regulation: http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/factsheet/proposed_emergency_reg060916.pdf

Water Conservation Act of 2009. Moreover, the Water Conservation Act of 2009, or SBX7-7, provides the regulatory framework to support the statewide reduction of 20% urban per capita water use by the year 2020 (20x2020). Each water retailer was to determine and report its existing baseline water consumption and establish an interim target (2015) and its 2020 target in their 2010 UWMP. Each water retailer is now required to identify the status of its 2015 interim target and reaffirm its 2020 target in this 2015 UWMP. Although water wholesalers are not required to meet the targets outlined in SBX7-7, MWA implements conservation programs and policies in partnership with and/or on behalf of its water retail agencies, including the City of Adelanto. This helps both the compliance with SBX7-7 and to ensure long-term water supply reliability goals are met. The 20x2020 baselines and targets are discussed in Chapter 5.

In addition to statewide conservation regulations, water use efficiency goals have been formed for the regional service area by MWA and the Alliance for Water Awareness and Conservation (AWAC). AWAC is a coalition of 25 local water agencies, including the City of Adelanto, and other regional organizations with the goal of reducing consumption by 20 percent by 2020 for the Mojave Basin Area and 5 percent by 2015 for the Morongo Area. AWAC Goals, updated in 2011 are:

- 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 or lower current GPCD and continue to position agencies for meeting future conservation needs.
- Exchange ideas between agencies, specifically at quarterly meetings

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5.0 BASELINE AND TARGETS

To comply with the SBX7-7 water conservation legislation, 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 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 April 30, 2011 draft 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 CUWCC BMPs.

In 2010, the City applied Method 1 – per capita daily use equals 80 percent of the City's baseline per capita water usage (in gallons per capita per day – GPCD). At the time, the City's per capita usage baseline average, minimum baseline average and SBX7-7 water conservation targets for 2015 and 2020 were established as follows:

- Baseline Average (based on 10-year data from 1996-2005) 321.8 GPCD
- Minimum Baseline Average (based on 5-year data from 2004-2008) 214.6 GPCD
- 2015 Water Conservation Target 262.9 GPCD
- 2020 Water Conservation Target 203.9 GPCD

Details on the calculation of Adelanto's baseline water usage and 2015 and 2020 per capita water conservation targets are included in Appendix H – Technical Memorandum, "*20x2020 GPCD Baseline Calculation & Water Use Target Method Selection*," June 1, 2011.

In the 2015 UWMP, the City must update its population data using 2010 Census data, and as a result, update its baseline and target information, and lastly demonstrate compliance with its established water use target for the year 2015. This also demonstrates whether or not the City is currently on track to achieve its 2020 target.

Compliance is verified by completion and submission of the SB X7-7 Verification Form, a series of Excel tables provided by DWR for the 2015 UWMP. The SB X7-7 Verification Form is shown in Appendix I and summarized in the tables in this chapter.

5.1 Updated Calculations from 2010 UWMP

CWC 10608.20 provides that an urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan, including changing the methodology if the City chooses. Once the 2015 UWMP is submitted, the target method may not be changed

in any amendments to the 2015 Plan or in the 2020 Plan. The City continues to use Method 1, although has updated its targets based on revised population data.

DWR requires population projections to be updated based on the most current 2010 U.S. Census data available. DWR determined that significant discrepancies exist between the Department of Finance (DOF) projected populations for 2010 (based on 2000 U.S. Census data) and actual population for 2010, based on 2010 U.S. Census data. The average difference between projected and actual was approximately 3 percent, but the difference for some cities was as high as 9 percent. Therefore, agencies that did not use 2010 Census data for their baseline population calculations in the 2010 UWMP must recalculate their baseline population for the 2015 UWMPs using 2000 and 2010 Census data (the full census data set was not available until 2012). This may affect the baseline and target GPCD values calculated in the 2010 UWMP, which must be modified accordingly in the 2015 UWMP.

Further, after its review of the City's 2010 UWMP, DWR indicated that the City did not utilize, or at least indicate the use of, the appropriate data to calculate its population projections. DWR indicated that while it appeared the 2010 UWMP shows the public water system only serves a portion of the City, population projections reflect the entire City's population. DWR further indicated that if this is correct, the use of DOF population figures for the entire City of Adelanto would be incorrect and would need to be revised, which may result in a change to the baseline and target calculations.

Since the City's water service area is contiguous with the City's boundaries, the entire City's population for use in its UWMP is appropriate. In addition, for the 2015 UWMP, MWA retained Beacon Economics to calculate population projections for MWA and each water supplier within its water service area, including the City (Appendix F). Therefore, the baselines and targets have been recalculated, as shown in the following sections, based on refined population data from the MWA Population study.

The City, as a retail water agency, has prepared and submitted the required SB X7-7 Verification Form (an Excel file) with its 2015 UWMP, which includes a series of standardized tables as provided by DWR. These standardized tables are new for 2015 to demonstrate compliance with the Water Conservation Act of 2009 (SB x7-7). The following sections provide the information as contained in the SB x7-7 Verification Form.

5.2 Service Area Population

In order to correctly calculate annual GPCD, the City must correctly determine the population it served for each baseline year in both of the baseline periods and for the 2015 compliance year. 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.

Therefore, the City must recalculate its baseline population, which will affect the baseline and target GPCD values that were calculated in the 2010 UWMP, and have been modified accordingly in this 2015 UWMP.

In 2015, 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 hired Beacon Economics[18] out of Los Angeles, California to prepare the population forecasts. The population forecasts are more fully described in Section 3.5.

Beacon Economics forecast of the MWA service area and its incorporated cities, sub areas, and water purveyors is based on historic correlations with population trends in their surrounding area. The Mojave Water Agency Population Forecast detailed report in included Appendix F.[19]

Table 5-1 shows population forecasts from the 2010 UWMP compared to the revised population using the Mojave Water Agency Population Forecast. The updated population data is used to revise the City's baseline and target GPCD calculations.

Table 5-1: Population – 2015 UWMP Compared to 2010 UWMP

Population Served	2000	2010	2015	2020	2025	2030	2035	2040
2015 UWMP - Updated	17,895	31,760	33,080	35,476	38,453	42,221	46,311	50,182
2010 UWMP	18,130	31,765	38,866	45,967	53,395	60,824	68,252	n/a

Source: Beacon Economics, Mojave Water Agency Population Forecast, December 2015
Note: 2000 and 2010 data from US Census Bureau; 2020 and 2035 data from SCAG; Population estimates for 2015, 2025 and 2030 based on linear interpolation between US Census Bureau and SCAG data points.

5.3 Gross Water Use

Gross water use is a measure of water that enters the distribution system of the City over a 12-month period with certain allowable exclusions. These exclusions include: recycled water use, indirect recycled water, water placed in long-term storage, water conveyed to another urban water supplier, water delivered for agricultural use, and process water. The City currently does not have any exclusions.

Gross water use must be reported for each year in the baseline periods as well as 2015, the compliance year. Table 5-2 shows the Gross Water Use for the City as required.

Table 5-2: Gross Water Use

Baseline Year	Volume Into Distribution System	Exclusions	Annual Gross Water Use
10 Year Baseline – Gross Water Use			
1996	4,475	0	4,475

[18] www.BeaconEcon.com
[19] Mojave Water Agency Population Forecast, December 2015, Beacon Economics

Table 5-2: Gross Water Use			
Baseline Year	**Volume Into Distribution System**	**Exclusions**	**Annual Gross Water Use**
1997	4,396	0	4,396
1998	4,015	0	4,015
1999	4,366	0	4,366
2000	4,871	0	4,871
2001	5,402	0	5,402
2002	5,710	0	5,710
2003	5,714	0	5,714
2004	6,062	0	6,062
2005	6,795	0	6,795
10 Year Baseline Average Gross Water Use			**5,178**
5 Year Baseline – Gross Water Use			
2004	6,062	0	6,062
2005	6,795	0	6,795
2006	6,538	0	6,538
2007	4,653	0	4,653
2008	5,326	0	5,326
5 Year Baseline Average Gross Water Use			**5,875**
2015 Compliance Year – Gross Water Use			
2015	4,049	0	**4,049**

5.4 Baseline and Compliance Daily Per Capita Water Use

Baseline daily per capita water use is measured in gallons per capita per day (GPCD) for baseline years. The Compliance GPCD is for the year 2015.

The City has chosen 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 5-year baseline period, the City has chosen the years 2004 to 2008. This baseline period is used to confirm that the selected 2020 GPCD target meets the minimum water use reduction requirements. This 5-year baseline period must be a continuous 5-year period that ends no earlier than December 31, 2007 and no later than December 31, 2010.

Table 5-3 presents the baseline GPCD as presented in the 2010 UWMP and updated based on revised population, as well as the Compliance GPCD for 2015.

Table 5-3: Baseline and Compliance GPCD					
Baseline Year	**2010 UWMP Population**	**2015 UWMP Population[a]**	**Volume Into Distribution System**	**2010 UWMP GPCD**	**2015 UWMP Revised GPCD**
10 Year Baseline GPCD					
1996	7,123	7,123	4,475	561	561
1997	8,433	8,433	4,396	465	465
1998	10,676	10,676	4,015	336	336
1999	12,708	12,708	4,366	305	305
2000	18,130	17,895	4,871	240	243
2001	18,284	19,282	5,402	264	250
2002	18,777	20,668	5,710	271	247
2003	19,477	22,055	5,714	262	231
2004	21,313	23,441	6,062	254	231
2005	23,338	24,828	6,795	260	244
2010 UWMP 10 Year Average Baseline GPCD				**322**	
Revised 10 Year Average Baseline GPCD					**311**
5 Year Baseline GPCD					
2004	21,313	23,441	6,062	254	231
2005	23,338	24,828	6,795	260	244
2006	24,796	26,214	6,538	235	223
2007	27,007	27,601	4,653	154	150
2008	28,000	28,987	5,326	170	164
2010 UWMP 5 Year Average Baseline GPCD				**215**	
Revised 5 Year Average Baseline GPCD					**202**
2015 Compliance Year GPCD					
2015	n/a	33,080	4,049		**109**

[a] 2000 and 2015 population are actual; 1996 to 1999 remained the same; 2001 to 2008 were extrapolation from 2000 (17,895) to 2010 (31,760) actuals.

5.5 2020 Target and 2015 Interim Target

2020 Target

The City's GPCD must demonstrate that the 2020 water use target that has been calculated will reduce the agency's 2020 water use by a minimum of 5 percent from the 5-year baseline. Table 5-4 summarizes the GPCD for each baseline and the 2015 compliance year.

Table 5-4: Summary of Baselines and Compliance Year GPCD	
Baselines and Compliance Year	**GPCD**
10 Year Baseline GPCD	**311**
5 Year Baseline GPCD	**202**
2015 Compliance Year Actual GPCD	**109**

Using the baseline information, the Calculated 2020 Target GPCD is 249, calculated as 20% of the 10 year baseline, as shown in Table 5-5.

Table 5-5: Target Method 1 - 20% Reduction – Calculated 2020 Target

10 Year Baseline GPCD	Calculated 2020 Target GPCD
311	**249**

However, as noted above, the City must demonstrate that the Calculated 2020 Target GPCD will reduce the City's 2020 water use by a minimum of 5 percent from the 5 Year Baseline (Maximum 2020 Target).

Using the 5 Year Baseline, Table 5-6 shows that the Calculated 2020 Target is more than the Maximum 2020 Target. Therefore, the Confirmed 2020 Target is 192 GPCD.

Table 5-6: Confirm Minimum Reduction for 2020 Target

5 Year Baseline GPCD	Maximum 2020 Target[1]	Calculated 2020 Target[2]	Confirmed 2020 Target
202	192	249	**192**

[1]Maximum 2020 Target is 95% of the 5 Year Baseline GPCD
[2]2020 Target is calculated based on Target Method 1 – 20% of 10 Year Baseline

2015 Interim Target

The 2015 Interim Target is the value halfway between the 10 Year Baseline GPCD and the Confirmed 2020 Target. The 2015 Interim Target is shown in Table 5-7

Table 5-7: 2015 Interim Target

10 Year Baseline GPCD	Confirmed 2020 Target GPCD	2015 Interim Target GPCD[1]
311	192	**252**

[1]Calculated as the midpoint between 311 and 192 ((311-192)/2+192).

Baselines and Targets Summary

Table 5-8 provides a summary of the baselines and targets for the City.

Table 5-8: Baselines and Targets Summary (GPCD)					
Baseline Period	**Start Year**	**End Year**	**Average Baseline GPCD**	**2015 Interim Target GPCD**	**Confirmed 2020 Target GPCD**
10 Year	1996	2005	311	**252**	**192**
5 Year	2004	2009	202		

5.6 2015 Compliance GPCD (Daily per Capita Water Use)

The term commonly used when referring to "daily per capita water use is "gallons per capita per day" or "GPCD". It is important to distinguish GPCD as used in the UWMP from the R-GPCD (Residential-GPCD) that has been used in drought reporting to the State Water Resources Control Board (SWRCB) in recent years.

GPCD is the total water use within a service area minus allowable exclusions, divided by population. This is used in the UWMP for purposes of the Water Conservation Act of 2009 (SB x7-7). R-GPCD is solely the estimated residential water use in a service area divided by population. R-GPCD has been used in drought reporting to the SWRCB for purposes of complying with the Governor's drought declarations and executive orders in 2014 and 2015.

Meeting the 2015 Interim Target

The City has calculated its actual 2015 water use to determine whether or not it has met its per capita 2015 target water use. Further, this assist the City in assessing its progress toward meeting its 2020 target water use.

Table 5-9 verifies 2015 compliance. In 2015 and again in 2020, there are several allowable adjustments that can be made to the City's gross water use, if appropriate. Allowable adjustments include: extraordinary events, weather normalization, and economic adjustment. All adjustments are optional and methodologies to use are detailed in Methodology 8: Criteria for Adjustment to Compliance Daily Per capita Water Use, and Methodology 4: Compliance Daily Per Capita Water Use of DWR's Methodologies document.[20] The City did not apply any adjustments to the Gross Water Use for 2015.

[20] Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use, February 2016, DWR: http://www.water.ca.gov/urbanwatermanagement/docs/2015/Methodologies%20-%20February%202016%20FINAL.pdf

Table 5-9: 2015 Compliance							
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments				Actual 2015 GPCD	**Did City Achieve Targeted Reduction for 2015?**
		Extraordinary Events	Weather Normalization	Economic Adjustment	Adjusted 2015 GPCD		
109	252	0	0	0	109	109	**YES**

The City's actual 2015 Interim GPCD is significantly below the 2015 target GPCD. Further, it is also significantly below the Confirmed 2020 Target GPCD of 192. This demonstrates the City is not only making excellent progress toward meeting its 2020 water use target, but is using substantially less water than projected.

5.7 Water Use Reduction Plan

To continue water conservation and water use efficiency to meet its 2020 Target GPCD, the City will continue to implement its Water Use Reduction Plan as first identified in its 2010 UWMP. To ensure continued long-term adequate reliability, the City plans on meeting or exceeding its 2020 Target while matching or staying below its water demand projections.

As demonstrated, the City of Adelanto surpassed its 2015 Interim Target and should not have any problem meeting its 2020 Target. The City will continue to encourage water conservation and water use efficiency through the following:

- Enforce the Water Waste Ordinance.
- Maintain and strengthen the tiered rate structure.
- Continue public education and outreach on water use efficiency and conservation in collaboration with MWA and Alliance for Water Awareness and Conservation (AWAC) through public communication, community events, and school education programs.
- Encourage or require new developments to install water conservation fixtures and landscape with low water use plant materials (xeriscape).
- Continue to operate and maintain the City's water distribution system with a goal of reducing water losses by repairing or eliminating any leaks that may develop as soon as practical and enhanced tracking.
- Continue planning toward the construction of a recycled water system.

6.0 SYSTEM WATER SUPPLIES

6.1 WATER SOURCES

Chapter 6 provides a description and quantification of sources of water available to the City of Adelanto. Water volumes reflect expectations for average year conditions. A discussion of sources includes the origin of the water supply, water quality, and issues unique to the supply. Management actions and projects that are anticipated to meet future water demands are also discussed. Supply reliability is discussed in Chapter 7 and water shortage contingency planning is discussed in Chapter 8.

Overview

The City obtains all of its water supply from local groundwater in the Mojave River Groundwater Basin.[21] 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 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. 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 SWP.

The court ordered adjudication of the Mojave Basin Area allocates a variable free production allowance (FPA) to each purveyor that supplies more than 10 AFY, including Adelanto. Each allocated FPA represents the purveyor's share of the water supply available from the MWA Subarea. FPAs are determined as a percentage of the purveyor's highest verified annual use from 1986 to 1990.

The FPA, which is currently set at 80 percent of BAP for agriculture and 60 percent of BAP for municipal and industrial (M&I), can vary from year to year depending on the Watermaster's safe yield projections for the Basin. If Adelanto, or another 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. Replacement obligations are satisfied by paying MWA and then purchasing unused FPA within the subarea. The replacement charge in 2014-15 was $484/AF (Invoice Date 6/1/2016) with anticipated increases projected by the Watermaster on March 23, 2016 are: $531/AF for 2015-16 (invoice date 6/1/2017), and $558/AF for 2016-17 (invoice date 6/1/2018). Table 6-1 shows the City's (BAP) and current allotted FPA from the Alto Subarea.

[21] 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 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 referred to as the Mojave Basin Area. Source: MWA 2015 UWMP, Section 3.4.

Table 6-1: Groundwater - Alto Subarea and City of Adelanto BAP and FPA – 2014-2015[1]						
MWA Subarea	**Base Annual Production (BAP)**	**Base Free Production Allowance (FPA)**	**Carryover**	**2014-15 Verified Production**	**Production Safe Yield**	**Percent Difference**
Alto Subarea	114,308	70,530	18,079	68,002	69,862	2.6%
City of Adelanto	4,366	2,620	854	3,773	n/a	n/a

[1] 22nd Annual Report of the Mojave Basin Area Watermaster, Water Year 2014-15, May 1, 2016.

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 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 4,366 AFY BAP and the 2,620 AFY FPA allocation shown in Table 6-1.

Mojave Water Agency (MWA)

The Mojave Water Agency was founded July 21, 1960. It was created 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 Californian's 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. Mojave Water Agency's service area, its subareas, and its ten major water purveyors are shown in Figure 6.1.[22]

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.

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.

[22] Draft MWA 2015 UWMP, May 8, 2016, Figure 1-3.

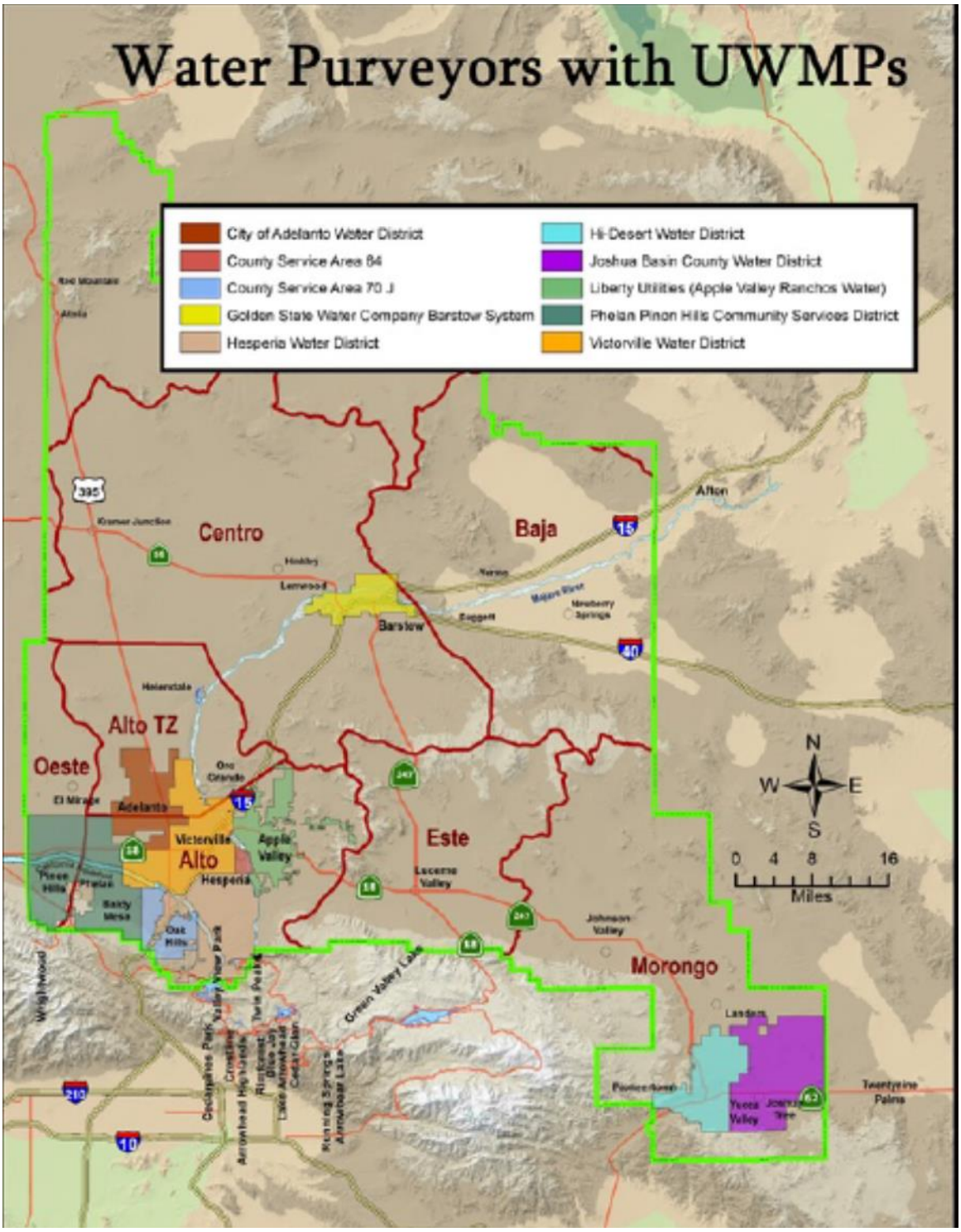


Figure 6.1
Mojave Water Agency Service Area
Large Water Purveyors

6.2 WATER SUPPLY

In the 2015 water year, the City pumped 94 percent of its water supply from groundwater wells accessing the Mojave River Groundwater Basin. The balance of supply was purchased from VWD through its intertie, which is also sourced from groundwater. Current and projected water supplies are shown in Table 6-2 and described in subsequent sections.

Table 6-2[1]: City of Adelanto Current and Planned Water Supplies (AFY)

Water Supply Source	Actual	Projected				
	2015	2020	2025	2030	2035	2040
Groundwater Production[2]	3,787	9,300	10,444	11,581	12,640	13,750
Groundwater Transfer - Intertie with VWD[3]	262	0	0	0	0	0
Groundwater Demand	4,049	4,578	4,872	5,292	5,737	6,195

[1] 2015 UWMP Guidebook Excel Table 6-8 Water Supplies – Actual and Table 6-9 Water Supplies – Projected.
[2] Mojave Groundwater Basin (see footnote 22); consistent with Table 6-5.
[3] Transfers between VWD and the City is also from groundwater; future year projections are determined annually and cannot be projected.

During normal years, the City obtains all of its water supply from the local groundwater aquifer through its wells. The City does not have any surface water or stormwater diversion facilities or desalination facilities, and is working to improve its recycled water facilities. Since the City is not located near the ocean, desalination is not a practical or economically feasible source of water.

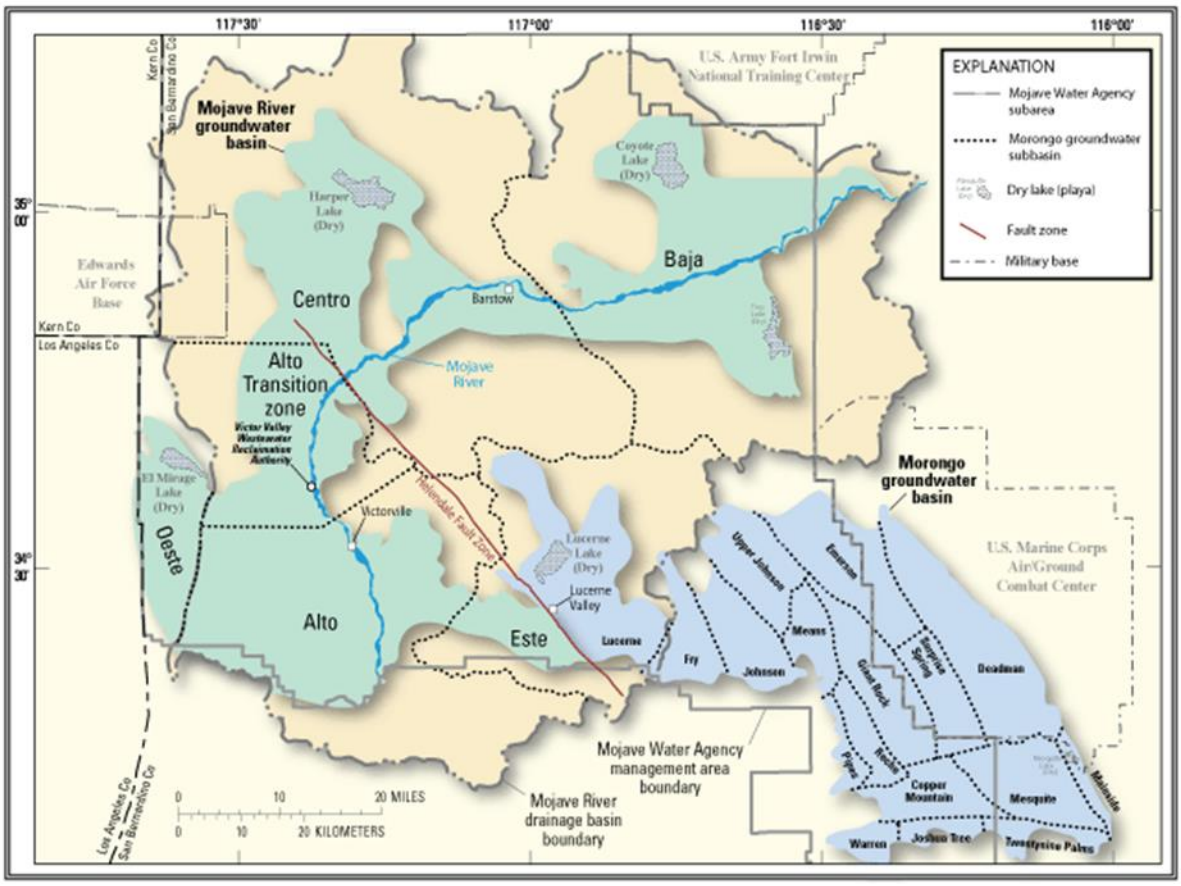
During normal water system operation, there are no transfer or exchanges of water within the City's service area. However, the City has two available emergency interties, both with the Victorville Water District (VWD). One is located on Air Expressway Boulevard just east of Highway 395. That intertie is a two-way connection from which Adelanto and VWD can both obtain and provide water. The second intertie is located near the intersection of Bellflower Street and Olivine Road. That intertie only allows one way flow from VWD to Adelanto. Adelanto only uses these interties on rare occasions with significant use in 2008 when it was used to fill the City's new 5 MG reservoir, and some additional use in 2014 (147 AF) and 2015 (262 AF).

6.2.1 Groundwater

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 6-1 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.[23]



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

Figure 6.2
Mojave Basin Area

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

[23] Draft 2015 MWA UWMP, May 9, 2016 - https://www.mojavewater.org/files/UWMP_PublicDraft_v1.pdf

soil, transpiration by plants, seepage into dry lakes where accumulated water evaporates, and seepage into the Mojave River. Recent investigations by MWA, USGS, 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.

The Mojave River provides an estimated average of 54,000 AFY per year of recharge to the Mojave River Groundwater Basin.[24] 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 July 2014 to June 2015, total basin production from MWA purveyors was 131,500 AF, with 71,300 from the Alto Subarea.[25]

According to the Draft MWA 2015 UWMP[26], the Mojave Basin provides a net natural annual water supply of 55,241 AFY, while the Alto Subarea provides 25,900 AFY during normal water years, and remain consistent during single-dry water years and multiple dry water year.

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 J). 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

[24] 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
[25] Draft 2015 MWA UWMP, May 9, 2016, Section 3.4.3.2-
https://www.mojavewater.org/files/UWMP_PublicDraft_v1.pdf
[26] Ibid

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[27], as well as Appendix E in MWA's 2015 UWMP.

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 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.

[27] 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

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 1-2. 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 Free Production Allowance (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.

The FPA is set as follows for each Subarea for water year 2015-2016:

- Alto Subarea - 80 percent of BAP for agriculture and 60 percent of BAP for municipal and industrial
- Oeste Subarea - 80 percent of BAP for agriculture and 60 percent of BAP for municipal and industrial (currently held in abeyance at 80 percent)
- Este Subarea - 80 percent of BAP
- Centro Subarea - 80 percent of BAP
- Baja Subarea – 50 percent of BAP

The Watermaster's 22nd Annual Report, Water Year 2014-15 (May 1, 2016) has recommended that the FPA in the Alto Subarea remains unchanged. The FPA is within 5 percent of the PSY, water levels within the Alto Subarea are relatively stable, and the Transition Zone water levels are also stable. It is noted that local water level declines in the Alto Subarea are most likely the result of drier than average water supply conditions in the past several years and not the result of over-pumping. Water production was 78,000 AF in 2013-14 and 68,000 AF in 2014-15. 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. Under existing basin conditions, rampdown is unnecessary. The water supply conditions in the Alto Subarea are sustainable. 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.

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 2009, state that the Mojave Groundwater Basin has experienced overdraft since the early 1950s.[28] 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 2014/15 Mojave Watermaster Report[29], 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

[28] The California Water Plan Update 2009 is available on DWR's website at: http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v3_southlahontan_cwp2009.pdf; references to groundwater challenges can be found in the Volume 3 Regional Update for the South Lahonton Region

[29] 22nd Annual Report of the Mojave Basin Area Water Master, Water Year 2014/15, Appendix B; report available at: http://www.mojavewater.org/annual_report.html

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.

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 accounts for the Alto Subarea as of December 31, 2015. 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

	MWA-Owned Stored Water[1] (AF)	Retailer-Owned Stored Water[2] (AF)	Total Stored Water (AF)
Alto Subarea	85,185	15,113	100,298

[1] MWA's banked groundwater storage accounts as of December 31, 2015.
[2]Retailer-owned water is owned by one of MWA's retailer agencies and consists of excess SWP purchased by MWA and then bought by the retailer.

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 (MWDSC). The amended agreement allows up to 390,000 AF of MWDSC entitlement water from the State Water Project (SWP) to be stored in the Mojave Basin. MWDSC has until December

31, 2035 to take return delivery of the water, through exchange of MWA entitlement from the SWP for delivery to MWDSC. 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 MWDSC. MWA has returned 29,000 AF to MWDSC. This program provides a benefit to the region by recharging groundwater basins at a relatively low cost to MWA using SWP water from MWDSC's entitlement, and allowing the water to be returned to MWDSC via MWA's unused SWP entitlement at no cost to MWA.[30]

- Groundwater Replenishment System: Since 2006, MWA has used the Mojave River Pipeline to recharge water to the Mojave River Basin. The pipeline can deliver up to 45,000 AFY to the Mojave Basin to offset growing depletion of natural supplies. 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. They 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.[31]

  The Oro Grande Wash Recharge Project will recharge up to 8,000 AF per year to support groundwater pumping in the western part of the Alto Subarea. Construction of the project included connecting to an existing turnout on the California Aqueduct, moss screen and metering facilities at the turnout, and a conveyance pipeline and outlet in the wash. The recharge basins will be constructed by the County of San Bernardino as part of a dual-purpose recharge and flood control detention basin. Design and construction of the recharge/flood control basin began in late 2012 and is expected to be completed by July 2016. MWA is nearing completion on the preliminary design phase for similar dual purpose recharge/flood control basins in Antelope Wash and Bandicoot Wash in the southern Alto region. MWA also initiated geotechnical and geohydrology work in the eastern Alto and Oeste Subareas that will provide better information and data to use in determining the best locations for future off-river recharge basins.[32]

- Regional Recharge and Recovery Project (R^3 Project): The R^3 Project is a conjunctive use project 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-owned production wells 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

[30] 22nd Annual Report of the Mojave Basin Area Water Master, Water Year 2014/15; report available at: http://www.mojavewater.org/annual_report.html
[31] Draft MWA 2015 UWMP, May 9, 2015, Section 3.2.4
[32] 22nd Annual Report of the Mojave Basin Area Water Master, Water Year 2014/15; report available at: http://www.mojavewater.org/annual_report.html

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. Phase 2 is planned to be completed once the capacity of the Phase 1 facilities is reached.[33]

- 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 – MWA maintains a comprehensive groundwater monitoring program to track dynamic conditions including groundwater production, storage, elevations, and quality. The program consists of over 900 monitoring wells and tracks water production within each of its five subareas. As previously noted, Adelanto lies within the Alto subarea, is relatively stable and, as a whole, appears to be in regional balance, although portions of the subarea have shown declining yields.

  According to MWA[34], 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 is expected that under current pumping conditions and long-term average flows in the river, water levels in the Floodplain Aquifer will generally remain stable. Water levels in the western portion of Alto in the Regional Aquifer have historically exhibited declines consistent with heavy pumping and limited local recharge. Currently, water levels in the western Alto area show stability or slight recovery. 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 and possibly higher localized septic return flow due to the lack of sewers in some areas. Continued pumping in depleted areas of the Regional Aquifer may result in long-term local negative impacts such as declining yields and water quality problems. As a whole, the Alto Subarea presently appears to be in relative regional balance.

  Localized declines in water levels may be ameliorated by a redistribution of groundwater production and return flows (e.g. construction of local wastewater treatment plants).

[33] Draft MWA 2015 UWMP, May 9, 2015, Section 3.5.3.1
[34] Draft MWA 2015 UWMP, May 9, 2016, Section 3.4.3.1

MWA Groundwater Management Plan [35]

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).[36] 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.

A draft update of the MWA GWMP was published in 2014, as part of the Mojave Region Integrated Regional Water Management Plan[37]. The draft update included revisions to Section 1 – Introduction of the GWMP. A full update was deferred given that the Sustainable Groundwater Management Act (SGMA) was not finalized yet. Deferring the full update would ensure that the GWMP is in full compliance with the SGMA. An update of the entire GWMP is currently being prepared and is expected to be completed by the end of 2016.

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.

[35] Draft MWA 2015 UWMP, May 9, 2016, Section 3.4.2
[36] Bulletin 118 can be found on DWR's website at:
http://www.water.ca.gov/groundwater/bulletin118/update2003.cfm
[37] MWA Draft 2014 Groundwater Management Plan -
http://www.mywaterplan.com/files/mwa_gmp_draft_toc_sect1.pdf

- 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. 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.

City of Adelanto Groundwater Wells

The City has nine currently active potable groundwater wells, one non-potable well and seven inactive wells, as shown in Table 6-4. 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).

Table 6-4: City of Adelanto Wells - All in Alto Subarea of Mojave River Groundwater Basin

Well Number	Date Drilled	Well Depth (feet)	Capacity (gpm)	Status
1G	1961	355	181	Active
2	1981	665	212	Inactive
2G	1977	75	783	Inactive
3G2	1982	74	287	Active
4	1985	569	684	Active
4G	1969	39	1,074	Active
5A	2001	352	325	Active
5G	1979	74	NA	Inactive
6	1988	461	274	Active
6G	Pre-1950	74	227	Inactive
7	1989	510	300	Active
8A	1991	658	518	Active Non-Potable
8G2	2003	180	754	Active
14	1995	64	250	Inactive
14A	2004	360	849	Active
15	2005	905	250	Inactive
16	2008	890	800	Active Non-Potable
TOTAL			**4,728**	

Source: 2007 Adelanto Water Master Plan and Monthly Production Sheet; Well 15 & 16 information provided by City Staff. Total capacity includes only active potable water capacity.

Table 6-5 presents the groundwater produced (pumped) from each well for the past five years.

Table 6-5: Groundwater Production from Active Potable Wells (AF)

Well Number	2011	2012	2013	2014	2015
1G	265	305	310	322	344
3G2	288	259	244	116	344

Table 6-5: Groundwater Production from Active Potable Wells (AF)					
Well Number	**2011**	**2012**	**2013**	**2014**	**2015**
4	157	39	91	87	0
4G	1,369	1,421	1,369	1,358	1,217
5A	350	102	105	0	0
6	284	236	407	229	33
7	357	293	352	432	465
8A*	18	0	0	0	0
8G2	1,020	1,075	732	862	91
14A	289	651	765	663	683
15	0	53	53	53	53
Emergency Interties	0	0	0	147	257
TOTAL	**4,398**	**4,434**	**4,429**	**4,569**	**4,049**

*Well 8A became inactive after January 2011.
Source: 2011 to 2016 Monthly Production Sheet.

Table 6.6 provides actual groundwater production for 2015 and estimated overall groundwater production projections for the years 2020 through 2040. Projections were estimated based on supply projections provided by MWA, anticipated area growth in population and historical production records from the City's wells.[38]

Table 6-6: Total Active Well Production – Actual 2015, Projections to 2040 (AFY)						
Groundwater	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Alto Subarea	71,300	80,346	84,767	90,163	95,747	100,823
City of Adelanto	4,049	4,578	4,872	5,292	5,737	6,195

Projections by individual well have not been provided for the following reasons:

1. Well Service Life – As noted in Table 6-4, several of the City's existing wells have been in service for over 25. The typical service life of a potable water production well is about 50 years. That being the case, it is likely some of these wells may be removed from service prior to the year 2035 and replaced with new wells constructed in future years; and

2. Not All Wells are Used Every Year – As is evident from Table 6-5, not all wells are utilized for production purposes in all years. Some of the currently inactive wells may be returned to service in future years while other currently active wells may be removed from service.

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 the region's and the City's reliance on the use of limited groundwater

[38] Draft MWA 2015 UWMP, May 9, 2016, Section 2.4

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 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 million gallons per day (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, to date the City has not been able to identify an opportunity to utilize the recycled water. Consequently, the City has not built a recycled water storage tank or 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. However, construction plans are not included in the foreseeable capital improvements plans of the City and no recycled water projections are available in the planning horizon of the UWMP.

Since Adelanto 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 Victorville Water District, 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.[39]

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

The City of Adelanto provides water and wastewater services to over 30,000 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 4.0 MGD wastewater treatment plant.[40] 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 Adelanto'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 Adelanto's customers generate wastewater roughly proportional to 60 to 70 percent of the City's water demand. Table 6-7 shows the total metered wastewater volume (2.297 MGD shown in AF) collected and treated for Adelanto in 2015.[41]

Table 6-7: Wastewater Collected Within Service Area in 2015

100%	Percentage of 2015 service area covered by wastewater collection system
90%	Percentage of 2015 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 2015	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?

[39] Draft MWA 2015 UWMP, May 9, 2016, Sections 4.3 and 4.4
[40] City of Adelanto Sewer Master Plan, December 2007, Wilson So and Associates, Chapter 3, page 3-1.
[41] PERC Water Corporation, May 2, 2016.

Table 6-7: Wastewater Collected Within Service Area in 2015						
Adelanto Public Utilities Authority	Metered	2,573	City of Adelanto	Adelanto Wastewater Treatment Facility	Yes	Yes
NOTES: WWTP third party contractor is PERC Water Corporation.						

Table 6-8 identifies the volume (2.297 MGD shown in AF [2,573]) of treated wastewater discharged within the service area, which is consistent with Table 6-7.

Table 6-8: Wastewater Treatment and Discharge Within Service Area in 2015										
							2015 volumes (AF)			
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
Adelanto Wastewater Treatment Facility	Adelanto Wastewater Treatment Facility	North end of City, cross streets Jonathan and Auburn	6B369805001	Other	No	Secondary, Undisinfected	2,573	2,573	0	0

Table 6-9 shows projected wastewater flows generated within the City's service area through 2040. The estimates included in Table 6-9 compare favorably with similar estimates in the City of Adelanto Sewer Master Plan (December 2007).

Table 6-9: City of Adelanto Historic and Projected Wastewater Collection (AFY)						
	2015	2020	2025	2030	2035	2040
Potable Water Demand	4,049	4,578	4,872	5,292	5,737	6,195
Est. Volume of Wastewater Collected	2,573	2,976	3,167	3,440	3,729	4,027

Note: 2015 is actual demand from Table 4-1; wastewater collected is assumed equal to 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 was not completed during the 2010-2015 planning period. 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. Further, capital improvement plans do not currently include projections of completion of the recycled water infrastructure improvements in the planning horizon of the 2015 UWMP; however, there is a proposed Bond Measure that includes completing recycled water Title 22 water and transmission lines. The UWMP will be updated when this information is confirmed.

Therefore, Current and Projected Recycled Water Direct Beneficial Uses within the Service Area is not included in this UWMP.

Table 6-10 shows the planned versus actual use of recycled water in AF from the 2010 UWMP for the year 2015.

Table 6-10: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual (AFY)

Use Type	2010 Projection for 2015	2015 actual use
Landscape irrigation (excludes golf courses)	1	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.		

6.3.4 Actions to Encourage and Optimize Future Recycled Water Use

In addition to the City of Adelanto'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, California's Proposition 13 Water Bond 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. When 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 6-11 shows the potential methods or actions to expand future recycled water use.

Table 6-11: Methods to Expand Future Recycled Water Use

Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use
Incentives	Schools and Parks	TBD	TBD
Incentives	Golf Courses and Cemeteries	TBD	TBD
Building Code Modification	Commercial	TBD	TBD
Ordinances	Highways and Medians	TBD	TBD
		Total	**TBD**

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]). Adelanto'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.[42]

However, should a future opportunity emerge for MWA and/or the City to consider development of desalination, these potential future supply opportunities are described below, including opportunities for desalination of brackish water, groundwater, and seawater.

[42] Draft MWA 2015 UWMP, May 9, 2016

Brackish Water / Groundwater Desalination. As discussed in Section 6.9, the groundwater supplies in the Mojave Basin 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 and potentially cause subsidence. However, an option to consider is for 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. A list summarizing the groundwater desalination plans of other SWP contractors is not available; however, MWA would begin this planning effort should the need arise.[43]

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. In this case, local groundwater desalination facilities would be projects implemented by retailers of SWP contractors and, if an exchange program was implemented, would involve coordination and wheeling of water through the contractor's facilities to MWA.

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 Exchanges or Transfers

During normal operation of the water system, there are no transfers or exchanges of water within the Adelanto's service area. However, as described in Section 6.2, the City's water system has two available interties with VWD, which are used on rare occasion. The last significant use of the intertie was in 2008 to fill the City's new 5 MG reservoir, followed by some additional use in 2014 (147 AF) and 2015 (262 AF), both due to well maintenance on two wells to ensure the ability to meet demands. The temporary transfer amounts are shown in Table 6-2.

One intertie is located on Air Expressway Boulevard just east of Highway 395. That intertie is a two-way connection from which Adelanto and VWD can both obtain and provide water. The second intertie is located near the intersection of Bellflower Street and Olivine Road. That intertie only allows one way flow from VWD to Adelanto. These two interties provide a potential additional source of water in case of a shortage or emergency. However, the City of Victorville also obtains all of its water from the local groundwater supply, and thus its reliability is also tied directly to the reliability of the groundwater supply.

[43] Ibid

Because Adelanto 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.

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 Adelanto's service area. Water use efficiency measures (demand management measures) described in Section 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.

The City has identified a number of capital projects aimed at improving the City's water supply reliability and enhancing the operations of the City's facilities. These projects, which are referenced in the City's Capital Improvement Program, include:

1. Water Well 14A Upgrade – Well 14A would be redirected through the water treatment plant to provide treatment for high Manganese. Total design and construction cost for this project have been estimated at $20,000. *Status:* Piping and pump design are under review.

2. Upgrade Electrical Switch Gear Booster and Booster 1200 B1Motor Replacement – The electrical switch gear booster 1200 and the B1 motor have surpassed their useful life. Upon failure of this equipment, the City could lose up to 65 percent of its water delivery. Total design and construction cost for this project have been estimated at $425,000. *Status:* Reviewing feasibility and cost estimates for electrical design.

3. Well 5A Rehabilitation – Well 5A was vandalized in 2013 and is currently inactive as shown in Table 6-5. A new motor and variable frequency drive system are needed. Activating this well will allow the City to access additional local groundwater and maintain a reliable supply of water into the future. Total design and construction cost for this project have been estimated at $215,000. *Status:* Reviewing feasibility and cost estimates for well design and rehabilitation.

4. Well 6 Rehabilitation – Well 6 pump and motor are at the end of their useful life and are inoperable. The well pumped only 33 AF in 2015 as shown in Table 6-5 and is currently inactive. Activating this well will allow the City to access additional local groundwater and maintain a reliable supply of water into the future. Total design and construction cost for this project have been estimated at $269,000. *Status:* Completed.

5. Reservoir Mixers – The installation of reservoir mixers at five reservoirs will eliminate stratification and help maintain water quality, as well as more consistent CL2 (chlorine) residual. Total design and construction cost for this project have been estimated at $192,500. *Status:* Feasibility is complete and obtaining approval.

6. Water Treatment Plant Project – The City has access to the State Project Water via the Barstow Pipeline, but before the surface water can be utilized, it must first be treated. The utilization of the State Project Water in future years will be important in meeting the City's future development needs. To assist in meeting that need, this project envisions design and development of a water treatment facility to treat SWP to meet safe drinking water standards as well as the extension of transmission lines to connect that source to the City's distribution grid. Total design and construction costs for this project have been estimated at $11.75 million. *Status:* Studying feasibility.

7. Water Reclamation Pipeline and Storage Project – As discussed in further detail in Section 6.3, the City has been exploring construction of a recycled water system as an alternative source of water for irrigation and other non-potable uses. This project would involve the design and development a waste water 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.

8. Water Storage Reservoir Zone 3 Tank Site Project - The City has identified the need to expand existing storage capacity to meet future peak demands relating to the potential development of a new prison facility. The City has additional space at the existing storage facilities in pressure zone three. This project will include design and construction of one to two additional storage reservoirs. Total design and construction costs for this project have been estimated at $4.5 million. *Status:* Reviewing feasibility.

9. Supervisory Control and Data Acquisition System (SCADA) – A SCADA system is envisioned to automatically operate the City's water treatment plant, wells, and storage reservoirs. SCADA controls the on-off operation of the wells and booster pumps, alerts staff to malfunctions and their location, generates reports, provides storage reservoir water levels, and other data, which will contribute to the increased reliability of the overall water system. The proposed system will replace an existing system, which is over 15 years old, obsolete, and inefficient, suffers from frequently malfunctions and requires semi-automatic or manual operation. Total design and construction costs for this project have been estimated at $400,000. *Status:* The City released a Request for Proposals for a SCADA system and proposal received are currently under review.

10. Valve Operator & GIS Software – Valve operators have been identified as a means to more efficiently exercise the City's water valves. The Geographic Information System (GIS) software, in conjunction with handheld Geographic Positioning (GPS) devices will be used to identify the locations of these valves. Total implementation costs for this

project has been estimated at $30,000. *Status:* Valve operators remain under consideration; the GIS software has been purchased and is in place; and the GPS handheld devices remain in the budget to be purchased.

11. Utility Vacuum – A 500-gallon utility vacuum would be used during water line breakages and valve box clean-outs. This vacuum would facilitate water system repairs and enable the system to be returned to operation quickly. The vacuum would also be used to pothole or locate water lines on an as-needed basis. Purchase of this equipment is estimated to cost $60,000. *Status:* Studying feasibility.

Regional Agency Projects and Programs

The 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.

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 2015 UWMP includes a list of basin management strategy projects that will improve water reliability within the Mojave Basin Area. Details of the following basin management strategies are included in section 6.2.1 Groundwater, Basin Management Strategies on page 6-11.

1. Groundwater storage and banking programs
2. Groundwater replenishment system, including Oro Grande Wash Recharge Project
3. Regional Rehabilitation and Recovery Project (R3 Project)
4. Treated wastewater recharging
5. Groundwater monitoring

6.7 Summary of Existing and Planned Sources of Water

Table 6-12 shows the City's existing and planned sources of reasonably available water through 2040.

Table 6-12: City of Adelanto – Existing and Planned Sources of Water (AFY)						
Water Supply Source	Existing	Planned/Projected				
	2015	2020	2025	2030	2035	2040
Groundwater Production[2]	3,787	9,300	10,444	11,581	12,640	13,750
Groundwater Transfer - Intertie with VWD[3]	262	0	0	0	0	0
Total	**4,049**	**9,300**	**10,444**	**11,581**	**12,640**	**13,750**

[1] 2015 UWMP Guidebook Excel Table 6-8 Water Supplies – Actual and Table 6-9 Water Supplies – Projected.
[2] Mojave Groundwater Basin (see footnote 22); consistent with Tables 6-2 and 6-5.
[3] Transfers between VWD and the City is also from groundwater; future year projections are determined annually and cannot be projected.

6.8 Climate Change Impacts to Supply

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 the hydrologic cycle.

DWR's California Water Plan Update 2013 (CWP) considers how climate change may affect water availability, water use, water quality, and the ecosystem.[44] Volume 1, Chapter 5 of the California Water Plan, "Managing an Uncertain Future," evaluated how statewide and regional water demands that might change by 2050 in response to uncertainties both gradual and sudden. The uncertainties will play out differently across the regions of California. Each region will need to develop a portfolio of resource management strategies that consider regional water-management challenges and can be implemented to address regional issues.

The effects of climate change may increase the occurrence of droughts and floods. The 2015 Delivery Capability Report[45] was released by the State of California Natural Resources Agency, Department of Water Resources to inform the public about the capabilities and operation of the SWP in the face of such uncertainties. Delta risk management and anticipation of sea level rise are among the policies and planning efforts regarding climate change.

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.

[44] California Water Plan Update 2013 Investing in Innovation & Infrastructure: Bulletin 160-13.
[45] State Water Project Final Delivery Capability Report, 2015 - State of California Natural Resources Agency, Department of Water Resources

MWA prepared a Climate Change Assessment as part of the Mojave Integrated Regional Water Management Plan, Final June 2014 Report, which describes the potential effects of climate change, the region's vulnerability to climate change, and potential strategies for adapting to climate change.

A thorough discussion of climate change impacts to the City's water supply is presented in Section 3.4 Potential Effect of Climate Change, page 3-9.

6.9 WATER QUALITY OF EXISTING SOURCES

As required by the Safe Drinking Water Act, which was reauthorized in 1996, the City provides annual Water Quality Reports to its customers; also known as Consumer Confidence Reports (CCR) (Appendix K). This mandate is governed by the Environmental Protection Agency (EPA) and the California Department of Public Health (CDPH) to inform customers of their drinking water quality. In accordance with the Safe Drinking Water Act, the City monitors a number of regulated and unregulated compounds in its water supply, as noted in the City's most recent (2014) CCR.

6.9.1 Imported Water

As previously noted, during normal operation of the water system, there are no transfer exchanges of imported water within the City's service area. The City does not typically import water from either of its two emergency interties with VWD; however, it recently received receive water through interties in 2013 and 2015.

Although Adelanto does not supply imported water to its customers, if the City exceeds its FPA and purchases replacement water from MWA, then MWA will recharge the basin with imported SWP water and recycled wastewater. The City's usage therefore has a direct effect on the volume of water that MWA recharges into the basin. The imported SWP water and wastewater are significant factors in the water quality of the Mojave River Groundwater Basin. Since the Mojave River Basin is essentially a closed basin, many contaminants from imported water will remain in the basin.

6.9.2 Groundwater

MWA maintains a comprehensive groundwater monitoring program consisting of over 900 monitoring wells in their service area. The impairment of groundwater for the beneficial use of drinking water is determined by comparing concentrations of constituents of concern in the groundwater against drinking water maximum contaminant levels (MCLs) and agricultural water quality parameters needed for specific crops. MCLs consist of primary and secondary MCLs. Primary MCLs are assigned to constituents for which a health-based risk is associated with consumption of water that exceeds a particular concentration. Secondary MCLs are assigned to constituents for which there is no considered health risk, but for which there may be aesthetic concerns such as taste, odor, color, etc. above a particular concentration.

There are numerous groundwater quality issues within the MWA service area. Key groundwater constituents of concern include arsenic, nitrates, iron, manganese, Cr-VI, fluoride, and total dissolved solids (TDS). Some of these constituents are naturally occurring

in desert environments while others are associated with human (anthropogenic) activities. Measurements in excess of drinking water standards have been found for some of these constituents within the Mojave River Basin and the Morongo Basin. Groundwater in these areas may have to be treated prior to consumption. Contaminant constituents of concern are addressed in further detail below.

Salinity

Because the Mojave River Basin is essentially a closed basin, salinity is a concern because salt contained in imported recycled wastewater and SWP supplies remain in the basin. Water from the SWP generally is low in salinity, with Total Dissolved Solids (TDS) averaging 250 mg/L over the long term in water supplied through the East Branch and 325 mg/L in water supplied through the West Branch. However, salinity in wastewater imports can be high.

Because SWP water and wastewater imports to the Mojave River Basin will be long term and persistent, MWA and the Lahontan regional Water Quality Control Board completed a cooperative study in 2007 to address salt balance within the MWA service area. The report basically showed that importation of SWP water mitigated the long-term effects of increased TDS primarily caused by population increases and the associated larger volumes of wastewater entering into the basins.

In December 2015, MWA completed a Salt and Nutrient Management Plan (SNMP), which provides an evaluation of potential groundwater quality issues that may result from sources of salts and nutrients and determine if these constituents would unreasonably degrade groundwater quality and potentially decrease the beneficial uses of groundwater within the basin. For the MWA SNMP, TDS and nitrate were analyzed as appropriate indicator constituents of salts and nutrients (S/Ns). These two constituents are the focus of the characterization of existing S/N groundwater quality.

Total salinity is commonly expressed in terms of TDS as milligrams per liter (mg/L). TDS concentrations in the groundwater are influenced by the chemistry of the aquifer and quality of water recharging the aquifer. TDS is not a health hazard at typical groundwater concentrations but can be an aesthetic issue and can shorten the useful life of pipes and water-based appliances in homes and businesses. TDS monitoring data are widely available for source waters (both inflows and outflows) in the service area, and because TDS is a general indicator of total salinity, TDS is an appropriate indicator of salt loading. TDS can be an indicator of anthropogenic impacts, but there are also naturally occurring background TDS concentrations in groundwater. The background TDS concentrations in groundwater can vary considerably based on purity and crystal size of the minerals, rock texture and porosity, the regional structure, origin of sediments, the age of the groundwater, and other factors.

TDS concentrations generally increase in downgradient portions of the Mojave River Basin and along groundwater flowpaths away from the primary recharge source in the basin, the Mojave River. Elevated TDS concentrations (greater than 1,000 mg/L) are generally associated with natural processes including mineralization and evaporation beneath dry lake beds.

The recommended Secondary MCL for TDS is 500 mg/L with an upper limit of 1,000 mg/L and a short-term limit of 1,500 mg/L. MWA monitoring indicates TDS levels of 421 mg/L in the Alto Subarea.[46] According to the City's 20014 CCR, TDS levels in Adelanto varied from 94 to 350 mg/L and averaged 176 mg/L.

Arsenic

Arsenic, which has been linked to certain cancers and skin conditions, is a naturally occurring element found in rocks, soil, water, and air. Arsenic from these sources can enter the water supply through the natural erosion of rocks, as well as the dissolution of ores and minerals. Arsenic can also be found in wood preservatives, alloying agents, certain agricultural applications, semi-conductors, paints, dyes, and soaps. Agriculture and industrial discharges from these sources can contribute to elevated levels of arsenic in drinking water supplies.

The federal MCL for arsenic in domestic water supplies of 10 µg/L has been in effect since January 2006 and California's revised arsenic MCL of 10 µg/L became effective on November 28, 2008 for both groundwater and surface water supplies. Previous California and federal MCLs for arsenic were 50 µg/L.

In April 2004, based on reported lung and urinary bladder cancer risk data, California's Office of Environmental Health Hazard Assessment (OEHHA) set a public health goal (PHG) for arsenic of 0.004 µg/L, to correspond to a *de minimis* cancer risk level. Arsenic can also result in a number of non-cancer effects at higher levels of exposure (e.g., vascular effects or skin effects), but the cancer risk is the most sensitive endpoint, and the basis for the PHG.

Monitoring results reported on CDPH's website for the period 2002-2005 showed arsenic is ubiquitous in drinking water sources, reflecting its natural occurrence. Those results also show many sources have arsenic levels above the 10 µg/L MCL (e.g., Southern California drinking water sources containing arsenic concentrations over 10 µg/L include San Bernardino (64 sources), Los Angeles (48 sources), Riverside (26 sources), Orange (4 sources), and San Diego (5 sources)).[47]

According to the City's 2014 CCR, arsenic levels in Adelanto varied from non-detect to 10 µg/L and averaged .48 µg/L, all of which are below the MCL.

In 2010, arsenic was detected in Well 8A with a concentration of 39 µg/L. That well was removed from service at that time and remains out of service until appropriate mitigation measures can be taken or the contaminant level drops below the MCL. In addition, the City's 2014 CCR reports that arsenic levels in Well 4 were found to exceed the MCL of 10 ppb (10 µg/L). Well 4 water is being blended with well waters with low levels of Arsenic to produce finished water below the MCL for Arsenic. A blending plan for Arsenic was submitted to CDPH in 2013.

[46] Draft MWA 2015 UWMP, May 9, 2016

[47] CDPH: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Arsenic.shtml - note the numbers reported on this site can change as the site is updated.

Chromium

Like arsenic, chromium is a naturally occurring element found in rocks, soil, plants, and animals. Chromium III is typically the form found in soils and is an essential nutrient that helps the body use sugar, protein, and fat. Chromium VI is used in a number of industrial applications including electroplating, stainless steel production, leather tanning, textile manufacturing, dyes and pigments, wood preservation and as an anti-corrosion agent. Chromium occurs naturally in deep aquifers and can also enter drinking water through industrial discharges. In drinking water, chromium VI is very stable and soluble, whereas chromium III is not very soluble. Chromium VI is the more toxic form and is known to cause lung cancer in humans when inhaled, but the human health effects from ingestion are still a subject of conjecture.

The MCL for chromium VI is 10 ug/L became effective on July 1, 2014. According to the City's 2014 CCR, chromium levels in Adelanto were non-detectable to 12 ug/L with an average of 3.94 ug/L, which is below the MCL.

Nitrates

Nitrate is a widespread contaminant in California groundwater. In drinking water, high nitrate levels can have acute health problems in infants less than six months old, causing a condition called methemoglobinemia, commonly known as "blue baby syndrome". Long-term health impacts in adults are not well-known, although some experts believe that long-term ingestion of water high in nitrate may increase the risk of certain types of cancer. High levels of nitrate in groundwater are associated with agricultural activities, septic systems, confined animal facilities, landscape fertilization, and wastewater treatment facilities. Nitrate does occur naturally in groundwater; however, natural nitrate levels in groundwater are generally very low (typically less than about 10 mg/L as nitrate (NO3)).

The MCL for nitrate in domestic water supplies are:[48]

- 45 (mg/L) for nitrate as NO3 (equivalent to 10 mg/L for nitrate as nitrogen (N))
- 10 mg/L for nitrate plus nitrite as N
- 1 mg/L for nitrite as N

Monitoring data sent to CDPH from 2002 to 2005 showed that many sources in California have high nitrate levels above MCLs. Nitrate as NO3 was detected at least once above its MCL in 731 sources (San Bernardino with 82 sources), nitrate + nitrite as N was detected at least once above its MCL in 169 sources (San Bernardino with 38 sources), and nitrite as N was detected at least once above its MCL in 21 sources. However, MWA sampling data indicates an average NO3 level of 2.5 mg/L, which is well below the MCL.[49]

According to the City's 2014 CCR, Nitrate levels in Adelanto varied from non-detect to 12 mg/L and averaged 3.94 mg/L, which is below the MCL.

[48] CDPH: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Nitrate.shtml - note the numbers reported on this site can change as the site is updated.
[49] Draft MWA 2015 UWMP, May 9, 2016 and MWA 2014 Consumer Confidence Report: https://www.mojavewater.org/files/CCR2014.pdf

As presented in the City's 2014 CCR, the City failed to monitor as required for drinking water standards for Nitrate during 2014 and, therefore, was in violation of the regulations. Even though this failure was not an emergency, the City's customers have a right to know what they should do, what happened, and what the City did to correct this situation.

The City is required to monitor drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not its drinking water meets health standards. During 2014, the City not complete all monitoring for Nitrate and therefore, cannot be sure of the quality of its drinking water during that time.

Nitrate samples are required to be taken annually from source water wells used for potable water consumption. During 2014, five of the ten wells were sampled for Nitrate and five were not. The latter five wells are utilized intermittently during the year on an as-needed basis; one well was out of service for maintenance issues and samples were not taken from that well. The remaining four wells were not sampled in accordance with the required sampling frequency.

Currently, one well remains out of service for maintenance and will be sampled when the well is returned to service. The remaining four wells were sampled on June 2, 2015. The results from Nitrate sampling was "non-detect" respectively for these wells. Nitrate sampling met water quality standards.

Methyl Tertiary-Butyl Ether (MTBE)

MTBE was the primary oxygenate in virtually all the gasoline used in California, prior to discovering it contaminated groundwater supplies and was found in surface water supplies. Following that discovery, MTBE was banned in California as of December 31, 2003 and was subsequently replaced by ethanol, which is now the primary oxygenate in use. In 2000, CDPH adopted a primary MCL of 13 µg/L for MTBE based on carcinogenicity studies in animals. MTBE has a California secondary MCL of 5 µg/L, which was established based on taste and odor concerns.[50]

MTBE is a serious threat to groundwater because it is very soluble in water and has low affinity for soil particles, so it moves quickly into the groundwater. Unfortunately, MTBE is also resistant to chemical and microbial degradation in water, thereby making treatment more difficult than that employed to remove other gasoline components. However, a combination of an advanced oxidation process (typically ozone and hydrogen peroxide) followed by granular activated carbon has been found to be effective in reducing the levels of these contaminants.

MWA's 2004 Regional Management Plan indicates that MTBE is not a concern in the Alto Subarea. Improved underground storage tank requirements and monitoring procedures, as well as the phase-out of MTBE as a fuel additive decreased the likelihood of MTBE groundwater problems. As a result, both the MWA 2015 UWMP and the Mojave Region IRWM Plan (June 2014) do not include a discussion on MTBE.

[50] CDPH: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/MTBE.shtml - note the numbers reported on this site can change as the site is updated periodically.

Manganese and Iron

Iron and manganese are both naturally occurring elements in groundwater and often occur together. High levels of these contaminants in drinking water are not known to pose direct adverse neurotoxic health risks. Children are considered to be particularly susceptible to possible effects of high levels of manganese exposure because they absorb and/or retain more manganese than adults.

However, high levels of iron and manganese in drinking and irrigation water can be associated with aesthetic issues and can cause damage and reduced effectiveness of water distribution and treatment systems. Within the region, iron and manganese levels have been detected above the MCL in the Centro Subarea along the Mojave River in the vicinity of Barstow, in the Alto TZ subbasin, and in localized areas of the Morongo Subarea. Localized elevated concentrations of manganese were also identified in Lucerne Valley in the Este Subarea.

Manganese is regulated by a 50 µg/L (.05 mg/L) secondary MCL. Monitoring data sent to CDPH showed that about 20 percent of drinking water sources monitoring for manganese have reported detections greater than the 0.05- mg/L secondary MCL.[51] According to the City's 2014 CCR, all Manganese samples taken in Adelanto were non- detect to 1.0 ug/L.

Iron in drinking water is typically not considered hazardous to health and is considered a secondary or aesthetic contaminant. The MCL for iron in water is currently 300 µg/L and is based on taste and appearance, rather than detrimental health effects. According to the City's 2014 CCR, Iron levels in Adelanto varied from non-detect to 20 µg/L, all of which were below the MCL. Filtration treatment is required for Iron and Manganese for wells 1G, 3G2, 4G, and 8G2.

Groundwater Quality Protection

In recognition of the serious threat posed by groundwater contamination, MWA implements groundwater protection activities to maintain the groundwater and the aquifer and ensure a reliable high quality supply. These activities include water quality monitoring, managing recharge site activities, hazardous materials response, and education and coordination with local agencies.

6.10 WATER QUALITY EFFECT ON WATER MANAGEMENT STRATEGIES AND SUPPLY RELIABILITY

The previous section summarized the general water quality issues that may be associated with water extracted from the Alto Subarea. As noted in MWA's 2015 UWMP,[52] water quality does not materially affect water supply reliability in the region. The City has not experienced any significant water quality problems in the past and does not anticipate any significant changes in the future, due in large part to the mitigation actions undertaken by MWA.

[51] CDPH: http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Manganese.shtml
[52] Draft MWA 2015 UWMP, May 9, 2016, and MWA 2014 Consumer Confidence Report: https://www.mojavewater.org/files/CCR2014.pdf

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7.0 WATER SUPPLY RELIABILITY

Assessment of water supply reliability is complex and dependent upon a number of factors, such as the number of water sources, regulatory and legal constraints, climate change, and expected growth, among others. Reliability of water supplies is based upon known information by the City and its water supplier at the time this 2015 UWMP was prepared.

Water supply reliability describes the long-term reliability of the City's water supplies. Shorter term reliability planning that may require immediate action, such as drought or a catastrophic supply interruption, is addressed in Chapter 8, Water Shortage Contingency Planning.

The Southern California region faces a challenge in satisfying demands and securing firm water supplies. Increased environmental regulations and the competition for water from outside the region have exacerbated these challenges. Continued population and economic growth has also led to increased regional water demands, which results in larger demands on local supplies.

Reliability is a measure of a water system's expected success in meeting the demands both in normal years and in years of water shortages. This section provides a description of the City's efforts in maintaining an adequate and reliable water supply and MWA's efforts in maintaining the region's groundwater supply in the Mojave Basin Area. In normal years, the City obtains all of its water supply from local groundwater aquifer. Given the City's total reliance on groundwater, the reliability of the City's water supply is thus entirely dependent on the reliability of the groundwater in the Mojave River Basin managed by MWA. Based on MWA's analysis, MWA has adequate supplies to meet demands during average, single-dry, and multiple-dry years throughout the 25-year planning period.[53]

Almost all of the water used within MWA's service area is supplied by pumped groundwater. To supplement the local groundwater supplies, MWA recharges the groundwater basins with SWP imported water, natural surface water flows, wastewater imports from outside MWA's service area, agricultural depletion from storage, and return flow from pumped groundwater not consumptively used. MWA's sources are only used to recharge the groundwater basins and are not supplied directly to any retailers, with the exception of two power plants, the High Desert Power Project and the LUZ Solar Plant.

MWA is actively operating recharge sites along their Mojave River Pipeline and Morongo Basin Pipelines. Their current recharge sites include Hodge, Lenwood, Daggett, Newberry Springs, and Rock Springs Outlet. These recharge sites provide MWA with the ability to recharge SWP water into subareas where replacement water is purchased, as well as the ability to bank excess SWP water, when available.

State funding has been made available, through California voters' approval, to increase reliability of state water supplies. In March 2000, California voters approved Proposition 13, which authorized the State to issue $1.97 billion of its general obligation bonds for water

[53] Draft MWA 2015 UWMP, Section 6 Reliability Planning, May 9, 2016

projects. Additionally, California voters approved Proposition 50 in November 2002, Proposition 84 in November 2006, and Proposition 1 in November 2014, which authorized the issuance by the State of $3.4 billion, $5.4 billion, and $7.545 billion, respectively, of general obligation bonds for water projects. Types of water projects eligible for funding under the Propositions include, but not limited to, water conservation, surface and groundwater storage, water treatment, water quality, ecosystem and watershed protection and restoration, drinking water protection, and Colorado River water management projects.

7.1 Constraints and Strategies on Water Sources

Each water supply source has its own reliability characteristics. In any given year, the variability in weather patterns around the state may affect the availability of supplies to the region differently. The City's service area is typical in terms of water management in southern California: local groundwater supplies are used almost exclusively in the region; imported water is recharged when available to sustain the local groundwater production; and local groundwater production is fairly consistent but availability of imported supplies are tied to annual climate conditions in northern California. This pattern of "conjunctive use" has been in effect since SWP supplies first came to the MWA's service area in 1978. SWP supplies have supplemented the overall supply of the MWA service area, which previously depended solely on local groundwater supplies.

7.1.1 Imported Water Source

MWA was formed to manage water resources within its service area, which encompasses the City of Adelanto. In this capacity, MWA has been planning and implementing projects to increase water supply reliability and prevent future water shortages.

To supplement the local groundwater supplies, MWA contracts with DWR for delivery of SWP water, providing an imported water supply to the groundwater basins. The SWP is owned and operated by DWR. The reliability of the SWP impacts MWA member agencies' ability to plan for future growth and supply, meeting the overall water supply needs for the region. On an annual basis, each of the 29 SWP contractors, including MWA, request an amount of SWP water based on their anticipated yearly demand. While the groundwater basin's available supply sources has some variability, the variability in SWP supplies has the largest effect on overall annual supply reliability. This annual variability is mitigated through the use of the groundwater aquifer by pre-storing SWP water when it is available.[54]

Each SWP contractor's Water Supply Contract contains a "Table A" amount that identifies the maximum amount of water that the contractor may request as specified in the contract between the DWR and the contractor. However, the amount of SWP water actually allocated to contractors each year is dependent on a number of factors that can vary significantly from year to year. The primary factors affecting SWP supply availability include hydrologic conditions in northern California, the amount of water in SWP storage reservoirs at the beginning of the year, regulatory, environmental and operational constraints, and the total amount of water requested by the contractors. The availability of SWP supplies to MWA and the other SWP contractors is generally less than their full Table A amounts in many

[54] SWP reliability discussion is based on information in the Draft MWA UWMP, May 9, 2016.

years and can be significantly less in very dry years, as shown in the last few years. Table 7-1 lists the historical SWP deliveries to MWA.[55]

Table 7-1: SWP Historical Deliveries to MWA

Year	Full MWA Table A Amount (AF)	Actual SWP Delivery to MWA (AF)	MWA Percent of Full Table A Amount	Final Statewide SWP Allocation
1981	22,843	0	0%	100%
1982	34,300	0	0%	100%
1983	36,700	24,489	67%	100%
1984	39,000	0	0%	100%
1985	41,400	0	0%	100%
1986	43,700	0	0%	100%
1987	46,000	0	0%	100%
1988	48,500	0	0%	100%
1989	50,800	0	0%	100%
1990	50,800	0	0%	100%
1991	50,800	3,423	7%	35%
1992	50,800	10,674	21%	45%
1993	50,800	11,487	23%	100%
1994	50,800	17,652	35%	50%
1995	50,800	8,740	17%	100%
1996	50,800	7,427	15%	100%
1997	50,800	14,040	28%	100%
1998	75,800	5,892	78%	100%
1999	75,800	8,071	11%	100%
2000	75,800	11,362	15%	90%
2001	75,800	4,320	6%	39%
2002	75,800	4,218	6%	70%
2003	75,800	39,242	52%	90%
2004	75,800	12,840	17%	65%
2005	75,800	33,323	44%	90%
2006	75,800	33,927	45%	100%
2007	75,800	20,064	26%	60%
2008	75,800	17,007	22%	35%
2009	75,800	21,528	28%	40%
2010	82,800	22,364	27%	55%
2011	82,800	*undetermined*	*undetermined*	80%
2012	82,800	*undetermined*	*undetermined*	65%
2013	82,800	*undetermined*	*undetermined*	20%
2014	82,800	*undetermined*	*undetermined*	35%
2015	85,800	8,909	10%	20%

MWA's current full Table A amount is 85,800 AFY in 2015 and will increase to 89,800 AFY between 2020 and 2040. Increases in MWA's Table A amount between 2009 and 2035 are

[55] Full Table A data extracted from DWR/MWA contract with Amendments through 10/12/2009 at: http://water.ca.gov/swpao/docs/wsc/MWA_O_C.pdf. SWP Delivery data extracted from MWA's Draft 2015 UWMP, May 9, 2016; 2015 water delivery data: http://www.mojavewater.org/water-deliveries.html;

from a 14,000 AFY purchase from Dudley Ridge Water District.
DWR prepares a biennial report to assist SWP contractors and local planners in assessing the near and long-term availability of supplies from the SWP. DWR issued its most recent update, the 2015 DWR State Water Project Delivery Capability Report (DCR), in July 2015. In the 2015 update, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2015 UWMPs. The 2015 DCR includes DWR's estimates of SWP water supply availability under both current and future conditions.

DWR's estimates of SWP deliveries are based on a computer model (CalSim II) that simulates monthly operations of the SWP and Central Valley Project (CVP) systems. Key assumptions and inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations, and projected contractor demands for SWP water. For example, the 2015 DCR uses the following assumptions to model current conditions: existing facilities, hydrologic inflows to the model based on 82 years of historical inflows (1922 through 2003), current regulatory and operational constraints, and contractor demands at maximum Table A amounts.

To evaluate SWP supply availability under future conditions, the 2015 DCR included four model studies. The first of the future-conditions studies, the Early Long Term (ELT) scenario, used all of the same model assumptions for current conditions, but reflected changes expected to occur from climate change, specifically, a 2025 emission level and a 15 cm sea level rise. The other three future conditions include varying model assumptions related to the Bay Delta Conservation Plan/California Water Fix (BDCP), such as changes to facilities and/or regulatory and operational constraints.

In spring 2015, DWR announced that BDCP would move from a Section 10 permit to a Section 7 permit process under the Federal Endangered Species Act. As a practical matter, this split the project into two distinct parts known as Cal WaterFix (Alternative 4A), the conveyance portion, and Cal EcoRestore, the restoration portion. Cal WaterFix is Alternative 4A in the recirculated environmental document, and the preferred alternative. Alternative 4A is different than any of the future scenarios modeled by DWR in the DCR. While there is widespread support for the BDCP/Cal WaterFix project, it would be speculative at this time to assume they will move forward. While there is significant support for BDCP, plans are currently in flux – environmental review is ongoing and is not anticipated to be final until at least 2016, and several regulatory and legal requirements must be met prior to construction.

For purposes of the MWA UWMP, the ELT scenario analyzed in DWR's 2015 DCR is deemed to be the most conservative and appropriate study to use for long-term planning estimates of future SWP supply availability. The ELT scenario, based on existing facilities and current operations, adjusted for the expected effects of climate change, is consistent with the studies DWR has used in its previous SWP Delivery Reliability Reports for supply availability under future conditions. Therefore, future SWP supply availability is based on the ELT study included in the 2015 DCR. In the 2015 Report, DWR presents the results of its analysis of the reliability of SWP supplies, based on model studies of SWP operations. In general, DWR model studies show the anticipated amount of SWP supply that would be available for a given SWP water demand, given an assumed set of physical facilities and operating constraints, based on more than 80 years of historic hydrology. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of

hydrologic conditions, for that assumed set of physical facilities and operating constraints. DWR presents the anticipated long-term average SWP delivery reliability as a percent of full contractor Table A amounts, which is 62 percent of Table A as the long-term average supply.

The extremely dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. Water year 2013 was a year with two hydrologic extremes.[56] October through December 2012 was one of the wettest fall periods on record, and was followed by the driest consecutive 12 months on record. Accordingly, the 2013 SWP supply allocation was a low 35 percent of SWP Table A amounts. The 2013 hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was an extremely dry year, with runoff for water year 2014 the fourth driest on record. Due to extraordinarily dry conditions in 2013 and 2014, the 2014 SWP water supply allocation was a historically low 5 percent of Table A amounts. The dry hydrologic conditions that led to the low 2014 SWP water supply allocation were extremely unusual, and to date have not been included in the SWP delivery estimates presented in DWR's 2015 Delivery Capability Report.[57] It is anticipated that the hydrologic record used in the DWR model will be extended to include the period through 2014 during the next update of the model, which is expected to be completed prior to issuance of the next update to the biennial SWP Delivery Capability Report. For the reasons stated above, the MWA UWMP uses a conservative assumption that a 5 percent allocation of SWP Table A amounts represents the "worst case" scenario.

For the MWA UWMP, the availability of SWP supplies to MWA was estimated by multiplying MWA's Table A amount (85,800 AFY in 2015 and 89,800 in 2020) by the delivery percentages from the 2015 DCR, discussed below. DWR analyses projected that the SWP deliveries during multiple-dry year periods could average about 33 percent of Table A amounts and could drop as low as 11 percent during an unusually dry single year. Table 7-2 summarizes the estimated SWP supply availability in a single dry year (based on a repeat of the worst-case historic hydrologic conditions of 1977) and over a multiple dry year period (based on a repeat of the worst-case historic four-year drought of 1931-1934).

Table 7-2: SWP Supply Availability

SWP	Average Year	Single Dry Year (1977)[a]	Single Dry Year (2014)[b]	Multiple Dry Years[c]
2015 - % of Table A Amount Available	62%	11%	5%	33%
2020 - % of Table A Amount Available	62%	11%	5%	33%

(a) The percentages of Table A amount projected to be available are taken from Table 6-3 of the 2015 DCR. Supplies are calculated by multiplying MWA's Table A amount of 85,800 AF (2015) or 89,800 AF (2020) by these percentages. Maximum Table A amount is referenced from DWR Bulletin 132.
(b) Based on the 2015 DCR historic single dry year of 1977.
(c) Based on worst-case single dry year of 2014, which is not captured in the 2015 DCR.

[56] A water year begins in October and runs through September.
[57] SWP delivery estimates from DWR's 2015 SWP Delivery Capability Report are from computer model studies, which use 82 years of historical hydrologic inflows from 1922 to 2003.

7.1.2 Local Supply

Net Natural Supply

A net natural supply of 57,349 AFY, including surface and subsurface water, flows to the five Subareas in the Mojave Basin area and to the Morongo Area.[58] Because the definition of the net natural supply is long-term natural supply estimates, the supplies are going to remain constant regardless of any annual changes in hydrology. Annual fluctuations in natural supplies do not impact the long-term sustainability of the groundwater basins; therefore, the supply is assumed to be 100 percent available in single-dry year and multiple-dry year conditions.

Return Flow

Return flow is the portion of pumped groundwater not consumptively used. Return flow becomes part of the water supply via treated wastewater effluent discharge (offsite disposal), septic system discharge (onsite disposal), return flow from agricultural uses, and to a much lesser extent from the irrigation of golf courses, parks and other outdoor uses. Return flow in the form of treated effluent becomes supply to a different part of the basin than where the pumping or the water use occurred. The timing of return flow is also important when considering return flow as supply as the return flow may not become available for many years.

In both single-dry year and multiple-dry year conditions, the return flow supplied by onsite disposal and discharge of treated effluent is assumed to be available immediately; this assumption is based on the prior uses of water generating returns that are continuing or have come online recently. Consequently, for planning purposes assuming the water uses remain similar in the future as in the past, the return flow supplied is considered 100 percent available.

Treated Wastewater Effluent

Treated wastewater as a source of supply has the advantage of consistently being available during any type of single-dry or multiple-dry year. The regional water supply balance benefits from these supplies because the groundwater basin is a closed system. MWA assumed that 100 percent of the existing supply of treated wastewater is available every year, as is the planned treated wastewater supply.

Local Supply Summary

The sum of the net natural supply, wastewater imports and return flow from pumped groundwater not consumptively used is the total local supplies for MWA. Therefore, the total local supply added to the SWP imported supply is the combined total available to the Mojave Basin Area and the Morongo Area. The net natural supply from the Mojave Basin Area is projected to be approximately 55,241 AFY in average and dry years.

As discussed in Section 6.2 Water Supply, Adelanto is within the Alto Subarea of the Mojave Basin, which is an adjudicated basin under which Basin Annual Production (BAP) and Free Production Allowances (FPA) have been established. Additionally, a Production Safe Yield (PSY) is determined annually for each of the five previously referenced Subareas. The PSY for the Alto Subarea is shown in Table 7-3.

[58] Draft MWA 2015 UWMP, May 9, 2016

Table 7-3: Mojave Basin Alto Subarea Projected Groundwater Production (AFY)						
Subarea	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Alto	71,300	80,346	84,767	90,163	95,747	100,823

Source: Draft MWA 2015 UWMP, Table 3-7, May 9, 2016

Adequacy of Supply. The MWA 2015 UWMP notes the current (2014/15) BAP for the Alto Subarea was 116,412 AFY, the FPA was 72,867 AFY, and the PSY was 69,862 AFY. MWA projects net long-term Alto Subarea supply reliability in the amounts of 25,900 AFY for normal, single-dry and multiple-dry years. The long term supply to each Subarea, and the Basin Area as a whole, is assumed to be available in all year types, normal, single dry year and multiple dry year. A premise of the Mojave Basin Judgment is that all demands are met. The Mojave Basin Judgment requires that any deficit in any year, must be purchased and recharged the following year. During dry periods water will be depleted from groundwater storage (as measured against the long term average) and replaced into storage during wet periods. Annual Deficits in each Subarea are to be resolved by importation of SWP imports.

Essentially all of the water used within the MWA is supplied by pumping groundwater. The physical solution to the Mojave Basin Judgment sets limits on the amount of groundwater production that can occur in each Subarea without incurring an obligation to buy imported water. Subareas upstream have an annual obligation to provide specific inflows to Subareas downstream based on long-term averages between 1931 and 1990.

Because water use within the MWA service area is supplied entirely by groundwater, MWA does not have any inconsistent water sources that cause reduced deliveries to users within the service area. Natural supply estimates are based on the long-term averages which account for inconsistency in supplies (i.e. historic periods of drought are included in the long-term average). A potential exception is any area where water quality could limit use as a potable supply. Wellhead treatment or provision of an alternative supply is planned for these areas.

Sustainability. Producers in the Mojave Basin Area are allowed to produce as much water as they need annually to meet their requirements, including the City, subject only to compliance with the physical solution set forth in the Mojave Basin Area 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 parties.

Based on this information, MWA concluded sufficient water supplies will exist to meet the demand of their retail agencies through 2040 for all normal, single-dry and multiple dry years. While these findings are subject to future evaluation, they currently represent the best available information on which to base Adelanto's 2015 UWMP.

7.1.3 Banked Groundwater Storage

MWA has a conjunctive use program to take advantage of the available MWA SWP supply, which, on average, is greater than the demand in the service area. MWA is able to store this water for future use when SWP supplies may not be available. This activity also allows MWA

to take advantage of wet year supplies based on the abundant groundwater storage capacity available in the Basins.

During normal and wet years, MWA delivers SWP water in excess of local demands and stores the surpluses as a part of the groundwater storage program. During dry years when SWP supplies are not sufficient to meet demands, MWA debits from banked supplies to meet demands. Some retail water agencies also have banked storage accounts which they may choose to draw from during any year, regardless of weather conditions. Table 6-3 in Section 6 shows the storage available for the Alto Subarea as of December 31, 2015.

7.1.4 Groundwater Quality Constraints

Identified in Section 6, groundwater quality presents constraints in several wells.

Arsenic. In 2010, arsenic was detected in Well 8A with a concentration of 39 μg/L (MCL is 10 μg/L). Well 8A was removed from service at that time and remains out of service until appropriate mitigation measures can be taken or the contaminant level drops below the MCL. In addition, arsenic levels in Well 4 were found to exceed the MCL. Well 4 water is now being blended with well waters with low levels of Arsenic to produce finished water below the MCL for Arsenic. A blending plan for Arsenic was submitted to CDPH in 2013.

Iron and Manganese. Filtration treatment is required for Iron and Manganese for wells 1G, 3G2, 4G, and 8G2. In addition, Well 14A is currently being planned for treatment for high Manganese.

7.1.5 Infrastructure Constraints

In Section 6.6 Future Water Projects, a number of capital projects have been identified to improve the City's water supply reliability and enhancing the operations of the City's facilities. Many of these projects, which are referenced in the City's Capital Improvement Program, have been and may continue to be deferred due to budget constraints. Reliability projects include:

- Upgrade Electrical Switch Gear Booster and Booster 1200 B1Motor Replacement – The electrical switch gear booster 1200 and the B1 motor have surpassed their useful life. Upon failure of this equipment, the City could lose up to 65 percent of its water delivery.
- Well 5A Rehabilitation – Well 5A was vandalized in 2013 and is currently inactive. Activating this well will allow the City to access additional local groundwater and maintain a reliable supply of water into the future.
- Well 6 Rehabilitation – Well 6 pump and motor are at the end of their useful life and are inoperable. The well pumped only 33 AF in 2015 and is currently inactive. Activating this well will allow the City to access additional local groundwater and maintain a reliable supply of water into the future.
- Reservoir Mixers – The installation of reservoir mixers at five reservoirs will eliminate stratification and help maintain water quality, as well as more consistent CL2 (chlorine) residual.

- Water Treatment Plant Project – The City has access to SWP water via the Barstow Pipeline, but before the surface water can be utilized, it must first be treated. The utilization of the SWP in future years will be important in meeting the City's future development needs. To assist in meeting that need, this project envisions design and development of a water treatment facility to treat SWP to meet safe drinking water standards as well as the extension of transmission lines to connect that source to the City's distribution grid.
- Water Reclamation Pipeline and Storage Project – The City has been exploring construction of a recycled water system as an alternative source of water for irrigation and other non-potable uses: design and development a waste water 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. 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.
- Water Storage Reservoir Zone 3 Tank Site Project - The City has identified the need to expand existing storage capacity to meet future peak demands relating to the potential development of a new prison facility. The City has additional space at the existing storage facilities in pressure zone three. This project will include design and construction of one to two additional storage reservoirs.
- Supervisory Control and Data Acquisition System (SCADA) – A SCADA system is envisioned to automatically operate the City's water treatment plant, wells, and storage reservoirs. SCADA controls the on-off operation of the wells and booster pumps, alerts staff to malfunctions and their location, generates reports, provides storage reservoir water levels, and other data, which will contribute to the increased reliability of the overall water system. The proposed system will replace an existing system, which is over 15 years old, obsolete, and inefficient, suffers from frequently malfunctions and requires semi-automatic or manual operation.

7.1.6 SWP and MWA Water Transfer and Exchange Programs

California's agricultural activities consume approximately 34 million acre-feet of water annually, which is 80 percent of the total water used for agricultural and urban uses and 40 percent of the water used for all consumptive uses. Voluntary water transfers and exchanges can make a portion of this agricultural water supply available to support the State's urban areas. Such existing and potential water transfers and exchanges are an important element for improving the water supply reliability within MWA's service area.

MWA is currently exploring opportunities to purchase water supplies from other water agencies and sources. Such transfers, exchanges, and groundwater banking programs, are important elements to enhancing the long-term reliability of the total mix of supplies currently available to meet water demand. MWA has identified several transfer and exchange opportunities with the Metropolitan Water District of Southern California, Solano County Water Agency and other SPW contractors.[59]

[59] Draft MWA 2015 UWMP, May 9, 2016, Section 3.5.

MWA has implement or identified the following transfer and exchange opportunities throughout its service area to continue to ensure water supply reliability:

- Pre-delivery of unused SWP supplies; up to 220,000 AF from 2010 to 2030
- Antelope Valley-East Kern Water Agency; transfer 1,800 AF; ongoing
- Central Coast Water Authority; exchange 1,000 AF; ongoing
- Metropolitan Water District Water Exchange Program; 465,000 AF; ongoing
- Other SWP contractors; water transfers, exchange or banking; under consideration
- Transfer within Mojave Basin Subareas; variable; ongoing

7.1.7 Regional Water Quality Control Board – Lahontan Region 6

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB or Regional Board) are responsible for the protection and, where possible, the enhancement of the quality of California's waters. The SWRCB sets statewide policy, and together with the Regional Boards, implements state and federal laws and regulations. Each of the nine Regional Boards adopts a Water Quality Control Plan, also known as a Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's ground and surface waters, and local water quality conditions and problems.

The current Lahontan Basin Plan incorporates language from and replaces three earlier plans: the Lahontan Regional Board's 1975 *North and South Lahontan Basin Plans*, as amended through 1991, and the State Water Resources Control Board's 1980 *Lake Tahoe Basin Water Quality Plan*, as amended through 1989. The earlier plans were combined into a single plan which was adopted by the Lahontan Regional Board in November 1994 and which took effect upon approval by the California Office of Administrative Law in March 1995. The current Basin Plan, includes amendments through September 10, 2015, and also incorporates important provisions of the Tahoe Regional Planning Agency's *Water Quality Management Plan for the Lake Tahoe Region*.

Rather than simply a collection of abstract goals and policies, the Lahontan Region Basin forms the basis for the Regional Board's regulatory program. It sets forth water quality standards for the surface and ground waters of the Region, which include both designated beneficial uses of water and the narrative and numerical objectives which must be maintained or attained to protect those uses. It also identifies general types of water quality problems, which can threaten beneficial uses in the Region as well as required or recommended control measures for these problems. In some cases, it prohibits certain types of discharges in particular areas. The Basin Plan summarizes applicable provisions of separate State Board and Regional Board planning and policy documents and water quality management plans adopted by other federal, state, and regional agencies. The Basin Plan also summarizes past and present water quality monitoring programs, and identifies monitoring activities, which should be carried out to provide the basis for future Basin Plan updates as well as waste discharge requirements or conditional waivers. The Basin Plan is not only a resource for the Regional Board's technical staff, but also serves as an educational document for both staff and dischargers. Regional Board orders cite the Basin Plan's applicable water quality standards and prohibitions. The Lahontan Basin is also used by

other agencies in their permitting and resource management activities.[60]

7.2 Reliability by Type of Year

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, as shown in Table 7-1, on average only provides 62% of Table A amounts for an average year, 5-11% for a single dry year, and 33% for multiple dry years, 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 available supplies and water demands for the City's service area were analyzed to assess the region's ability to satisfy demands during three scenarios: an average water year, single-dry year, and multiple-dry years. The tables in this section present the supplies and demands for the various drought scenarios for the projected planning period of 2015 to 2040 in five year increments. Table 7-4 presents the data set (basis of water year data) for selecting Average, Single-Dry, and Multiple-Dry Years. Data is based on MWA's base years and reliability in the region and for the Mojave Basin.

Table 7-4: Basis of Water Year Data

Year Type	Base Year	Available Supplies if Year Type Repeats
		% of Average Supply
Average Year	1922-2003	100%
Single-Dry Year	1977, 2014[a]	100%
Multiple-Dry Years 1st Year	1931-1934	100%
Multiple-Dry Years 2nd Year	1931-1934	100%
Multiple-Dry Years 3rd Year	1931-1934	100%
Multiple-Dry Years 4th Year	1931-1934	100%

[a] The 2015 DWR State Water Project Delivery Capability Report (DCR) utilizes 1977 as the historic single-dry water year, with an allocation of 11 percent. The allocation was lower in 2014 with a delivery percentage of five percent, but 2014 is not incorporated in the 2015 DCR. However, it is anticipated that it will be included in the next update of the DCR. Both years are shown to represent a single-dry water year.

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 2015 UWMP).

[60] Additional detailed information on the Lahontan Basin Plan is available on the Lahontan RWQCB website at http://www.waterboards.ca.gov/rwqcb6/water_issues/programs/basin_plan/

7.2.1 Average Year

An average year is a year, or an averaged range of years, that most closely represents the average water supply available to the City. The UWMP Act uses the term "normal" conditions, which is interchangeable with "average". Consistent with MWA, the City has identified 1922 through 2003 as base years to calculate an average year.

7.2.2 Single-Dry Year

A single-dry year is the year that represents the lowest water supply available to the agency. The water supplies and demands for City's service area over the 25-year planning period were analyzed in the event that a single-dry year occurs. Consistent with MWA, the City has identified 1977 and 2014 as the single driest years. The 2015 DCR utilizes 1977 as the historic single-dry water year, with an allocation of 11 percent. The allocation was lower in 2014 with a delivery percentage of five percent, but 2014 is not incorporated in the 2015 DCR. It is anticipated that it will be included in the next update of the DCR. Both years are shown herein to represent a single-dry water year.

7.2.3 Multiple-Dry Year Period

A multiple dry year period is represented by the lowest average water supply availability to the City for a consecutive multiple year period (three years or more). This is generally considered to be the lowest average runoff for a consecutive multiple year period (three years or more) for a watershed since 1903. DWR has interpreted "multiple dry years" to mean three dry years; however, water agencies may project their water supplies for a longer time period.

Consistent with MWA, water supplies and demands for City's service area over the 25-year planning period were analyzed in the event that a four-year multiple-dry year event occurs, similar to the drought that occurred during the years 1931 to 1934. During multiple-dry years, SWP availability is anticipated to be reduced to 33 percent limiting the ability to recharge the groundwater basin, although MWA confirms that adequate groundwater supplies are available in all hydrologic conditions, as explained previously.

7.2.4 Sources for Water Data

The City utilized the MWA 2015 UWMP for water supply reliability data, which successively relies on DWR water supply data for the SWP, as well as local water data for natural supply, water conservation, water reuse and transfers of FPA among parties. The City also utilized certain information from the Mojave Basin Area Watermaster Annual Report for Water Year 2013-14.

7.3 Supply and Demand Assessment

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 2040. 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 2015 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.

Projected water demand was calculated by MWA by analyzing historical per capita water use and utilizing the population projections (Beacon Economics, December 2015). For each water purveyor within MWA's service area, historical per capita water use was calculated for each available water use sector, such as residential, commercial, industrial, landscape irrigation, etc. A logarithmic regression was applied for the historical per capita water use of each sector, which projects future per capita water use to 2060. The projected future per capita water use for each sector is aggregated into an overall future per capita water use for the water purveyor. The projected per capita water use was multiplied by the water purveyor's population projection to calculate a water use projection. Demand is projected to remain constant in the different hydrologic years – single-dry and multiple-dry.

MWA's 2015 UWMP forecasts good 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.

Table 7-5 shows a comparison of supply and demand in a Normal or Average year for the 25-year planning horizon in 5-year increments.

Table 7-5: Normal (Avg) Year Supply and Demand Comparison (AFY)

Average Year	2020	2025	2030	2035	2040
Supply - Groundwater	9,300	10,444	11,581	12,640	13,750
Demand	4,578	4,872	5,292	5,737	6,195
Difference	**4,722**	**5,572**	**6,289**	**6,903**	**7,555**

Table 7-6 shows a comparison of supply and demand in a Single-Dry year for the 25-year planning horizon in 5-year increments. Single-dry projections presented for the City are consistent with MWA's regional projections for Single-Dry years.

Table 7-6: Single-Dry Year Supply and Demand Comparison (AFY)

Groundwater Supply 100% of Average	2020	2025	2030	2035	2040
Supply - Groundwater	9,300	10,444	11,581	12,640	13,750
Demand	4,578	4,872	5,292	5,737	6,195
Difference	**4,722**	**5,572**	**6,289**	**6,903**	**7,555**

Table 7-7 shows a comparison of supply and demand for Multiple-Dry years for the 25-year planning horizon in 5-year increments. Multiple-Dry year projections presented for the City are consistent with MWA's regional projections for Multiple-Dry years.

Table 7-7: Multiple Dry Years Supply and Demand Comparison (AFY)

Groundwater Supply 100% of Average		2020	2025	2030	2035	2040
First Year	Supply	9,300	10,444	11,581	12,640	13,750
	Demand	4,578	4,872	5,292	5,737	6,195
	Difference	**4,722**	**5,572**	**6,289**	**6,903**	**7,555**
Difference as a % of Supply		**51%**	**53%**	**54%**	**55%**	**55%**
Second Year	Supply	9,300	10,444	11,581	12,640	13,750
	Demand	4,696	5,040	5,470	5,921	6,291
	Difference	**4,604**	**5,404**	**6,111**	**6,719**	**7,459**
Difference as a % of Supply		**50%**	**52%**	**53%**	**53%**	**54%**
Third Year	Supply	9,300	10,444	11,581	12,640	13,750
	Demand	4,755	5,124	5,559	6,013	6,387
	Difference	**4,545**	**5,320**	**6,022**	**6,627**	**7,363**
Difference as a % of Supply		**49%**	**51%**	**52%**	**52%**	**54%**
Fourth Year	Supply	9,300	10,444	11,581	12,640	13,750
	Demand	4,814	5,208	5,648	6,105	6,483
	Difference	**4,486**	**5,236**	**5,933**	**6,535**	**7,267**
Difference as a % of Supply		**48%**	**50%**	**51%**	**52%**	**53%**

7.4 Regional Supply Reliability

An urban water supplier must shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions. (CWC 10620)

The general goal of MWA's groundwater protection activities is to maintain the groundwater and the aquifer to ensure a reliable high quality supply. MWA's 2015 UWMP provides water

management strategies to achieve this goal even during dry periods based on conservative water supply and demand assumptions over the next 25 years.

To supplement local groundwater supplies, MWA contracts with the DWR for delivery of SWP water, providing an imported water supply to the groundwater basins. However, the variability in SWP supplies affects the ability of MWA to meet the overall water supply needs for the region. While each of the groundwater basin's available supply sources have some variability, the variability in SWP supplies has the largest effect on overall annual supply reliability. This annual variability is mitigated through the use of the groundwater aquifer by pre-storing SWP water when it is available.

As mentioned earlier, MWA has a conjunctive use program to take advantage of available MWA SWP supply. MWA is able to store this water for future use when SWP supplies may not be available. This activity also allows MWA to take advantage of wet year supplies because of the abundant groundwater storage capacity available in the Basins.

During normal and wet years, MWA delivers SWP water in excess of local demands and stores the surpluses as a part of the groundwater storage program. During dry years when SWP supplies are not sufficient to meet demands, MWA debits from banked supplies to meet demands.

Table 7-8 shows MWA's projected supply and demand in all water year types. Maximizing the use of SWP water, optimizing groundwater banking, continuing regional water management and coordination, along with local agency planned improvements and expansion projects, conservation and water use efficiency measures, and maximizing the use of recycled water, MWA has adequate supplies to meet demands within the region during average, single-dry, and multiple-dry years throughout the 25-year planning period.

Table 7-8: MWA Projected Supply and Demand in All Water Year Types (AFY)

Water Supply Source and Water Year Type	2020	2025	2030	2035	2040
Wholesale (Imported) (% of Table A)					
SWP – Avg/Normal Year (62%)	55,676	55,676	55,676	55,676	55,676
SWP – Single-Dry Year – 1977 (11%)	9,878	9,878	9,878	9,878	9,878
SWP – Single-Dry Year – 2014 (5%)	4,490	4,490	4,490	4.490	4,490
SWP – Multiple-Dry Year (33%)	29,634	29,634	29,634	29,634	29,634
Yuba Accord Water – Avg-Normal Year	600	600	600	600	600
Yuba Accord Water – Single- and Multiple-Dry Year	0	0	0	0	0
Local Supplies					
Net Natural Supply – All water year types	57,349	57,349	57,349	57,349	57,349

Table 7-8: MWA Projected Supply and Demand in All Water Year Types (AFY)					
Water Supply Source and Water Year Type	**2020**	**2025**	**2030**	**2035**	**2040**
Return Flow – All water year types	52,356	54,471	57,057	59,727	62,157
Wastewater Import – All water year types	2,800	2,800	2,800	2,800	2,800
Groundwater Banking – Avg/Normal Year [a]	0	0	0	0	0
Groundwater Banking – Single-Dry Year – 1977 [b]	25,983	27,857	31,164	34,579	37,685
Groundwater Banking – Single-Dry Year – 2014 [b]	31,371	33,245	36,552	39,967	43,073
Groundwater Banking – Multiple-Dry Years [b]	6,227	8,101	11,408	14,823	17,929
Total Supply – Avg/Normal Year	**168,781**	**170,896**	**173,482**	**176,152**	**178,582**
Total Supply – Single-Dry Year – 1977	**148,366**	**152,355**	**158,248**	**164,333**	**169,869**
Total Supply – Single-Dry Year - 2014	**148,366**	**152,355**	**158,248**	**164,333**	**169,869**
Total Supply – Multiple-Dry Years	**148,366**	**152,355**	**158,248**	**164,333**	**169,869**
Total Estimated Demands	**148,366**	**152,355**	**158,248**	**164,333**	**169,869**

[a] Not needed in normal/average years.

[b] Existing banked SWP water in MWA groundwater storage accounts; amounts reflect stored water needed to meet demand after all other supplies are used.

Source: Draft MWA 2015 UWMP, May 9, 2016, Tables 6-3, 6-4, 6-5, and 6-6.

8.0 WATER SHORTAGE CONTINGENCY PLANNING

California's extensive system of water supply infrastructure, its reservoirs, groundwater basins, and inter-regional conveyance facilities, mitigates the effect of short-term dry periods. Defining when a drought begins is a function of drought impacts to water users. Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Droughts occur slowly, over a multiyear period. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline. In addition to climate, other factors that can cause water supply shortages include earthquakes, chemical spills, and energy outages at treatment and pumping facilities. The City has included the probability of catastrophic outages in its reliability planning.

On June 24, 2015, the City adopted a revised Water Conservation Plan (same as Water Shortage Contingency Plan) to respond to the Governor's Proclamation declaring a drought State of Emergency to exist in California due to severe drought conditions.

The January 2014 Governor's Proclamation finds that dry conditions and lack of precipitation present urgent problems to drinking water supplies and cultivation of crops, which put farmers long term investments at risk. The conditions also threaten the survival of animals and plants that rely on California's rivers, including many species in danger of extinction. The January 2014 Proclamation also calls on all Californians to reduce their water usage by 20 percent. As the drought continued, on April 25, 2014 the Governor's signed a Proclamation declaring a drought State of Emergency to exist in California due to severe drought conditions and signed an Executive Order to redouble drought actions.

The City's revised Water Conservation Plan (Appendix L) is summarized as presented in this chapter.

8.1 Stages of Action

The City of Adelanto has proposed a four-stage plan of action for implementation in the event of a long-term drought or a significant loss of supply, including losses of up to 50 percent of the water supply. The four stages of action include:

Stage 1 – Stage 1 becomes effective when the City declares a water shortage exists. In this stage, the APUA will recommend a voluntary 10 percent reduction in water use based on an established baseline year determined by the City at the time Stage 1 is implemented. Simultaneously with this declaration, the City will begin a public outreach campaign to encourage the efficient use of water. This will include articles published in local newspapers, information posted on the City's website, literature distributed to customers and educational conservation programs held on school campuses.

Stage 2 – Stage 2 is entered when the Stage 1 reduction goal has not been met for two consecutive years of a drought. Public awareness efforts will continue and a survey will be conducted on Stage 1 efforts. The City will establish a water conservation advisory committee

comprised of officials from the Adelanto Public Utilities Authority and the City of Adelanto.

Stage 3 - Stage 3 goes into effect if the water shortage continues for four consecutive years. This stage recommends 20% Mandatory reductions in water use effective June 1, 2015. A plan and Ordinance to enforce penalties for excessive water use will be developed as part of Stage 3. The Ordinance will include prohibitions against specific wasteful practices such as gutter flooding, open-hose car washing, driveway wash downs and other similar practices as described in further detail below (under the heading "Water Conservation Plan"). During Stage 3, the City will also analyze the impacts of the Conservation Plan on revenue and expenditures and propose measures to overcome those impacts.

Stage 4 – Stage 4 will be declared if a water shortage continues for one year beyond Stage 3. In this stage, the City shall determine the extent of any required additional conservation measures needed to address water supply reductions of up to 50 percent.

Consumer compliance with all stages will be enforced through penalties, as outlined in Section 8.3.

Table 8-1 shows the use reduction stages as a guideline for recommending the appropriate conservation stage and water conservation target.

Table 8-1: Stages of Water Shortage Contingency Plan

Stage	Percent Supply Reduction[1] *(Numerical value as a percent)*	Water Supply Condition *(Narrative description)*
Stage 1	Up to 10%	Water shortgage declared
Stage 2	Up to 10%	Stage 1 reduction goal has not been met for two consecutive years of drought
Stage 3	10% to 20%	Water shortage continues for four consecutive years
Stage 4	20% to 50%	Water shortage continues for one year beyond Stage 3

[1] *Stage 4 in the Water Shortage Contingency Plan addresses a water shortage of 50%.*

8.2 Prohibitions on End Uses – Water Conservation Plan

Chapter 8.20 (Appendix L) of Adelanto's Municipal Code entitled "Water Conservation Plan"[61] sets forth the rules and regulations governing the use of water in the City, even during

61 http://library.amlegal.com/nxt/gateway.dll/California/adelanto_ca/cityofadelantocaliforniamunicipalcode?f=templates$fn=default.htm$3.0$vid=amlegal:adelanto_ca

non-drought times. The 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 M).

This section of the City's Municipal Code specifically requires all water users to abide by specific water conservation measures at all time, including during non-drought times. Table 8-2 presents a summary of the restrictions and prohibitions, following by more detailed narrative of each prohibition.

Table 8-2: Restrictions and Prohibition

Stage	Restrictions and Prohibitions on End Users	Penalty, Charge, or Other Enforcement?
All Stages	Landscape - Restrict or prohibit runoff from landscape irrigation	Yes
All Stages	Landscape - Limit landscape irrigation to specific days	Yes
All Stages	Landscape - Limit landscape irrigation to specific times	Yes
All Stages	Other - Prohibit use of potable water for washing hard surfaces	Yes
All Stages	Other - Require automatic shut of hoses	Yes
All Stages	Water Features - Restrict water use for decorative water features, such as fountains	Yes
All Stages	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Yes
All Stages	CII - Restaurants may only serve water upon request	Yes
All Stages	CII - Construction water shall be used in an efficient manner	Yes
All Stages	All new construction shall have low-flush toilets and low-flow showerheads and faucets	Yes
All Stages	Water for cooling systems must be recycled where possible	Yes
All Stages	Pools - Allow filling of swimming pools only when an appropriate cover is in place.	Yes
All Stages	CII - Lodging establishments must post a notice to urge guests to conserve water	Yes
All Stages	Customers encouraged to install flow restrictors or pressure reducer, intall toilet tank displacement devices, and replace appliances with water savings models	Yes
All Stages	Use drought tolerant or native plant material	Yes
All Stages	Use low precipitation irrigation and timing devices	Yes
All Stages	At least 50% of new model homes shall include low water use, drought tolerant or native plants	Yes
All Stages	Provide exemptions where recycled water is used	Yes

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.
- Even address numbers water outdoor landscape on Tuesday and Thursday.
- Odd address numbers water outdoor landscape on Wednesday and Friday.
- 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.

8.3 Penalties, Charges, Other Enforcement of Prohibitions

Chapter 8.20.050 of the City's Municipal Code stipulates that anyone who violates any provision of the City's water conservation code (Chapter 8.20) shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished in accordance with the provisions of Chapter 1.20 of the Code (Municipal Code Violations).

Enforcement Code Compliance officers shall be empowered to investigate instances of Water Waste and enforce all provisions. Officers will issue any notice of violation or administrative citation in accordance with the provision in the Chapter 8.20.050 of the City's Municipal code.

(a) Administrative Fines shall be assessed as follows:

(1) For a first violation of any prohibition of this Chapter 8.20 prior to the issuance of an administrative citation, shall be issued in accordance with the procedures for service and posting set forth in Section 8.20.050 of this Chapter.

(2) For violation (s) of any prohibitions during Shortage Stage 1, Administrative Fines may be assessed for each violation of the provisions of Section 8.20.050 in the amount of two hundred dollars ($200.00).

(3) For violation(s) of any prohibitions during Shortage Stage 2 Administrative Fines may be assessed for each violation of the provisions of Section 8.20.050 in the amount of three hundred dollars ($300.00).

(4) For violation(s) of any prohibitions during Shortage Stage 3, Administrative Fines may be assessed for each violation of the provisions of Section 8.20.050 in the amount of five hundred dollars ($500.00).

(5) For violation(s) of any prohibitions during Shortage Stage 4, Administrative Fines may be assessed for each violation of the Provisions of Section 8.20.050 in the amount of Seven hundred dollars ($700.00).

(b) The City Manager or his/her designee may waive any Administrative Fine or portion thereof assessed under this Section Pursuant to written procedures (to be developed by the City Manager) wherein mitigating circumstances or other conditions make the imposition of the Administrative Fine unreasonable.

(c) If the Responsible Person(s) fails to correct the violation(s), subsequent administrative citations and fines may be issued for the same violation(s).

(d) Payment of the Administrative Fine shall not excuse the failure to correct the violation nor shall it bar further enforcement action up to and including discontinuance of water service (following the notice specified in Section 8.20.050 (c) of this Chapter.

(e) Any fines imposed under this Section shall be collected in accordance with the Cities currently-effective Water Regulations and Service provisions as adopted by Ordinance. Such fines shall be deposited in the Cities APUA fund.

8.4 Consumption Reduction Methods

Table 8-3 summarizes the consumption reduction methods the City will enact in each shortage stage and the water savings percentage goal.

Table 8-3: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods

Stage	Consumption Reduction Methods by Water Supplier
Stage 1	Expand Public Information Campaign; up to 10% water savings
Stage 2	Expand Public Information Campaign; conduct survey on Stage 1 efforts; establish water conservation advisory committee among APUA and City; up to 10% water savings
Stage 3	Enforce penalties for excessive water use and prohibition infractions; analyze impacts of Water Conservation Plan on revenue and expenditures, and proposed measures to overcome impacts; 10% to 20% water savings
Stage 4	Additional conservation measures to address water supply reductions up to 50%; 20% to 50% water savings

8.5 Determining Water Shortage Reductions

During normal water supply conditions, production figures are recorded daily and are incorporated into the City's water production report. During water shortages, water usage will continue to be closely monitored on a daily or, if necessary, hourly basis depending on the severity of the drought. Production data from the City's wells can be retrieved on an hourly basis. This will allow City staff to determine the effects of a reduction on water production

within the system. Further, since all City water customers are metered, the City will monitor water demand based on billing records during water shortages.

During a shortage resulting from a disaster, production figures will be monitored on an ongoing basis. The City's SCADA system will provide prompt warning of any critical conditions. Once a shortage stage is implemented, actual reductions in water production and usage can be determined based on the SCADA system monitoring. Reports will be provided on a daily basis to the City's Director of Utilities.

8.6 Revenue and Expenditure Impacts

The Adelanto Water Authority Fund provides funding for the operation and maintenance of the City's water distribution system under an enterprise fund separate from the City's General Fund. In governmental accounting, enterprise funds are used to account for operations that are operated and financed in a manner similar to private business enterprises where the intent is that the costs (expenses including depreciation) of providing goods or services to the general public on a continuing basis are to be financed or recovered primarily through user charges; or where periodic determination of revenues earned, expenses incurred, and/or net income is deemed appropriate, for capital maintenance, public policy, management control accountability or other purposes.

The Water Authority Enterprise Fund also serves as an emergency source of funds in the event of an extreme water shortage. Should an extreme shortage be declared and a large reduction in water sales occur for an extended period of time, the City would re-examine its water rate structure and monitor projected expenditures. If needed, the City would consider increases in rates to overcome revenue lost.

8.7 Water Shortage Stage Resolution

The City's Water Shortage Contingency Plan identifies actions to be taken by water consumers within the City's service area during periods of adequate water supply and during moderate, high, and severe water shortages. The purpose of the Water Shortage Contingency Plan is to provide procedures with voluntary and mandatory provisions to minimize the effect of a water shortage and reduce overall water usage. A Water Shortage Stage Resolution that could be enacted by the Adelanto Public Utility Authority during times of a declared water shortage is included in Appendix N.

Prior to and during implementation of the Water Shortage Contingency Plan and Resolution, the City would likely meet water shortage demands by increasing groundwater pumping and implementing water use efficiency programs. Water for public health, safety and welfare, water for maintenance of water facilities, and "grey water" use are all exempt from mandatory reductions. Special case circumstances may be reviewed by the City Manager's Office.

8.8 Catastrophic Supply Interruption

A water shortage emergency could result from a drought or a catastrophic event such as an earthquake, transmission facility failure, regional power outage, flooding, supply contamination from chemical spills, or other adverse conditions.

The City recognizes, that in the event of an emergency such as an earthquake, the integrity of the water system can be breached causing disruptions in water supply. Because of the possibility of emergencies from both man-made and natural causes, water utility emergency planning is of utmost importance. The City's Emergency Operations Plan (EOP) complies with the Standardized Emergency Management System (SEMS) developed by the State of California, and the National Incident Management System (NIMS) developed by the Federal Emergency Management Agency. The EOP includes information on the Emergency Operations Organization, the roles and responsibilities of each section, and includes operational checklists to guide response actions.

In the event of an emergency, the City Manager will assume overall responsibility for coordinating the City's response. The City's Director of Public Utilities will coordinate all activities relating to water operations. The City of Adelanto has also entered into mutual aid agreements with other local cities and the County of San Bernardino, which may be implemented during an emergency, if necessary.

8.9 Minimum Supply Next Three Years

The Mojave Water Agency has projected a reliable supply of water during all multiple dry years through 2040. Consequently, MWA does not anticipate any problems in meeting the City's demands during multiple dry years occurring over the next three years. Information shown in Table 8-4 is extracted from Table 6-2.

Table 8-4: Minimum Supply Next Three Years

	2016	2017	2018
Available Water Supply	9,300	9,300	9,300

9.0 DEMAND MANAGEMENT MEASURES

The City of Adelanto recognizes water use efficiency as an integral component of current and future water strategy in its service area. Demand management measures (DMM) refer to policies, programs, rules, regulation and ordinances, and the use of devices, equipment and facilities that, over the long term, have been generally justified and accepted by the industry as providing the means to achieve a "reliable" reduction in water demand. This means providing education, tools, and incentives to help residents and businesses reduce the amount of water used on their property. Demand management is as important to ensuring water supply reliability as is providing a new water supply. The City has aggressively pursued conservation in an effort to reduce demand and stretch existing water supplies.

The Urban Water Management Planning Act originally required implementation of 14 DMMs; also known as best management practices (BMP). These 14 DMMs include technologies and methodologies that have been sufficiently documented in multiple demonstration projects that result in more efficient water use and conservation.

In 2014, the section of the CWC addressing DMMs was significantly modified based on recommendations from the Independent Technical Panel (ITP)[62] to the legislature. In its report to the Legislature, the ITP recommended that the UWMP Act should be amended to simplify, clarify, and update the DMM reporting requirements. The ITP recommended, and the legislature enacted, streamlining the retail agency requirements from the 14 specific measures to six more general requirements plus an "other" category. "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 requirement categories for 2015 compared to the original 14 DMMs for reporting. The six general DMM requirements are consistent with the CUWCC Foundational BMPs, while the "other" category is consistent with the CUWCC Programmatic BMP programs.

Table 9-1 Demand Management Measure Reporting

2015 DMM Reporting	2010 and Prior DMM Reporting
Six General DMM Categories	**14 Original DMMs**
1. Water Waste Prevention Ordinance	1. Water survey programs for single-family residential and multifamily residential customers
2. Metering	2. Residential Plumbing Retrofit
3. Conservation Pricing	3. System water audits, leak detection, and repair
4. Public Education and Outreach	4. Metering with commodity rates for all new connections and retrofit of existing connections

[62] The ITP was formed by DWR to provide information and recommendations to DWR and the Legislature on new demand management measures, technologies and approaches to water use efficiency (see http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u2/).

Table 9-1 Demand Management Measure Reporting	
2015 DMM Reporting	**2010 and Prior DMM Reporting**
Six General DMM Categories	**14 Original DMMs**
5. Programs to Assess and Manage Distribution System Real Loss	5. Large landscape conservation programs and incentives
6. Water Conservation Program Coordination and Staffing Support	6. High-efficiency washing machine rebate programs
Other – Programs with a significant impact on water use as measured in GPCD	7. Public information programs
	8. School education programs
	9. Conservation programs for commercial, institutional, and industrial
	10. Wholesale agency programs
	11. Conservation pricing
	12. Water conservation coordinator
	13. Water waste prohibition
	14. Residential ultra-low flush toilet replacement programs

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 to meet its water use targets.

MWA Implements DMMs on Behalf of the City. The Mojave Water Agency is a member of the California Urban Water Conservation Council (CUWCC/Council)[63]. As a CUWCC member, MWA submits annual reports to the Council in accordance with the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), most recently amended January 4, 2016.

MWA implements many of the urban water conservation DMMs on behalf of its purveyors, including the City of Adelanto. Since the City is not a member of the CUWCC, it has not submitted past Retail Water Agency Annual Reports to the Council. Therefore, DMM descriptions that follow include activities performed by MWA on behalf of the City.

As Signatory to the CUWCC MOU, MWA has committed to a good faith effort in implementing the 14 previously mentioned cost-effective BMPs. "Implementation" means achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in each BMP's definition, and to satisfy the commitment by the signatories to use good faith efforts to optimize savings from implementing BMPs as described in the MOU. A BMP, as defined in the MOU, is a "policy, program, practice, rule, regulation or ordinance or the use of devices, equipment or facilities which meets either of the following criteria; (a) An established and general accepted practice among water suppliers that results in more efficient use or conservation of water; or (b) A

[63] Information on CUWCC can be found on their website at: https://www.cuwcc.org/

practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water agencies to carry out."

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 Alliance for Water Awareness and Conservation (AWAC).[64] AWAC is a collaborative group of over twenty 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.
- Exchange ideas between agencies, especially at quarterly meetings.

AWAC has also adopted an Operational Plan to assist its members in reporting on conservation activities in their service areas in accordance with state requirements.[65] The Operation Plan addresses feasible water conservation alternatives, including implementation of the DMMs and conservation priorities as contained in the MWA's IRWM Plan and CUWCC's MOU.

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 include the following, with the most recent applications accepted in February 2016:

- 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

[64] Information on AWAC can be found on their website at: http://www.hdawac.org/aboutus/
[65] The Operational Plan, adopted in November 2006 and most recently amended in November 2009 can be found on AWAC's website at: http://www.hdawac.org/documents/documents/OperationalPlan2009.pdf

9.1 Demand Management Measures – Recent and Current

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 2015 UWMP should be referred to for more detailed information on the regional BMPs program and each individual BMP that are being implemented on behalf of the City.

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.

Section 8 of this UWMP presents the City's Water Shortage Contingency Plan including reference to water waste prohibition included in the City's Water Conservation Plan. Chapter 8.20 (Appendix L) 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 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 M). 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.

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 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). Residents in small areas of the City that do not currently have water lines purchase water from a water fill station located at the City's main Water Service yard. Water sales at the fill station are metered and accounted for in Commercial water use. 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 section 3 – Conservation Pricing.

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. Specific information on the City's rate structure is presented in Table 9-2. As noted, the tiered commodity rates were phased in over a four year period, beginning in 2009 and completed in 2013.

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	Tier 3 Usage (units)	Tier 3 Water Usage Rate
¾"	$26.50	1-15	$2.40	16-25	$3.40	26+	$4.40
1"	$44.26	1-25	$2.40	26-42	$3.40	43+	$4.40
1-½"	$88.25	1-50	$2.40	51-83	$3.40	84+	$4.40
2"	$141.25	1-80	$2.40	81-133	$3.40	134+	$4.40
3"	$265.00	1-150	$2.40	151-250	$3.40	251+	$4.40
4"	$441.76	1-250	$2.40	251-417	$3.40	418+	$4.40
Senior Low Income ¾"	$13.25	1-15	$2.40	16-25	$3.40	26+	$4.40
Low Income ¾"	$18.54	1-15	$2.40	16-25	$3.40	26+	$4.40

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

4 – Public Education and Outreach

Public Communication Measures

Adelanto, MWA and AWAC. The City works collaboratively with MWA and AWAC 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/
- The City has installed a kiosk in the lobby of City Hall to provide information on water conservation and efficiency. Anyone coming into City Hall 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. Applications approved for the Cash for Grass program equals 286 for a total of 188,367 square feet of turf removed, resulting in 31.79 AFY of water savings. A similar program for small landscapes was offered through the end of 2015 (program data was not immediately available at the time of the UWMP Update).
- 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 8,165 service connections. In addition to distribution of information at community events 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). 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 (www.hdmwa.com) is "to provide a venue for those

involved in the waterworks industry located in the greater Victor Valley and Mountain communities." 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.

High Desert Regional Partnership with SCE

The City participates in the High Desert Regional Partnership with Southern California Edison (SCE). 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 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.

5 – Programs to Assess and Manage Distribution System Real Loss

As presented in Section 4.4, reporting of system losses is required by the CWC for the first time 2015 UWMPs. System water loss is the difference between water production and water consumption and represents "lost" water. Distribution system losses can include both accounted-for and unaccounted-for losses attributed to unmetered water use, leaking pipes, or other events causing water to be withdrawn from the system and not measured, such as hydrant flushing, street cleaning, new construction line draining and/or filling and draining and flushing, and firefighting.

Accounted-for losses within the City include the following activities that are known although not metered or charged for:

- Hydrant Testing and Flushing – Hydrant testing to monitor the level of fire protection available throughout the City is performed by the San Bernardino County Fire Department. The APUA also performs hydrant flushing to eliminate settled sediment and ensure better water quality water. Water used during hydrant testing and flushing is not metered.
- Firefighting – Water used to fight fires is also not metered.

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. However, for the benefit of contrast to accounted-for losses listed above, the following are identified as unaccounted-for losses that may occur, although can be managed:

- Leakage – Water lost from system leakage from pipes, valves, pumps, and other water system appurtenances.
- Customer Meter Inaccuracies – Meters have an inherent accuracy for a specified flow range; however, flow above or below that range is usually registered at a lower rate. Meters also become less accurate with time due to wear.

The City recently transitioned to a new water billing system and is unable to obtain water use data by customer type. While the City continues to work on this issue, it is not possible to identify an accurate percentage of water loss for the most recent 12 months representing calendar year 2015. However, as discussed in Section 4.4, the City has completed the AWWA Water Audit WAS v5.0 (Appendix G) based on best available information.

The AWWA Water Audit shows water loss for the past 12-month period is 18.9 percent; much higher than the previous reporting period. The City intends to conduct performance measures to lower its water losses to at least 10 percent, an acceptable rate as defined by AWWA.[66] Therefore, for the purposes of this Plan, the water loss percentage projected for the planning horizon is 10 percent projected for the years 2020 through 2040, as shown in Table 9-3. The City is confident that this is within the range of acceptable water loss and is within a small margin of error.

Table 9-3: City of Adelanto System Water Loss 2015 – 2040 (AFY)

Agency	2015	2020	2025	2030	2035	2040
Water Production	4,049	4,578	4,872	5,292	5,737	6,195
Water Consumption	3,282	4,120	4,385	4,763	5,163	5,576
Difference (System Loss)	767	458	487	529	574	620
System Loss Percentage	18.9%	10.0%	10.0%	10.0%	10.0%	10.0%

The City currently conducts routine and planned system maintenance to prevent losses. The City's water loss percentage 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.

City staff anticipates that current practices and future capital improvement projects will help to reduce the percentage 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 is currently developing a program to provide 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. There is no timeline for implementation currently proposed.

6 – Water Conservation Program Coordination and Staffing Support

The City has one designated Conservation Specialist who 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 Conservation Specialist works in collaboration with and is supported by programs and information from MWA and AWAC, as described in 4 – Public Education and Outreach. The City's annual budget includes funding for the Conservation Specialist.

[66] American Water Works Association states 10 percent or less unaccounted-for water (losses) in a water system is acceptable.

Conservation Coordinator Contact:

Belen Cordero
Conservation Specialist
bcordero@ci.adelanto.ca.us
(760) 559-2683
11600 Air Expressway, Adelanto, CA 92301

7 – Other Demand Management Measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented

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 held a recent toilet giveaway resulting in distribution of 600 ultra-low flow toilets 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.[67]

[67] A copy of AB 1881 (the Model Efficiency Landscape Ordinance) can be found here:

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 promotes the use of HECWs.

d. HETs: In recent years, MWA offered rebates of $165 for each high efficiency toilet 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 Planned Implementation to Achieve Water Use Targets

As previously discussed in Section 5.7, the City is already achieving and surpassing its water use targets, but will continue water conservation and water use efficiency to ensure it will meet its 2020 Target GPCD. The City will continue to implement its Water Use Reduction Plan as first identified in its 2010 UWMP.

The City will continue to encourage water conservation and water use efficiency through the following:

- Enforce the Water Waste Ordinance.
- Maintain and strengthen the tiered rate structure.
- Continue public education and outreach on water use efficiency and conservation in collaboration with MWA and AWAC through public communication, community events, and school education programs.
- Encourage or require new developments to install water conservation fixtures and landscape with low water use plant materials (xeriscape).
- Continue to operate and maintain the City's water distribution system with a goal of reducing water losses by repairing or eliminating any leaks that may develop as soon as practical and enhanced tracking.
- Continue planning toward the construction of a recycled water system.

http://www.water.ca.gov/wateruseefficiency/docs/ab_1881_bill.pdf

9.3 California Urban Water Conservation Council

California Urban Water Conservation Council (CUWCC) members have the option of submitting their 2013–2014 Best Management Practices (BMP) annual reports in lieu of, or in addition to, describing the DMMs in their UWMP, if the supplier is in full compliance with the CUWCC's MOU.

Since the City is not a CUWCC member, it has provided a description of its DMMs in section 9.1 above.

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10.0 PLAN ADOPTION, SUBMITTAL AND IMPLEMENTATION

10.1 Inclusion of all 2015 Data

The City of Adelanto 2015 UWMP includes water use and planning data for the entire year of 2015.

10.2 Notice to Cities and Counties

The City notified the County of San Bernardino, Mojave Water Agency and City of Victorville (Victorville Water District) on April 18, 2016 that it is reviewing its 2010 UWMP and considering amendments to the Plan. The notification letter included the UWMP revision schedule, contact information, and where the Final Draft 2015 UWMP could be viewed once it is available. This occurred within the required 60-day notification period prior to the public hearing. Copies of the notification letters are included in Appendix O.

Table 10-1. Notification to County and Agencies

City/Agency Name	60-Day Notice	Notice of Public Hearing
Mojave Water Agency	☑	☑
Victorville Water District	☑	☑
County Name	**60-Day Notice**	**Notice of Public Hearing**
San Bernardino County	☑	☑

10.3 Notice to the Public

In accordance with Government Code 6066, the City noticed the public hearing in the Daily Press[68], a local newspaper in the Victorville/San Bernardino County area, which included the time and place of the hearing, as well as the location where the Plan is available for public inspection. Copies of the public notices, including proof of publication, are included in Appendix O.

In addition, the City again notified the County of San Bernardino, Mojave Water Agency and City of Victorville (Victorville Water District) on June 6, 2016 that it would be holding a

[68] http://www.vvdailypress.com/

public hearing on June 22, 2016 to review its 2015 UWMP and considering amendments to the Plan. Copies of the public hearing notification letters are also included in Appendix O.

10.4 Public Hearing and Plan Adoption

The 2015 UWMP Update was adopted by resolution of the Adelanto Public Utilities Authority (APUA) on June 22, 2016, following a public hearing at the same meeting. The public hearing included a presentation on the City's baseline values, water use targets, and implementation plan of the 2015 UWMP. The public hearing allowed the public the opportunity to comment on the Plan and further allowed the APUA Board to consider any further modifications of the UWMP in response to public input before adoption. The resolution of adoption is included in Appendix O.

Draft copies of the Plan were posted on the City's website prior to the Public Hearing thereby making them available to the public.

10.5 Plan Submittal

The Plan was submitted to the DWR electronically by July 1, 2016 through WUEdata, the State's online submittal tool at https://wuedata.water.ca.gov.secure/, a CD copy was submitted to the State Library, Government Publications Section within 30 days of approval of the Plan, and an electronic copy was provided to the County of San Bernardino within 30 days of approval of the Plan. Finally, copies of the adopted UWMP were also made available to the public within 30 days following City Council adoption. The public can access an electronic copy of the Plan on the City's website and also obtain a copy at City Hall during normal business hours.

The City anticipates review by DWR of its UWMP within about one year from submittal. DWR will review the Plan using the checklist (Appendix D) and make a determination whether or not the UWMP addresses the requirements of the CWC. Upon completion of their review, DWR will issue a letter to the City with the results of the review.

10.6 Amending the Adopted UWMP

If the City amends its adopted UWMP, each of the steps for notification, public hearing, adoption, and submittal must also be followed for the amended Plan.

In June 2015, the City amended its 2010 UWMP to respond to the State Water Resources Control Board emergency regulations pertaining to drought conservation in response to the Governor's Executive Order B-29-15 addressing the state's historic and relentless drought. These regulations required the City to cut its water consumption by 20 percent beginning June 1, 2015. The City addressed this mandatory requirement by amending its 2010 UWMP, Section 8.5 Water Shortage Contingency Ordinance to include provisions necessary to comply with the Governor's decree. This 2015 UWMP update includes the 2015 amended Water Shortage Contingency Ordinance.

APPENDICES

Appendix A	California Water Code – Urban Water Management Planning Act of 1983, amended to 2015
Appendix B	California Water Code – Sustainable Water Use and Demand Reduction (SB X7-7)
Appendix C	Changes to California Water Code Since 2010
Appendix D	DWR Urban Water Management Plan Checklist
Appendix E	60-Day Notice Letters
Appendix F	Mojave Water Agency Population Forecast
Appendix G	AWWA Water Loss Audit
Appendix H	2011 Technical Memorandum on SBx7-7 20x2020 GPCD Baseline Calculation & Water Use Target Method Selection
Appendix I	SB X7-7 Verification Form
Appendix J	Mojave Basin Judgement
Appendix K	City of Adelanto 2014 Consumer Confidence Report
Appendix L	Landscape Water Conservation Ordinance No. 441, Adelanto Municipal Code, Section 17.60
Appendix M	City of Adelanto Water Conservation Plan, Adelanto Municipal Code, Section 8.20
Appendix N	Draft Water Conservation Plan Resolution
Appendix O	Notice of Public Hearing Letters, Notice of Public Hearing and Resolution for Plan Adoption, Proof of Publication of Public Hearing Notice