



Appendix N Water Supply Assessment



Appendices

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California Senate Bill 610 Water Supply Assessment

for

Mesa Water District One Metro West Project

Prepared for
Mesa Water District

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ACRONYMS AND ABBREVIATIONS

ACT	Urban Water Management Planning Act of 1983
AF	Acre Feet
AFY	Acre Feet per Year
AWPF.....	Advanced Water Purification Facilities
CCF	Hundred Cubic Feet
CDD	City Distribution Division
CVP	Central Valley Project
CPTP	Coastal Pumping Transfer Program
DSOD	Department of Safety of Dams
DU	Dwelling Unit
DWR	Department of Water Resources
EIR	Environmental Impact Report (see PEIR)
EO	Executive Order
EOC.....	Emergency Operations Plan
ERRP	Emergency Response and Recovery Plan
FY.....	Fiscal Year
GP	General Plan
GPCPD	Gallons Per Capita Per Day
gpd	Gallons Per Day
gpm	Gallons Per Minute
IRP	Infrastructure Reliability Project
ISA	Interim Supply Allocation
ISL	Interim Supply Limitation
ITR	Industrial to Residential
KSF.....	Thousand Square Feet
MAF	Million Acre Feet
Max	Maximum
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
mg/L	Milligrams Per Liter
MHI.....	Median Household Income
Min	Minimum
MWDOC	Municipal Water District of Orange County
PEIR	Program Environmental Impact Report
RHNA	Regional Housing Needs Assessment
RWQCB.....	Regional Water Quality Control Board
RWS.....	Regional Water System
SB.....	Senate Bill
SB X7-7	Water Conservation Act of 2009
SF.....	Square Feet



SWP	State Water Project
SWRCB	State Water Resources Control Board
USBR	U.S. Bureau of Reclamation
UWMP	Urban Water Management Plan
WCIP	Water Conservation Implementation Plan
WPCP	Water Pollution Control Plant
WSA	Water Supply Assessment or Water Supply Agreement
WSIP	Water System Improvement Program
WS&TD	Water Supply and Treatment Division
WUMP	Water Utility Master Plan
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

The purpose of the “Water Supply Assessment Report” is to satisfy the requirements under Senate Bill 610 (SB 610), Water Code Section 10910 et seq., and Senate Bill 221 (SB 221), Government Code Section 66473.7 that adequate water supplies are or will be available to meet the water demand associated with the proposed development. While recognizing that it is not possible to guarantee a permanent water supply for all users in California in the amounts requested, SB 610 requires that a water supply assessment (WSA), based on specific criteria, be prepared to document the sufficiency of available water supply for the Mesa Water District (Mesa Water®) and the proposed project. WSA’s are typically prepared for specific development projects. In this particular case, One Metro West Project (Project). The WSA identifies water supply and reliability within the Mesa Water® Distribution System, now and into the future, and makes a determination regarding water supply sufficiency for the Project. **The WSA does not, nor is it intended to, identify infrastructure needs for service distribution for the proposed projects.**

Mesa Water District created 2015 Urban Water Management Plan (2015 UQMP) to determine the existing and projected water demand supply. The 2015 UWMP states that the local groundwater wells Mesa Water® utilizes sufficiently supply the existing and projected water demands. The 2015 UWMP did not consider the proposed One Metro West Development Project. One Metro West is a 16.2-acre mixed-use community including residential, commercial and office spaces. The existing area is occupied by a dietary supplement manufacturer, a commercial decoration warehouse, and a frozen bakery product and supplies manufacturer, the One Metro West Project will replace the existing building. This WSA identifies water supply and reliability to Mesa Water®, now and into the future, and makes a determination regarding water supply sufficiency for the Project. The WSA does not, nor is it intended to, identify infrastructure needs for service distribution for the proposed projects.

Preparation of a WSA is considered at a point in time when known future projects are evaluated and accounted for in future water demands. It is also understood that new and innovative programs and projects in conceptual planning are yet to be designed. Therefore, WSAs are a part of the ongoing planning efforts of Mesa Water® to optimize its water resources program.

The WSA includes a discussion of the relevant legislation requiring the WSA, an overview of the proposed Project, analysis of water demands for Mesa Water®’s existing service area including the Project over a 20+ year planning period, and an analysis of reliability of Mesa Water®’s water supplies. This WSA includes discussion of the potential impacts that each agency that supplies water to the region has on Mesa Water® and concludes with a sufficiency analysis of water supply during normal, single-dry, and multiple dry years over a 20-year planning period.

Water Supply

Mesa Water District relies on District produced local groundwater from wells and imported water from Metropolitan Water District (MWD). However, Mesa Water® maintains 100% reliability on groundwater pumping whenever possible.

- Mesa Water District has groundwater supplied by 7 wells. Five active wells pump “clear” groundwater directly into the distribution system, following disinfection with chloramines. The other two wells pump amber colored groundwater from a deeper aquifer and is treated at the Mesa Water Reliability Facility (MWRF) before distribution. The groundwater wells are a primary source of water to Mesa Water®.
- Mesa Water District has three (3) metered water connections with MWDOC (OC-44, OC-14, and CM-2).

Water Demand

In the FY 2018 Mesa Water® was projected to produce 17,660 AF in the FY 2019. Mesa Water®’s total metered potable water demand for the FY 2019 is 16,065 AFY. The One Metro West Development Project water demand is estimated to add 167 AFY to the Mesa Water® distribution system.

Mesa Water® has projected that by the year 2040 the total system demand will be 20,809 AFY. Combine this projection with the Proposed Development Project (203 AFY) and the total water demand is anticipated to increase to 21,012 AFY by 2040 under normal water year conditions (drought years would see reduced water demands as a result of conservation measures).

Demand and Supply Projections

Mesa Water District has a total groundwater well production capacity of 28,937 AFY and will meet its future water demands, including the demands for the Proposed Project, from existing supply sources. Mesa Water® will maintain 100% reliability on groundwater pumping, but if needed, imported water is an option. Analysis of water demand and supply projections for Mesa Water® demonstrate that Mesa Water® has water supply contracts with MWDOC that are sufficient to meet the Project’s increased water demand through the year 2040.

This WSA demonstrates that possible reductions in imported water deliveries due to drought conditions do not prevent Mesa Water® from satisfying its anticipated demands.

Conclusion

The information included in this WSA identifies a sufficient program of water supply for Mesa Water®, now and into the future, including a sufficient water supply for One Metro West.

1.0 INTRODUCTION

The purpose of the Water Supply Assessment (WSA) is to satisfy the requirements under Senate Bill 610 (SB 610), Water Code Section 10910 et seq., and Senate Bill 221 (SB 221), Government Code Section 66473.7 that adequate water supplies are or will be available to meet the water demand associated with the proposed One Metro West Development (Project). SB 610 focuses on the content of a water supply agency's Urban Water Management Plan (UWMP). It also stipulates that, when an environmental impact report (EIR) is required in connection with a project, the appropriate water supply agency must provide an assessment of whether its total project water supplies will meet the projected water demand associated with the Proposed Project. SB 610 applies to a proposed residential development of more than 500 dwelling units, or large commercial, industrial, or mixed-use development. SB 221 requires water supply verification when a tentative map, parcel map, or development agreement for a project is submitted to a land use agency for approval. SB 221 applies to proposed residential development of more than 500 dwelling units with some exceptions. The need for an assessment or verification is determined by the lead agency for the project.

The WSA identifies water supply and reliability to the Mesa Water® Distribution System, now and into the future, and makes a determination regarding water supply sufficiency for the Project. **The WSA does not, nor is it intended to, identify infrastructure needs for service distribution for the proposed project.**

Michael Baker is the lead Engineer for the preparation of an EIR pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000, et seq. for the One Metro West Development. The proposed project is located in the north-western portion of the City of Costa Mesa, adjacent to I-405 and is approximately 1,000 feet from the Santa Ana River, approximately 5 miles from the Santa Ana River's outfall into the Pacific Ocean. The existing site is a 15.60-acre industrial area which will be demolished and replaced with the proposed One Metro West Development. The new development will consist of three residential apartment buildings comprised of 1,057 dwelling units, and 6,000 square feet of specialty retail. A fourth building will house 25,000 square feet of commercial creative office space.

The preparation of the EIR and the proposed 1,057 dwelling units stipulate that a Water Supply Assessment should be prepared for the development.

The WSA is prepared using the most recent Urban Water Management Plan (UWMP), the most recent Water Master Plan (WMP), and additional information provided by Mesa Water District and the Developer. These documents and information serve as the basis of data and includes a discussion of the Senate Bill 610 legislation, an overview of the proposed land use changes identified in the Project, analysis of water demands for Mesa Water®'s existing service area, and the project and other development projects over a 20-year planning period. The WSA also includes an analysis of reliability of Mesa Water®'s water supplies and water quality and

concludes with an analysis describing water supply during normal, single-dry, and multiple dry years over a 20-year planning period.

1.1 References

The following documents were used as reference information in the development of this WSA:

1. 2015 Urban Water Management
2. 2014 Water Master Plan Update
3. OCWD Engineer's Report
4. Mesa Water District's Actual 2019 Demand Data
5. Mesa Water District's Revised Water Demand Projections

2.0 LEGISLATION

2.1 SB 610 – Water Supply Planning

SB 610 was implemented in January 2002. SB 610 requires any development that qualifies as a “Project” under Water Code 10912 to be supported with a Water Supply Assessment (WSA) report drafted specifically to identify the public water system that shall supply water to the project and analyze the availability and reliability of water supply to the development. The WSA shall include the following, if applicable to the supply conditions:

1. Discussion with regard to whether the public water system’s total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system’s existing and planned future uses.
2. Identification of existing water supply entitlements, water rights, or water service contracts secured by the purveying agency and water received in prior years pursuant to those entitlements, rights, and contracts.
3. Description of the quantities of water received in prior years by the public water system under the existing water supply entitlements, water rights or water service contracts.
4. Water supply entitlements, water rights or water service contracts shall be demonstrated by supporting documentation such as the following:
 - a. Written contracts or other proof of entitlement to an identified water supply.
 - b. Copies of capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.
 - c. Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.
 - d. Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.
5. Identification of other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system.
6. If groundwater is included for the supply for a proposed project, the following additional information is required:
 - a. Description of groundwater basin(s) from which the proposed project will be supplied. Adjudicated basins must have a copy of the court order or decree adopted and a description of the amount of groundwater the public water system has the legal right to pump. For non-adjudicated basins, information on whether the DWR has identified the basin as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of DWR that characterizes the condition of the basin, and a detailed

- description of the efforts being undertaken in the basin to eliminate the long-term overdraft condition.
- b. Description and analysis of the amount and location of groundwater pumped by the public water system for the past five (5) years from any groundwater basin from which the proposed project will be supplied. Analysis should be based on information that is reasonably available, including, but not limited to, historic use records.
 - c. Description and analysis of the amount and location of groundwater projected to be pumped by the public water system from any groundwater basin from which the proposed project will be supplied. Analysis should be based on information that is reasonably available, including, but not limited to, historic use records.
 - d. Analysis of sufficiency of the groundwater from the basin(s) from which the proposed project will be supplied.
7. The WSA shall be included in any environmental document prepared for the project.
 8. The WSA may include an evaluation of any information included in that environmental document. A determination shall be made whether the projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.

2.2 [SB X7-7](#) and [EO B-37-16](#) and [EO B-40-17](#)

The Water Conservation Act of 2009 (SB X7-7) requires all California urban water agencies to set and meet certain demand reduction targets in order to assist the State in reducing urban water use 20 percent by 2020. The Act also requires each agency to monitor its progress toward its targets. This was implemented for the purpose of meeting the mandate to reduce per capita urban water consumption 20 percent statewide. SB X7-7 describes the overall process by which the Mesa Water District is to comply with the requirements. It specifically identifies methods for establishing urban water use targets.

Governor Jerry Brown issued a State of Emergency and Continued State of Emergency in 2014 in response to the persistent state-wide drought. In April 2015, Executive Order (EO) B-29-15 was issued by the Governor, which required a water use reduction of 25 percent, as compared to 2013 usage, throughout the State. The EO outlined specific water use reductions designed to heighten the urgency to reduce water consumption and facilitate the ability of local agencies to implement and enforce water conservation requirements.

Following unprecedented water conservation and plentiful winter rain and snow, on April 7, 2017 Governor Brown ended the drought State of Emergency in most of California, while maintaining water reporting requirements and prohibitions on wasteful practices such as water during or right after rainfall. EO B-40-17 lifts the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne, where emergency drinking water projects will continue to be implemented to help address diminished groundwater supplies. The Order also rescinds two

emergency proclamations from January and April 2014 and four drought-related Executive Orders issued in 2014 and 2015, as briefly discussed above. EO B-40-17 builds on actions taken in EO B-37-16, which remains in effect, to continue making water conservation a way of life in California. The State Water Resources Control Board (SWRCB) maintains urban water use report requirements and prohibitions on wasteful practices such as watering during or after rainfall, hosing off sidewalks and irrigating ornamental turf on public street medians. As directed by Governor Brown in EO B-37-16, the Board will separately take action to make reporting of wasteful water practices permanent.

The Executive Director for the SWRCB, on April 26, 2017, rescinded the water supply stress test requirements and remaining mandatory conservation standards for urban water suppliers. The action was in response to Governor Brown's earlier announcement ending the drought state of emergency and transitioning to a permanent framework for making water conservation a California way of life. Additional information can be found on the SWRCB website at:

http://www.swrcb.ca.gov/waterrights/water_issues/programs/drought/emergency_mandatory_regulations.shtml

3.0 ONE METRO WEST PROJECT

3.1 Project Description

The One Metro West Development (Project) site is a 16.2-acre industrial area located North of Interstate 405, bounded by Sunflower Avenue and the South Coast Collection commercial development to the east and industrial uses to the west. The existing site is comprised of one building totaling 345,900 square feet of industrial use space. The existing building houses a dietary supplement manufacturer, a commercial decoration warehouse, and a frozen bakery product and supplies manufacturer. The existing industrial space, including the building, concrete sidewalks, asphalt pavement, landscaping, etc. will be demolished and replaced with the proposed Project.

The Developer plans to set aside 0.45 acres to OCTA along I-405 for future widening. The new development will occupy the remaining 15.75 acres and consist of three residential apartment buildings comprised of 1,057 dwelling units, and 6,000 square feet of specialty retail. A fourth building will contain 25,000 square feet of commercial creative office space. Each building is also equipped with one or more of the following parking options: below grade parking structure, above grade parking structure, at-grade parking stalls. The One Metro West Development will also have 1.5 acres of publicly irrigated open space, plus an additional 0.75 acres of landscaped median along Sunflower Avenue. Table 3-1 summarizes the existing and proposed developments.

Table 3-1: Existing and Proposed Development

Land Use	Classification	Dwelling Units / Building Area	Land Area
Existing			
Industrial	Industrial	345,900 SF	16.2 Acres
Proposed			
Residential	Medium/High Density	1,057	--
Creative Office	Commercial	25,000 SF	--
Retail	Commercial	6,000 SF	--
Park	Open Space	--	1.5 Acres
Landscaped Median	Open Space	--	0.75 Acres

3.2 Project Water Demands

The land use changes proposed as part of this Project will result in increased water demands. The proposed demands were estimated based upon demand factors and peaking factors established in the 2014 Water Master Plan (2014 WMP). It is assumed that the demand factors listed in the 2014 WMP account for both indoor and outdoor water consumption based on their respective land use category. Mesa Water®’s 2014 Water Master Plan does not specify irrigation demand factors based on land use type. Since the percentage of common irrigated area is a significant portion of the total development area, Michael Baker estimated a separate irrigation demand factor for this development. The irrigation demand factor is based off industry standards in similarly developed cities. See Table 3-2 for the water demand factors used in this analysis.

Table 3-2: Water Demand Factors ^[1]

Water Demand Factor Classification	Average Annual Demand (AAD)	Max Day Demand (MDD) (AAD*1.5)	Peak Hour Demand (PHD) (MDD*1.5)
Residential			
Low Density Residential (<25 DU's/Ac)	2,500 gpd/acre	3,750 gpd/acre	5,625 gpd/acre
Mid/High Density Residential (>25 DU's/ Ac)	4,500 gpd/acre	6,750 gpd/acre	10,125 gpd/acre
Non-Residential			
Commercial	2,500 gpd/acre	3,750 gpd/acre	5,625 gpd/acre
Industrial	3,000 gpd/acre	4,500 gpd/acre	6,750 gpd/acre
Irrigation ^[2]	2,400 gpd/acre	--	--

[1] Source: 2014 Water Master Plan Technical Memoranda No. 1.2, prepared by Carollo Engineers

[2] Irrigation demands developed by Michael Baker using industry standard data

The existing site is occupied by a 345,900 square foot industrial building. Mesa Water District provided meter data for the FY 2019, which indicated a total water usage of 7,819 hundred cubic feet (CCF) for the year. The meter data indicates less water usage that would be expected from a manufacturing facility of this size, which means that the facility may have been abandoned part way through the year. Table 3-3 contains the existing project site demand.

Table 3-3: Existing Water Demands ^[1]

Land Use	Site Acreage	Building Square Footage	Average Day Demand [1]		Maximum Day Demand (MDD) (ADD*1.5)		Peak Hour Demand (PHD) (MDD*1.5)
			(gpd)	(gpm)	(gpm)	(gpm)	(gpm)
Industrial	16.2	345,900	16,024	11.13	24,036	16.69	25.04

[1] Source: Based on FY 2019 Mesa Water District meter data.

Similarly, the proposed commercial and irrigation demands were calculated using Mesa Water’s published demand factors. The calculations for those demands are summarized in Table 3-4.

To develop the residential demands, Michael Baker calculated the development density using the ratio of the total number of dwelling units to the total development area. The calculated density is 67.11 DU/Ac. This density value places the development within the most dense land use category that Mesa Water District publishes in the 2014 Water Master Plan Technical Memoranda No. 1.2, the Mid/High Land Use category. However, the Mid/High land use factor covers any land use density greater than 25 DU/acre. Typically, developments that fall into the Mid/High density land use category, in Mesa Water®’s service area, are less than 40 DU/acre.

Using the published demand factor would result in demands being artificially lower than can generally be expected from a development of this size. Therefore, Michael Baker developed a modified demand factor to account for the discrepancy between the land use density and the actual development density. The modified demand factor is developed by converting from demand per acre to demand per dwelling unit using the calculation in Equation 3-1.

Equation 3-1:

$$\text{Modified Demand Factor} = \frac{4,500 \text{ gpd/acre}}{25 \text{ DU/Ac}} = 180 \text{ gpd/DU}$$

The modified demand factor was used to calculate the proposed development’s average day demand. The demand calculation using the modified demand factor is summarized in Table 3-4.

Table 3-4: Project Water Demands ^[1]

Land Use	Category	DU	Area (Ac)	Average Day Demand		Maximum Day Demand		Peak Hour Demand
				(gpd)	(gpm)	(gpd)	(gpm)	(gpm)
Residential	Mid/High	1,057	--	190,260	132.13	285,390	198.19	297.28
Commercial	--	--	0.71	1,779	1.24	2,669	1.85	2.78
Irrigation ^[2]	--	-	2.25	5,400	3.75	13,500	9.38	25.03
Total				197,439	137.1	301,559	209.4	325.1

[1] Demand and peaking factors based on Table 3-2.

[2] Irrigation peaking factors based on industry standard data. Maximum Day= 2.5xAAD. Peak Hour Demand is MDDx2.67.

Based upon the proposed land use, the total average water demand for the Project is expected to increase the total system demand for this site. The total increase in demand is calculated in Table 3-5.

Table 3-5: Net Increase in Demand

Condition	Average Day Demand		Maximum Day Demand		Peak Hour Demand
	(gpd)	(gpm)	(gpd)	(gpm)	(gpm)
Existing	16,024	11.13	24,036	16.69	25.04
Proposed	197,439	137.11	301,559	209.42	325.09
Net Increase	181,416	125.98	277,523	192.72	300.06

4.0 MESA WATER DISTRICT WATER DEMAND

4.1 Overview

Since the last UWMP update, southern California’s urban water demand landscape has been largely shaped by the efforts to comply with SB X7-7. This law requires all of California’s retail urban water suppliers serving more than 3,000 acre-feet per year (AFY) or 3,000 service connections to achieve a 20 percent reduction in demands (from a historical baseline) by 2020. Mesa Water® has been actively engaged in efforts to reduce water use in its service area to meet the 2020 final water use target. Meeting this target is critical to ensure that Mesa Water® remains eligible to receive future state water grants and loans.

In April 2015, Governor Jerry Brown issued an Emergency Drought Mandate as a result of one of the most severe droughts in California’s record, requiring a collective reduction in statewide urban water use of 25 percent by February 2016. In response to the Governor’s mandate, Mesa Water® carried out more concentrated conservation efforts. It has also implemented higher (more restrictive) stages of its Water Conservation and Water Supply Emergency Program to achieve its demand reduction target of 20 percent prescribed by the California State Water Resources Control Board (SWRCB).

In addition to local water conservation ordinances, Mesa Water® has engaged in activities that include being a signatory member of the California Urban Water Conservation Council’s (CUWCC) Best Management Practices (BMP) Memorandum of Understanding (MOU) since 1994 and participating in water audit and leak detection programs. Mesa Water® has also partnered with MWDOC on educational programs, retrofits, and trainings.

These efforts have been part of statewide water conservation ordinances that require modifications to watering landscape watering, serving water in restaurants and bars, and reducing the amount of laundry cleaned by hotels.

The purpose of this section is to analyze Mesa Water®’s current water demands by customer type, factors that influence those demands, and projections of future water demands for the next 20 years. In addition, to satisfy SB X7-7 requirements, this section provides details of Mesa Water®’s SB X7-7 compliance method selection, baseline water use calculation, and 2015 and 2020 water use targets.

4.2 Factors Affecting Demand

Water demands within the Mesa Water® service area is dependent on many factors such as local climate conditions and the evolving hydrology of the region, demographics, land use characteristics, and economics are key factors of affecting demand for Mesa Water®. In addition to local factors, the watersheds of California’s imported water are experiencing drought conditions and impacting available and future water supplies.

4.2.1 Climate Characteristics

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

The average temperature ranges from 53.6°F in December to 68.8°F in August. Annual precipitation averages 10.6 inches, occurring mostly between November and March. The average evapotranspiration (ET) is about 45.6 inches per year, which is almost four times the annual average rainfall.

Local rainfall has limited impacts on reducing irrigation demand for Mesa Water®. Water that infiltrates into the soil may enter groundwater supplies depending on the local geography. However, due to the large extent of impervious cover in southern California, rainfall runoff quickly flows to a system of concrete storm drains and channels that lead directly to the ocean. OCWD is one agency that has successfully captured stormwater in the Santa Ana River for years and used it as an additional source of supply for groundwater recharge. There is growing awareness regarding the beneficial use of capturing and using stormwater as a local source and is anticipated to continue developing in the future.

Metropolitan's water supplies come from the State Water Project (SWP) and the Colorado River Aqueduct (CRA), influenced by climate conditions in northern California and the Colorado River Basin, respectively. Both regions have been suffering from multi-year drought conditions with record low precipitation which directly impact water supplies to southern California.

4.2.2 Demographics

Water is delivered to a current population of 110,000 according to the latest population estimate from Mesa Water®. The Mesa Water® service area population is projected to increase by 3 percent by 2040 representing an average growth rate of 0.1 percent per year. A population update will be conducted when the Mesa Water District boundaries are re-evaluated in 2022. In addition to the permanent population, the Mesa Water District service area attracts a significant number of visitors during the summer months and contributes to increased water demands. Furthermore, housing is becoming denser as new residential developments within Mesa Water District’s boundary are more frequently multi-storied. Table 4-1 shows the population projections in five-year increments out to 2040 within the Mesa Water® service area.

Table 4-1: Population - Current and Projected

Retailed: Population-- Current and Projected					
Population Served	2020	2025	2030	2035	2040
	110,000	110,552	111,105	111,662	112,222

4.2.3 Land Use

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

4.3 Water Use by Customer Type

An agency's water consumption can be projected by understanding the type of use and customer type creating the demand. Developing local water use profiles helps to identify when, where, how, quantity of water used, and by whom within the agency's service area. A comprehensive profile of the agency's service area enables the impacts of water conservation efforts to be assessed and to project the future benefit of water conservation programs.

The following sections of this UWMP provide an overview of Mesa Water® customer water consumption by customer account type as follows:

- Single-family Residential
- Multi-family Residential
- Commercial
- Institutional/ Government

Other water uses including sales to other agencies and non-revenue water are also discussed in this section.

4.3.1 Overview

There are approximately 25,000 current customer active service connections ranging in size from 5/8" to 10" in the Mesa Water® distribution system with all existing connections metered, there are no inactive connections. Approximately 70 percent of Mesa Water®'s water demand is residential, approximately 21 percent for Commercial, Industrial, and Institutional users, approximately 8 percent dedicated landscape irrigation, and the remaining less than one percent for other uses such as construction hydrant meters and fire-line testing.

Table 4-2 contains a summary of the Mesa Water® service area total water demand in fiscal year (FY) 2014-15 and the FY 2018-19 for potable water usage.

Table 4-2: Demands for Potable Water – Actual (AF)

Retail: Demands for Potable- Actual			
Use Type	Level of Treatment When Delivered	2015 Actual	2019 Actual ^[1]
		Volume	Volume
Single Family	Drinking Water	5,158	5,673
Multi-Family	Drinking Water	5,112	5,622
Institutional/Governmental	Drinking Water	1,137	843
Commercial	Drinking Water	3,242	2,362
Industrial	Drinking Water	301	242
Landscape	Drinking Water	1,879	1,309
Other	Drinking Water	15	14
Total		16,844	16,065
Note: [1] 2018 Land use breakdown volumes are approximate and were based on 2015 land use breakdown values and approximate land use percentages discussed in Section 4.3.1.			

Source: Mesa Water District 2015 UWMP Table 2-2

4.3.2 Non-Residential

Non-residential demands include commercial and dedicated landscape use. Mesa Water® has a mix of commercial uses (markets, shopping centers, restaurants, office complexes, etc.) and public entities (schools, airport, fairgrounds, fire stations, and government offices), that account for 21 percent of total demand. Dedicated landscape for public park facilities, businesses, and golf courses accounts for 8 percent of total potable demand.

4.3.3 Sales to Other Agencies

Mesa Water® does not currently sell water to other agencies.

4.3.4 Non-Residential

Non-revenue water is defined by the American Water Works Association (AWWA) to include the sum of specific types of water loss and any authorized, unbilled consumption that occurs within the water distribution system. Non-revenue water consists of three components: unbilled authorized consumption (e.g. hydrant flushing, firefighting, and blow-off water from well start-ups), real losses (e.g. leakage in mains and service lines), and apparent losses (unauthorized consumption and metering inaccuracies).

A water loss audit was conducted per AWWA methodology for Mesa Water® to understand the relation between water loss and revenue losses. This audit was developed by the AWWA Water Loss Task Force as a universal methodology that could be applied to any water distribution system. This audit meets the requirements of SB 1420 that was signed into law in September

2014. Understanding and controlling water loss from a distribution system is an effective way for Mesa Water® to achieve regulatory standards and manage their existing resources.

Table 4-3 below is a result of the AWWA Water Audit completed for Mesa Water®. The water loss summary was calculated over a one-year period from available data and the methodology explained above. The volume of water loss calculated for this period represents 2.2 percent of Mesa Water®’s annual water supplied, this presents an opportunity to identify areas of high water loss and develop strategies to minimize it.

Table 4-3: Water Loss Audit Summary

Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
07/2018	343 AF

Source: Mesa Water District FY 2019 Water Audit

4.4 Demand Projections

Demand projections were developed by Mesa Water® within their service area based on available data as well as land use, population and economic growth per the Master Plan that was adopted in November 2014.

4.4.1 Demand Projection Methodology

The water demand projections were an outcome of Mesa Water®’s Master Plan based on land use within the service area. Future land uses and development projects were individually identified by parcel for the Master Plan through two approaches. The first approach was to review all development plans that were received by the City of Costa Mesa Planning Department in 2012 and 2013. Eight developments of at least 14 units were deemed to be of a sufficient size to impact future water use within the service area and were included in the future demand forecast (Mesa Water® Master Plan, Carollo, November 2014). The second approach used aerial imagery of the service area to identify vacant lots and potential infill sites for future developments. Identified parcels included residential and commercial areas and were assumed to follow the zoning designation from the City of Costa Mesa 2004 General Plan Land Use Map.

Together the two approaches identified over 82 acres of parcels for future development within the service area for a corresponding demand projection of 357 AF, see Table 4-4 for a summary of the land use breakdown and projected demand breakdown.

Table 4-4: Projected Future Development Demand

Retail: Projected Future Development Demand			
Land Use Type	Water Demand Factor (gpd/acre)	Area (acres)	Projected Demand (AFY)
Low Density Residential	2,500	11.3	32
Mid/High Density Residential	4,500	53.5	270
Commercial	2,500	5.0	14
Industrial	3,000	12.4	42
Total	N/A	82.3	357

Source: Mesa Water District 2014 Water Master Plan Technical Memoranda 1.2, Table 10

Linear interpolation was used to project demands out to 2040 as shown in Section 4.4.3. The Banning Ranch Development water demand of 614 AFY was evaluated but not included in demand projections as the timing of this development is unknown.

4.4.2 Agency Refinement

Demand projections were developed by Mesa Water® as part of their 2014 Master Plan (Mesa Water® Master Plan, Carollo, November 2014) and used as the basis of the 2015 UWMP.

4.4.3 Projections throughout 2040

A key component of the 2015 UWMP is providing insight into Mesa Water®’s future water demand outlook. Mesa Water®’s 2015 potable water demand is 16,844 AFY, met through locally pumped groundwater. Table 4-5 contains a projection of the potable water demand through the year 2040.

Table 4-5: Demands for Potable Water- Projected (AF)

Retail: Demands for Potable- Projected						
Use Type	Projected Water Use					
	<i>Report to the Extent that Records are Available</i>					
	2019 Actual ^[1]	2020 ^[2]	2025	2030	2035	2040
Single Family	5,673	5,964	5,975	5,995	6,015	6,036
Multi-Family	5,622	5,911	5,922	5,942	5,962	5,982
Institutional/Governmental	843	1,305	1,316	1,321	1,325	1,330
Commercial	2,362	3,744	3,755	3,767	3,780	3,793
Industrial	242	338	349	350	351	353
Landscape	1,309	2,166	2,176	2,184	2,191	2,198
Other	14	16	17	17	17	17
Total	16,065	19,444	19,510	19,576	19,641	19,709

[1] See Table 4-2

[2] Mesa Water District 2019 Water Usage Forecast

Source: Mesa Water District 2015 UWMP Table 2-4

The above demand values were provided by Mesa Water® to MWDOC as part of the UWMP effort. As the regional wholesale supplier of Orange County, MWDOC works in collaboration with each of its retail agencies as well as Metropolitan, its wholesaler, to develop demand projections for imported water, if any. Mesa Water® has decreased its reliance on imported water by pursuing a variety of local groundwater supplies and water conservation strategies and with population expected to increase minimally, Mesa Water® per capita water use is projected to decrease as detailed in Section 4.5 below. Note future water savings and lower income residential demands are included in projections.

The demand data presented in this section accounts for passive savings in the future. Passive savings are water savings as a result of Codes, Standards, Ordinances, or Transportation and Land Use Plans as well as public outreach on water conservation and higher efficiency fixtures. Passive savings are anticipated to continue for the next 25 years and will result in continued water saving and reduced consumption levels.

4.4.4 Total Water Demand Projections

Based on the information provided above, the total demand for potable water is listed below in Table 4-6. It should be noted that the actual FY 2019 water demands were 16,065 AF, 18% lower than the 2020 forecasted water demands from Table 4-5. The actual to-date FY 2020 water demands are approximately 8% lower than the planned water budget of 17,748 AF.

Table 4-6: Total Water Demands (AF)

Retail: Total Water Demands						
	2019	2020	2025	2030	2035	2040
Potable Water	16,065	19,444	19,510	19,576	19,642	19,709
Total Water Demand	16,065	19,444	19,510	19,576	19,642	19,709

Source: Mesa Water District 2019 Water Usage Forecast

4.5 SB X7-7 Requirements

SB X7-7, signed into law on February 3, 2010, requires the State of California to reduce urban water use by 20 percent by the year 2020. Mesa Water® must determine baseline water use during their baseline period and water use targets for the years 2015 and 2020 to meet the state’s water reduction goal. Mesa Water® may choose to comply with SB X7-7 individually or as a region in collaboration with other retail water suppliers. Under the regional compliance option, Mesa Water® is still required to report its individual water use targets. Mesa Water® is required to be in compliance with SB X7-7 either individually or as part of the alliance, or demonstrate they have a plan or have secured funding to be in compliance, in order to be eligible for water related state grants and loans on and after July 16, 2016.

4.5.1 2015 and 2020 Targets

Under Compliance Option 1, the simple 20 percent reduction, the Mesa Water® 2015 target is 162 GPCPD and the 2020 target is 144 GPCPD as summarized in Table 4-7. The 2015 target is the midway value between the 10-year baseline and the confirmed 2020 target. In addition, the confirmed 2020 target needs to meet a minimum of 5 percent reduction from the five-year baseline water use.

Table 4-7: Baselines and Targets Summary

Baselines and Targets Summary					
Baseline Period	Start Year	End Year	Average Baseline GPCPD*	2015 Interim Target*	Confirmed 2020 Target*
10-15 Year	1996	2005	180	162	144
5 Year	2004	2008	177		

*All values are in Gallons per Capita per Day (GPCPD)

Source: Mesa Water District 2015 UWMP Table 2-9

Table 4-8 compares Mesa Water® 2015 water use target to its actual 2015 consumption. Based on this comparison, Mesa Water® is in compliance with its 2015 interim target and has already achieved the 2020 water use target, assuming water usage between 2016 and 2020 does not increase beyond the 2020 target.

Table 4-8: 2015 Compliance

Actual 2015 GPCPD*	2015 Interim Target GPCPD*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
108	162	Yes

*All values are in Gallons per Capita per Day (GPCPD)

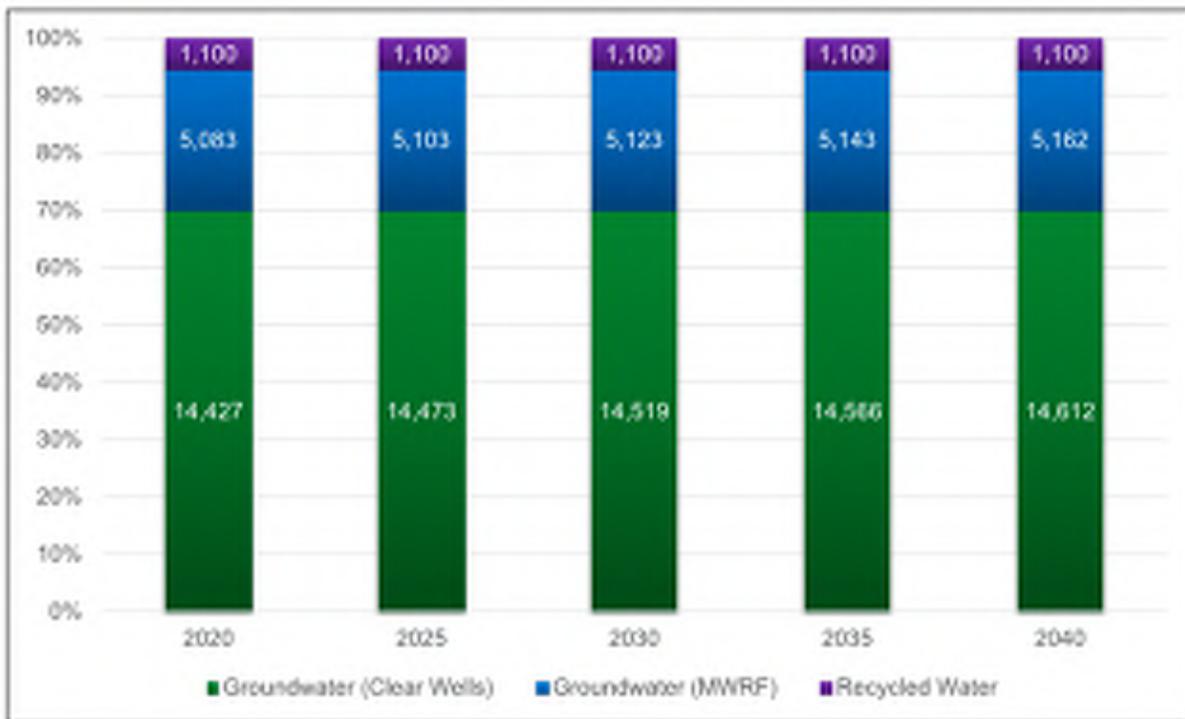
Source: Mesa Water District 2015 UWMP Table 2-10

5.0 WATER SOURCES AND SUPPLY RELIABILITY

5.1 Overview

Mesa Water® currently relies on a combination of clear and amber-tinted groundwater from the Orange County Groundwater Basin for 100% of its demands. Mesa Water® works together with three primary agencies, Metropolitan, MWDOC, and OCWD to ensure a safe and reliable water supply that will continue to serve the community in periods of drought and shortage. Mesa Water®’s projected water supply portfolio is shown on Figure 5-1.

Figure 5-1: Water Supply Sources in Mesa Water® (AF)



Source: Mesa Water District 2015 UWMP Figure 3-1

The following sections provide a detailed discussion of Mesa Water®’s water sources as well as the future water supply portfolio for the next 25 years. Additionally, Mesa Water®’s projected supply and demand under various hydrological conditions are compared to determine Mesa Water®’s supply reliability for the 25-year planning horizon.

5.2 Imported Water

Mesa Water® also has the ability to supplement its local groundwater with imported water purchased from Metropolitan through MWDOC. Metropolitan’s principal sources of water are the Colorado River via the CRA and the Lake Oroville watershed in Northern California through the SWP. The water obtained from these sources is treated at the Robert B. Diemer Filtration Plant located north of Yorba Linda. Typically, the Diemer Filtration Plant receives a blend of

Colorado River water from Lake Mathews through the Metropolitan Lower Feeder and SWP water through the Yorba Linda Feeder. In the past, imported water has represented up to about one third of Mesa Water®’s total annual supply, however, since the MWRf came on-line in January 2013, Mesa Water® has not needed to import water to meet demand. When requested by OCWD, Mesa Water® participates in the Coastal Pumping Transfer Program (CPTP) and receives a pre-determined amount of its groundwater pumping allocation from imported water. While Mesa Water® is currently 100 percent reliant on local sources, Mesa Water® also maintains imported water connections as backup to local supplies. Mesa Water® can obtain imported water from MWDOC through four connections as listed in Table 5-1.

The combined capacity from these connections is rated at approximately 42 mgd. However, the actual capacity that can be obtained is determined by the difference in hydraulic grade line (HGL) between the imported water transmission main and Mesa Water®’s distribution system as well as the conveyance capacity within Mesa Water®’s distribution system.

Mesa Water® has two metered interconnections with the City of Huntington Beach and the Irvine Ranch Water District (IRWD). In addition, there are 16 emergency interconnections with the City of Santa Ana, City of Newport Beach, and IRWD.

Table 5-1: Imported Water Capacity

Imported Water Pipeline/Turnout	Active Number of Turnouts	Turnout Capacity (cfs)	Maximum Delivery Capacity (mgd)
OC-44	3	67	43.3
OC-14	1	10	6.5
CM-2	1	15	9.7
CM-6	1	4	2.6
Subtotal	6	96	62.1

Although Mesa Water® has historically relied on imported water to supplement its demands, Mesa Water® is projected to meet its future demands using local groundwater through 2040.

5.3 Groundwater

Historically, local groundwater has been the cheapest and most reliable source of supply for Mesa Water®. In FY 2019 Mesa Water® relies on approximately 16,065 AFY of groundwater from the OC Basin. This source of supply meets approximately 94 percent of Mesa Water®’s total annual demand.

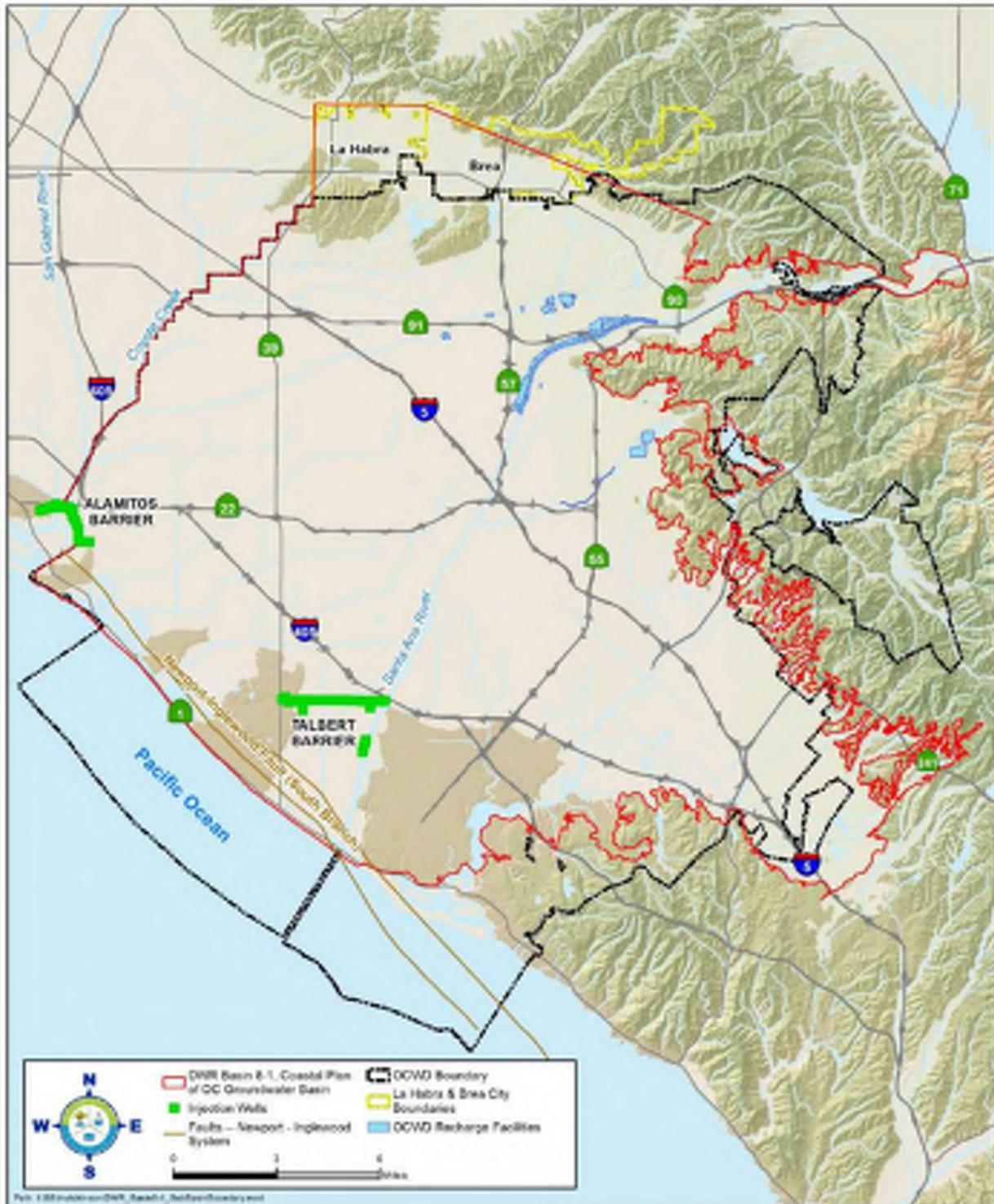
This section provides a description of the OC Basin and the management measures taken by OCWD to optimize local supply and minimize overdraft. This section also provides information on historical groundwater production as well as a 25-year projection of Mesa Water®’s groundwater supply.

5.3.1 Basin Characteristics

The OC Basin underlies the northerly half of Orange County beneath broad lowlands. The OC Basin covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, and the Pacific Ocean to the southwest. The OC Basin boundary extends to the Orange County-Los Angeles Line to the northwest, where groundwater flows across the county line into the Central Groundwater Basin of Los Angeles County. The total thickness of sedimentary rocks in the OC Basin is over 20,000 feet, with only the upper 2,000 to 4,000 feet containing fresh water. The Pleistocene or younger aquifers comprising this OC Basin are over 2,000 feet deep and form a complex series of interconnected sand and gravel deposits. The OC Basin's full volume is approximately 509,000 AF, for more information on The OC Basin operations, see the OCWD Annual Engineer's Report.

There are three major aquifer systems that have been subdivided by OCWD, the Shallow Aquifer System, the Principal Aquifer System, and the Deep Aquifer System. These three aquifer systems are hydraulically connected as groundwater is able to flow between each other through intervening aquitards or discontinuities in the aquitards. The Shallow Aquifer system occurs from the surface to approximately 250 feet below ground surface. Most of the groundwater from this aquifer system is pumped by small water systems for industrial and agricultural use. The Principal Aquifer system occurs at depths between 200 and 1,300 feet below ground surface. Over 90 percent of groundwater production is from wells that are screened within the Principal Aquifer system. Only a minor amount of groundwater is pumped from the Deep Aquifer system, which underlies the Principal Aquifer system and is up to 2,000 feet deep in the center of the OC Basin. The three major aquifer systems are shown on Figure 5-2.

Figure 5-2: Map of the Orange County Groundwater Basin and Its Major Aquifer Systems



Source: Mesa Water District 2015 UWMP Figure 3-2

The OCWD was formed in 1933 by a special legislative act of the California State Legislature to protect and manage the County's vast, natural, groundwater supply using the best available technology and defend its water rights to the OC Basin. This legislation is found in the State of California Statutes, Water – Uncodified Acts, Act 5683, as amended. The OC Basin is managed by OCWD under the Act, which functions as a statutorily-imposed physical solution.

Groundwater levels are managed within a safe basin operating range to protect the long-term sustainability of the OC Basin and to protect against land subsidence. OCWD regulates groundwater levels in the OC Basin by regulating the annual amount of pumping (OCWD, Groundwater Management Plan 2015 Update, June 2015).

5.3.2 Basin Production Percentage

The OC Basin is not adjudicated and as such, pumping from the OC Basin is managed through a process that uses financial incentives to encourage groundwater producers to pump a sustainable amount of water. The framework for the financial incentives is based on establishing the basin production percentage (BPP), the percentage of each Producer's total water supply that comes from groundwater pumped from the OC Basin. Groundwater production at or below the BPP is assessed a Replenishment Assessment (RA). While there is no legal limit as to how much an agency can pump from the OC Basin, there is a financial disincentive to pump above the BPP. Agencies that pump above the BPP are charged the RA plus the Basin Equity Assessment (BEA), which is calculated so that the cost of groundwater production is approximately equal to MWDOC's full-service rate. The BEA can be increased to discourage production above the BPP. The BPP is set uniformly for all Producers by OCWD on an annual basis.

The BPP is set based on groundwater conditions, availability of imported water supplies, and Basin management objectives. The supplies available for recharge must be estimated for a given year. The supplies of recharge water that are estimated are: 1) Santa Ana River stormflow, 2) Natural incidental recharge, 3) Santa Ana River baseflow, 4) GWRS supplies, and 5) other supplies such as imported water and recycled water purchased for the Alamitos Barrier. The BPP is a major factor in determining the cost of groundwater production from the OC Basin for that year.

In some cases, OCWD encourages treating and pumping groundwater that does not meet drinking water standards in order to protect water quality. This is achieved by using a financial incentive called the BEA Exemption. A BEA Exemption is used to clean up and contain the spread of poor quality water. OCWD uses a partial or total exemption of the BEA to compensate a qualified participating agency or Producer for the costs of treating poor quality groundwater. When OCWD authorizes a BEA exemption for a project, it is obligated to provide the replenishment water for the production above the BPP and forgoes the BEA revenue that OCWD would otherwise receive from the producer (OCWD, Groundwater Management Plan 2015 Update, June 2015).

There are multiple sources of information available that state the pumping capacity of Mesa Water®’s groundwater wells. The status and pump capacities of Mesa Water®’s clear water wells are listed in Table 5-2, while the amber wells are listed in Table 5-3.

Table 5-2: Clear Water Wells Capacity

Source	Status	Well Capacity (gpm)	Well Capacity (mgd)	Well Capacity (AFY)
Well 1	Active	2,400	3.47	3,871
Well 3	Active	2,260	3.25	3,645
Well 5	Active	3,800	5.47	6,129
Well 7	Active	1,500	2.16	2,420
Well 9	Active	1,980	2.85	3,194
Total Pumping Capacity		11,940	17.19	19,259

Table 5-3: Amber Wells and MWRf Capacity

Source	Current Status	2019 Capacity (gpm)	2019 Capacity (mgd)	2019 Capacity (AFY)
Well 6	Active	3,000	4.32	4,840
Well 11	Active	5,000	7.20	8,065
Well Pumping Capacity		8,000	11.52	12,904
MWRf Treatment Capacity		6,000	8.64	9,678

The clear water wells have a capacity of 17.19 MGD, or 19,259 AFY. The Mesa Water Reliability Facility (MWRf) treats amber colored water from two wells and have a combined capacity of 8.64 MGD, or 9,678 AFY.

5.3.2.1 2015 OCWD Groundwater Management Plan

OCWD was formed in 1933 by the California legislature to manage and operate the OC Basin in order to protect and increase the OC Basin’s sustainable yield in a cost-effective manner. As previously mentioned, the BPP is the primary mechanism used by OCWD to manage pumping in the OC Basin. In 2013, OCWD’s Board of Directors adopted a policy to establish a stable BPP with the intention to work toward achieving and maintaining a 75 percent BPP by FY 2015-16. Although BPP is set at 75 percent, based on discussions with OCWD a conservative BPP of 70 percent is assumed through 2040. Principles of this policy include:

- OCWD’s goal is to achieve a stable 75 percent BPP, while maintaining the same process of setting the BPP on an annual basis, with the BPP set in April of each year after a public hearing has been held and based upon the public hearing testimony, presented data, and reports provided at that time.
- OCWD must manage the OC Basin in a sustainable manner for future generations. The BPP will be reduced if future conditions warrant the change.

- Each project and program to achieve the 75 percent BPP goal will be reviewed individually and assessed for their economic viability.

The OC Basin’s storage levels would be managed in accordance to the 75 percent BPP policy. It is presumed that the BPP will not decrease as long as the storage levels are between 100,000 and 300,000 AF from full capacity. If the OC Basin is less than 100,000 AF below full capacity, the BPP will be raised. If the OC Basin is over 350,000 AF below full capacity, additional supplies will be sought after to refill the OC Basin and the BPP will be lowered.

The OC Basin is managed to maintain water storage levels of not more than 500,000 AF below full condition to avoid permanent and significant negative or adverse impacts. Operating the OC Basin in this manner enables OCWD to encourage reduced pumping during wet years when surface water supplies are plentiful and increase pumping during dry years to provide additional local water supplies during droughts.

OCWD determines the optimum level of storage for the following year when it sets the BPP each year. Factors that affect this determination include the current storage level, regional water availability, and hydrologic conditions. When the OC Basin storage approaches the lower end of the operating range, immediate issues that must be addressed include seawater intrusion, increased risk of land subsidence, and potential for shallow wells to become inoperable due to lower water levels (OCWD, Groundwater Management Plan 2015 Update, June 2015).

5.3.2.2 OCWD Engineer’s Report

The OCWD Engineer’s Report reports on the groundwater conditions and investigates information related to water supply and Basin usage within OCWD’s service area. The 2017-2018 Engineer’s Report indicates the total groundwater recharge, the total groundwater production, and the accumulated overdraft (AOD). Table 5-4 contains these values, and more information on the OC Groundwater Basin can be found in the OCWD Engineer’s Report in Appendix B.

Table 5-4: OC Groundwater Basin Summary

Retail: Orange County Groundwater Basin Summary	
Groundwater Recharge	352,637 AF
Groundwater Production	301,637 AF
Accumulated Overdraft (AOD)	(329,730) AF

Source: OCWD Engineer’s Report Appendix 5

5.3.3 Groundwater Historical Extraction

Pumping limitations set by the OCWD Basin Production Percentage (BPP) and the pumping capacity of the wells are the only constraints affecting the groundwater supply to Mesa Water®. A summary of the groundwater volume pumped by Mesa Water® is shown in Table 5-5.

Table 5-5: Groundwater Volume Pumped (AF)

Retail: Groundwater Volume Pumped		
Groundwater Type	Location or Basin Name	FY 2019
Alluvial Basin	Orange County Groundwater Basin	16,065
Total		16,065

Source: Mesa Water District 2015 UWMP Table 3-1

5.4 Summary of Existing and Planned Sources of Water

The actual and projected sources and volume of water for the year 2015 are displayed in Table 5-6 and Table 5-7 respectively.

Table 5-6: Water Supplies, Actual (AF)

Retail: Water Supplies - Actual				
Water Supply	Additional Detail on Water Supply	Water Quality	2015	2018
			Actual Volume	Actual Volume
Groundwater	Orange County Groundwater Basin	Drinking Water	16,844	16,065
Total			16,844	16,065

Source: Mesa Water District 2015 UWMP Table 3-2

Table 5-7: Water Supplies, Projected (AF)

Retail: Water Supplies - Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply				
		2020 ^[1]	2025 ^[2]	2030 ^[2]	2035 ^[2]	2040 ^[2]
		Reasonably Available Volume				
Groundwater	Clear Wells	11,161	14,047	14,095	14,142	14,190
Groundwater	MWRF	4,087	5,463	5,481	5,500	5,519
In-Lieu/CPTP	--	1,000	1,100	1,100	1,100	1,100
Total		16,248	20,610	20,676	20,742	20,809

[1] Mesa Water District’s FY 19 Water Supply Report

[2] Mesa Water District Water Usage Forecast

5.5 Supply Reliability

5.5.1 Overview

Every urban water supplier is required to assess the reliability of their water service to its customers under normal, dry, and multiple dry water years. Mesa Water® depends on 100 percent local groundwater supplies to meet its water demands and has taken numerous steps to ensure it has adequate supplies. While Mesa Water® does not project the delivery of imported water, the development of numerous local projects increases the reliability of the imported

water system. There are various factors that may impact reliability of supplies such as legal, environmental, water quality and climatic which are discussed below. The water supplies are projected to meet full-service demands; Metropolitan's 2015 UWMP finds that Metropolitan is able to meet, full-service demands of its member agencies starting 2020 through 2040 during normal years, single dry year, and multiple dry years, in case Mesa Water® should need to supplement its local supplies with imported water.

Metropolitan's 2015 Integrated Water Resources Plan (IRP) update describes the core water resources that will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2020 through 2040. The foundation of Metropolitan's resource strategy for achieving regional water supply reliability has been to develop and implement water resources programs and activities through its IRP preferred resource mix. This preferred resource mix includes conservation, local resources such as water recycling and groundwater recovery, Colorado River supplies and transfers, SWP supplies and transfers, in-region surface reservoir storage, in-region groundwater storage, out-of-region banking, treatment, conveyance and infrastructure improvements.

5.5.2 Factors Impacting Reliability

The Act requires a description of the reliability of the water supply and vulnerability to seasonal or climatic shortage. The following are some of the factors identified by Metropolitan and Mesa Water® that may have an impact on the reliability of Metropolitan supplies and local supplies.

5.5.2.1 Legal

The addition of more species under the Endangered Species Act and new regulatory requirements could impact SWP operations by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations.

5.5.2.2 Water Quality

5.5.2.2.1 Imported water

Metropolitan is responsible for providing high quality potable water throughout its service area. Over 300,000 water quality tests are performed per year on Metropolitan's water to test for regulated contaminants and additional contaminants of concern to ensure the safety of its waters. Metropolitan's supplies originate primarily from the CRA and from the SWP. A blend of these two sources, proportional to each year's availability of the source, is then delivered throughout Metropolitan's service area.

Metropolitan's primary water sources face individual water quality issues of concern. The CRA water source contains higher total dissolved solids (TDS) and the SWP contains higher levels of organic matter, lending to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's high level of organic matter, Metropolitan blends CRA and SWP

supplies and has upgraded all of its treatment facilities to include ozone treatment processes. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium VI while also investigating the potential water quality impact of emerging contaminants, N-nitrosodimethylamine (NDMA), and pharmaceuticals and personal care products (PPCP). While unforeseeable water quality issues could alter reliability, Metropolitan's current strategies ensure the deliverability of high quality water

The presence of Quagga Mussels in water sources is a water quality concern. Quagga Mussels are an invasive species that was first discovered in 2007 at Lake Mead, on the Colorado River. This species of mussels forms massive colonies in short periods of time, disrupting ecosystems and blocking water intakes. They are capable of causing significant disruption and damage to water distribution systems. Controlling the spread and impacts of this invasive species within the CRA requires extensive maintenance and results in reduced operational flexibility. It also resulted in Metropolitan eliminating deliveries of CRA water into Diamond Valley Lake (DVL) to keep the reservoir free from Quagga Mussels.

5.5.2.2.2 Groundwater

OCWD is responsible for managing the OC Basin. To maintain groundwater quality, OCWD conducts an extensive monitoring program that serves to manage the OC Basin's groundwater production, control groundwater contamination, and comply with all required laws and regulations. A network of nearly 700 wells provides OCWD a source for samples, which are tested for a variety of purposes. OCWD collects 600 to 1,700 samples each month to monitor Basin water quality. These samples are collected and tested according to approved federal and state procedures as well as industry-recognized quality assurance and control protocols.

Salinity is a significant water quality problem in many parts of southern California, including Orange County. Salinity is a measure of the dissolved minerals in water including both TDS and nitrates.

OCWD continuously monitors the levels of TDS in wells throughout the OC Basin. TDS currently has a California Secondary Maximum Contaminant Level (MCL) of 500 mg/L. The portions of the OC Basin with the highest levels are generally located in the Cities of Irvine, Tustin, Yorba Linda, Anaheim, and Fullerton. There is also a broad area in the central portion of the OC Basin where TDS ranges from 500 to 700 mg/L. Sources of TDS include the water supplies used to recharge the OC Basin and from onsite wastewater treatment systems, also known as septic systems. The TDS concentration in the OC Basin is expected to decrease over time as the TDS concentration of GWRS water used to recharge the OC Basin is approximately 50 mg/L.

Nitrates are one of the most common and widespread contaminants in groundwater supplies, originating from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. The MCL for nitrate in drinking water is set at 10 mg/L. OCWD regularly monitors nitrate levels in

groundwater and works with producers to treat wells that have exceeded safe levels of nitrate concentrations. OCWD manages the nitrate concentration of water recharged by its facilities to reduce nitrate concentrations in groundwater. This includes the operation of the Prado Wetlands, which was designed to remove nitrogen and other pollutants from the Santa Ana River before the water is diverted to be percolated into OCWD's surface water recharge system.

Although water from the Deep Aquifer System is of very high quality, it is amber-colored and contains a sulfuric odor due to buried natural organic material. These challenging aesthetic qualities require treatment before use as a source of drinking water. The total volume of the amber-colored groundwater is estimated to be approximately 1 MAF.

Other contaminants that OCWD monitors within the OC Basin include:

- Methyl Tertiary Butyl Ether (MTBE) – MTBE is an additive to gasoline that increases octane ratings but became a widespread contaminant in groundwater supplies. The greatest source of MTBE contamination comes from underground fuel tank releases. The primary MCL for MTBE in drinking water is 13 µg/L.
- Volatile Organic Compounds (VOC) – VOCs come from a variety of sources including industrial degreasers, paint thinners, and dry-cleaning solvents. Locations of VOC contamination within the OC Basin include the former El Toro marine Corps Air Station, the Shallow Aquifer System, and portions of the Principal Aquifer System in the Cities of Fullerton and Anaheim.
- NDMA – NDMA is a compound that can occur in wastewater that contains its precursors and is disinfected via chlorination and/or chloramination. It is also found in food products such as cured meat, fish, beer, milk, and tobacco smoke. The California Notification Level for NDMA is 10 ng/L and the Response Level is 300 ng/L. In the past, NDMA has been found in groundwater near the Talbert Barrier, which was traced to industrial wastewater dischargers.
- 1,4-Dioxane – 1,4-Dioxane is a suspected human carcinogen. It is used as a solvent in various industrial processes such as the manufacture of adhesive products and membranes.
- Perchlorate – Perchlorate enters groundwater through application of fertilizer containing perchlorate, water imported from the Colorado River, industrial or military sites that have perchlorate, and natural occurrence. Perchlorate was not detected in 84 percent of the 219 production wells tested between the years 2010 through 2014.
- Selenium – Selenium is a naturally occurring micronutrient found in soils and groundwater in the Newport Bay watershed. The bio-accumulation of selenium in the food chain may result in deformities, stunted growth, reduced hatching success, and suppression of immune systems in fish and wildlife. Management of selenium is difficult as there is no off-the-shelf treatment technology available.

- Constituents of Emerging Concern (CEC) – CECs are either synthetic or naturally occurring substances that are not currently regulated in water supplies or wastewater discharged but can be detected using very sensitive analytical techniques. The newest group of CECs include PCPPs and endocrine disruptors. OCWD’s laboratory is one of a few in the state of California that continuously develops capabilities to analyze for new compounds (OCWD, Groundwater Management Plan 2015 Update, June 2015).

5.5.2.3 Climate Change

Changing climate patterns are expected to shift precipitation patterns and affect water supply. Unpredictable weather patterns will make water supply planning more challenging. The areas of concern for California include a reduction in Sierra Nevada Mountain snowpack, increased intensity and frequency of extreme weather events, and rising sea levels causing increased risk of Delta levee failure, seawater intrusion of coastal groundwater basins, and potential cutbacks on the SWP and Central Valley Project (CVP). The major impact in California is that without additional surface storage, the earlier and heavier runoff (rather than snowpack retaining water in storage in the mountains), will result in more water being lost to the oceans. A heavy emphasis on storage is needed in the State of California.

In addition, the Colorado River Basin supplies have been inconsistent since about the year 2000, resulting in 13 of the last 16 years of the upper basin runoff being below normal. Climate models are predicting a continuation of this pattern whereby hotter and drier weather conditions will result in continuing lower runoff.

5.5.3 Normal-Year Reliability Comparison

Although not projected to be used, Mesa Water® has entitlements to receive imported water from Metropolitan through MWDOC via connection to Metropolitan's regional distribution system. Pipeline and connection capacity rights do not guarantee the availability of water, per se, but they do guarantee the ability to convey water when it is available to the Metropolitan distribution system. All imported water supplies are assumed available to Mesa Water® from existing water transmission facilities. The demand and supplies listed below also include local groundwater supplies that are available to Mesa Water® through OCWD by a pre-determined pumping percentage. Mesa Water® is 100 percent reliable on groundwater for normal year demands from 2020 through 2040.

For the 2015 UWMP, the normal year was selected using a range from 1990 through 2014. Due to ongoing drought conditions within California and the increased implementation of mitigation measures, this historical range was determined to represent an average water demand for this UWMP. The water demand forecasting model developed for the Orange County Reliability Study (described in Section 4.4.1), to project the 25-year demand for Orange County water agencies, also isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The explanatory variables of population, temperature, precipitation, unemployment rate, drought restrictions, and conservation measures were used

to create the statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition. The average (normal) demand is represented by the average water demand of 1990 to 2014 (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016).

5.5.4 Single-Dry Year Reliability Comparison

A single-dry year is defined as a single year of zero to minimal rainfall within a period that average precipitation is expected to occur. The water demand forecasting model developed for the Orange County Reliability Study (described in Section 4.4.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition (1990-2014). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the OC Basin area where the Mesa Water® service area is located (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016). Detailed information of the model is included in Appendix G of 2015 Mesa Water® Urban Water Management Plan.

Mesa Water®'s metering data indicates that it is 100 percent reliable on groundwater for single dry year demands from 2020 through 2040 with a demand increase of six percent from normal demand with significant reserves held by Metropolitan, local groundwater supplies, and conservation.

5.5.5 Multiple-Dry Year Reliability Comparison

Multiple-dry years are defined as three or more consecutive years with minimal rainfall within a period of average precipitation. The water demand forecasting model developed for the Orange County Reliability Study (described in Section 4.4.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition (1990-2014). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the OC Basin area where the Mesa Water® service area is located (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016). It is conservatively assumed that a three-year multi dry year scenario is a repeat of the single dry year over three consecutive years (FY 2011-12 through FY 2013-14).

Mesa Water® is capable of meeting all customers' demands with significant reserves held by Metropolitan, local groundwater supplies, and conservation in multiple dry years from 2020 through 2040 with a demand increase of six percent from normal demand with significant reserves held by Metropolitan, local groundwater supplies, and conservation. The basis of the water year is displayed in Table 5-8.

Table 5-8: Basis of Water Year Data

Retail: Basis of Water Year Data			
Year Type	Base Year	Available Supplies if Year Type Repeats	
		<input type="checkbox"/>	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP Location
		<input checked="" type="checkbox"/>	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available	% of Average Supply
Average Year	1990-2014		100%
Single-Dry Year	2014		106%
Multiple-Dry Years 1st Year	2012		106%
Multiple-Dry Years 2nd Year	2013		106%
Multiple-Dry Years 3rd Year	2014		106%
NOTES:			
[1] Developed by MWDOC as 2015 Bump Methodology			

Source: Mesa Water District 2015 UWMP Table 3-4

5.6 Supply and Demand Assessment

A comparison between the supply and the demand for projected years between 2010 and 2040 is shown in Tables 5-9 and 5-10. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures

Table 5-9: Normal Year Supply and Demand Comparison (AF)

Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	16,248	20,610	20,676	20,742	20,809
Demand totals	16,248	20,610	20,676	20,742	20,809
Difference	0	0	0	0	0

A comparison between the supply and the demand in a single dry year is shown in Table 5-10. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

Table 5-10: Dry Year Supply and Demand Comparison (AF)

Retail: Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	21,847	21,917	21,987	22,058	22,126
Demand totals	21,847	21,917	21,987	22,058	22,126
Difference	0	0	0	0	0

Source: Mesa Water District 2015 UWMP Table 3-6

A comparison between the supply and the demand in multiple dry years is shown in Table 5-11.

Table 5-11: Multiple Dry Years Supply and Demand Comparison (AF)

Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First Year	Supply Totals	21,847	21,917	21,987	22,058	22,126
	Demand Totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
Second Year	Supply Totals	21,847	21,917	21,987	22,058	22,126
	Demand Totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
Third Year	Supply Totals	21,847	21,917	21,987	22,058	22,126
	Demand Totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
NOTES:						
[1] Developed by MWDOC as 2015 Bump Methodology						

Source: Mesa Water District 2015 UWMP Table 3-7

5.7 Water Shortage Contingency Plan

In connection to recent water supply challenges, the State Water Board found that California has been subject to multi-year droughts in the past, and the American Southwest is becoming drier, increasing the probability of prolonged droughts in the future. Due to current and potential future water supply shortages, Governor Brown issued a drought emergency proclamation in January 2014 and signed the 2014 Executive Order which directs urban water suppliers to implement drought response plans to limit outdoor irrigation and wasteful water practices if they are not already in place. Pursuant to California Water Code Section 106, it is the declared policy of the State that the use of water for domestic use is the highest use of water and that the next highest use is for irrigation. In southern California, the development of such policies has occurred at both the wholesale and retail level. This section describes the water supply shortage policies Metropolitan, MWDOC, and Mesa Water® have in place to respond to events including catastrophic interruption and up to a 50 percent reduction in water supply.

5.7.1 Shortage Actions

5.7.1.1 MWDOC Water Supply Allocation Plan

The Board of Directors adopted the Water Conservation and Water Supply Emergency Program, Ordinance No. 26, on May 14, 2015. Ordinance No. 26 establishes a comprehensive staged water conservation program that will encourage reduced water consumption within the Mesa Water® service area through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within Mesa Water®. Along with permanent water conservation requirements, the Mesa Water®

Comprehensive Water Conservation Program consists of the following three (3) stages found in Table 5-11 to respond to a reduction in potable water available to Mesa Water® for distribution to its customers with year round requirements in effect at all times unless a mandatory conservation stage has been implemented by the Board of Directors (Mesa Water District, Ordinance No. 26, May 2015, See Appendix C).

Table 5-12: Stages of Water Shortage Contingency Plan

Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction ^[1]	Water Supply Condition
1	Up to 20%	A Level 1 Water Supply Shortage exists when Mesa Water® determines, in its sole discretion, a water supply shortage or threatened shortage exists, and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.
2	Up to 30%	A Level 1 Water Supply Shortage exists when Mesa Water® determines, in its sole discretion, a water supply shortage or threatened shortage exists, and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.
3	Up to 50%	A Level 3 Water Supply Shortage condition is also referred to as an "Emergency" condition. A Level 3 condition exists when Mesa Water® declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to maintain sufficient water supplies for public health and safety.
[1] One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.		

Source: Mesa Water District 2015 UWMP Table 5-1

5.7.2 Three-Year Minimum Water Supply

As a matter of practice, Metropolitan does not provide annual estimates of the minimum supplies available to its member agencies. As such, Metropolitan member agencies must develop their own estimates for the purposes of meeting the requirements of the Act.

Section 135 of the Metropolitan Water District Act declares that a member agency has the right to invoke its “preferential right” to water, which grants each member agency a preferential right to purchase a percentage of Metropolitan’s available supplies based on specified, cumulative financial contributions to Metropolitan. Each year, Metropolitan calculates and distributes each member agency’s percentage of preferential rights. However, since Metropolitan’s creation in

1927, no member agency has ever invoked these rights as a means of acquiring limited supplies from Metropolitan.

As an alternative to invoking preferential rights, Metropolitan and its member agencies accepted the terms and conditions of Metropolitan’s shortage allocation plan, which allocated imported water under limited supply conditions. In fact, in FY 2015-2016, Metropolitan implemented its WSAP at a stage level 3 (seeking no greater than a 22.25 percent regional reduction of water use), which is the largest reduction Metropolitan has ever imposed on its member agencies. This WSAP level 3 reduction was determined when Metropolitan water supplies from the SWP was at its lowest levels ever delivered and water storage declined greater than 1 MAF in one year.

MWDOC has adopted a shortage allocation plan and accompanying allocation model that estimates firm demands on MWDOC. Assuming MWDOC would not be imposing mandatory restrictions if Metropolitan is not, the estimate of firm demands in MWDOC’s latest allocation model has been used to estimate the minimum imported supplies available to each of MWDOC’s retail agencies for 2015-2018. Thus, the estimate of the minimum imported supplies available to Mesa Water® is 18,526 AF, as a backup to its groundwater supplies as shown in Table 5-12 (MWDOC, Water Shortage Allocation Model, November 2015).

Table 5-13: Minimum Supply 2016-2018 (AF)

Retail: Minimum Supply 2016-2018			
	2016	2017	2018
Available Water Supply	18,526	18,526	18,526

Source: Mesa Water District 2015 UWMP Table 5-2

5.7.3 Catastrophic Supply Interruption

5.7.3.1 Metropolitan

Metropolitan has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM Plan and WSAP. Metropolitan also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the southern California region, including seismic events along the San Andreas Fault. In addition, Metropolitan is working with the state to implement a comprehensive improvement plan to address catastrophic occurrences outside of the southern California region, such as a maximum probable seismic event in the Delta that would cause levee failure and disruption of SWP deliveries. For greater detail on Metropolitan’s planned responses to catastrophic interruption, please refer to Metropolitan’s 2015 UWMP.

5.7.3.2 Mesa Water District Water Shortage Emergency Response

In 1991, in accordance with the requirements of Assembly Bill IIX, Mesa Water® developed a comprehensive water shortage contingency plan as an amendment to the 1990 UWMP. The plan

included all of the information necessary to meet the requirements of subdivision (e) of California Water Code Section 10631.

Public meetings and the availability of copies of the draft Water Shortage Contingency Plan were properly noticed in the local newspaper and were available for public review.

In addition to droughts, earthquakes, hazardous material spills or leaks, severe storms or floods, and widespread power outages can cause water supply shortages. Mesa Water® keeps abreast of water supply situations and has always taken a proactive approach in responding to water shortages. It is Mesa Water®'s policy to inform customers of current and projected water supply situations long before Mesa Water®, or its suppliers, declare water shortages.

5.7.4 Prohibitions, Penalties and Consumption Reduction Method

5.7.4.1 Mesa Water District Water Shortage Emergency Response

The Water Conservation Ordinance No. 26 lists water conservation requirements which shall take effect upon implementation by the Board of Directors. These prohibitions shall promote the efficient use of water, reduce or eliminate water waste, complement the Mesa Water® Water Quality regulations and urban runoff reduction efforts, and enable implementation of the Mesa Water® Water Shortage Contingency Measures. A list of Mesa Water®'s prohibitions can be found in Table 5-13.

Table 5-14: Restrictions and Prohibitions on End Uses

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
Permanent Year-Round	Landscape - Limit landscape irrigation to specific times	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.	No
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation	-	No
Permanent Year-Round	Other - Prohibit use of potable water for washing hard surfaces	This restriction does not apply in situations necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a handheld hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high pressure water broom.	No
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than seven (7) days of receiving notice from Water Mesa®.	No
Permanent Year-Round	Water Features - Restrict water use for decorative water features, such as fountains	Operating a water fountain or other decorative water feature that does not use recirculated water is prohibited.	No
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	-	No

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
Permanent Year-Round	CII - Restaurants may only serve water upon request	-	No
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service	-	No
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water®.	No
Permanent Year-Round	Other	Installation of non-recirculating water systems is prohibited in new commercial conveyor car was and new commercial laundry systems.	No
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves	-	No
Permanent Year-Round	Other	All commercial conveyor car wash systems must use re-circulating water systems or must secure a waiver of this requirement from Mesa Water®.	No
1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water®. This provision does not apply to watering or irrigating by use of a handheld bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than seventy-two (72) hours of receiving notice from Water Mesa®.	Yes
1	Landscape - Other landscape restriction or prohibition	Irrigation is prohibited during rain events	Yes

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
2	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water®. This provision does not apply to watering or irrigating by use of a handheld bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than forty-eight (48) hours of receiving notice from Water Mesa®.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than twenty-four (24) hours of receiving notice from Water Mesa®.	Yes
3	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	-	Yes
3	Other water feature or swimming pool restriction	Filling and refilling of residential swimming pools or outdoor spas with water is prohibited.	Yes

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
3	Other	No new potable water service, new temporary meters, and statement of immediate ability to serve or provide water service will be issued except under the following circumstances: 1) a valid, unexpired building permit has been issued for the project, 2) the project is necessary to protect the public health, safety, and welfare, or the applicant provides substantial evidence of an enforceable commitment that water demand for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of Mesa Water®.	Yes

Source: Mesa Water District 2015 UWMP Table 5-3

5.7.4.2 Penalties

Any customer who violates provisions of the Water Conservation Program by either excess use of water or by specific violation of one or more of the applicable water use restrictions for a particular mandatory conservation stage may be cited by Mesa Water® and subject to written notices, surcharges, fines, flow restrictions, and/or service termination.

The first and second violations will result in a written warning issued by Mesa Water®. During effective periods of Level 1, Level 2, and Level 3-Water Supply Shortages, the third violation will result in a written violation along with a conservation fee of one hundred dollars (\$100). A fourth and any subsequent violation will receive in a written warning along with a conservation fee of (\$200). In addition to any fines, Mesa Water® may install a flow restricting device and/or disconnect a customer's water service for a willful violation of mandatory restrictions (Mesa Water District, Ordinance No. 26, May 2015).

5.7.4.3 Consumption Reduction Methods

Table 5-14 lists the consumption reduction methods that will be used to reduce water use in restrictive stages.

Table 5-15: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods

Retail Only: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference
1	Other	Stage 1 Water Conservation Measures
2	Other	Stage 2 Water Conservation Measures
3	Other	Stage 3 Water Conservation Measures

Source: Mesa Water District 2015 UWMP Table 5-4

5.7.5 Reduction Measuring Mechanism

Mesa Water®'s system is monitored by a modern computer-based Supervisory Control and Data Acquisition (SCADA) system. This system allows Mesa Water® staff to monitor the status and control all elements of the Mesa Water® system from one central and various remote locations. The SCADA system continuously records data and printed reports of system conditions can be generated on demand.

All customer-billing records are maintained on a SQL database system using Cogsdale Customer Information Software. Mesa Water®'s customer information and billing software has the capability to generate usage reports in formats necessary to monitor customer usage.

MWDOC will provide each member agency with monthly water use reports that will compare each member agency's current cumulative retail usage to their allocation baseline from Metropolitan. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.

6.0 CONCLUSION

Mesa Water District optimizes its water resource supply through an integrated resource approach, utilizing available water programs and projects. Mesa Water® receives its water from groundwater, imported water.

The WSA includes a discussion of the Senate Bill 610 legislation, an overview of the One Metro West, and analysis of water demands for Mesa Water®'s existing service the proposed changes to Mesa Water® development projects over the UWMP planning horizon. The WSA also includes an analysis of reliability of Mesa Water®'s water supplies and water quality and concludes with a sufficiency analysis of water supply during normal, single-dry, and multiple dry years for the next 20 years and build out.

The WSA does not evaluate the adequacy of the Mesa Water®'s infrastructure to handle the available water supplies nor does it make any recommendations with respect to capital improvements that may be necessary in order to provide an adequate level of service to the proposed development projects.

This WSA identifies a program of options to provide sufficient water supply for One Metro West over a 20-year planning period as well as build out.

The proposed One Metro West includes changes to the land use of the existing 16.2 acre site from industrial to a mixed use development which includes residential, commercial, and office land use. The change in land use results in a net increase of the maximum day demands by 288,058 gpd, or 322.67 AFY.

Mesa Water® obtains water from the local groundwater sources produced by District wells, and if needed, imported water via Metropolitan Water District. Mesa Water® currently is able to rely solely on own groundwater wells.

The information included in this Water Supply Assessment identifies programs and activities that collectively represent reasonable opportunities to ensure an adequate supply of water for Mesa Water®, inclusive of the subject Project, now and into the future.

Mesa Water® can provide an adequate supply of water and has opportunities to increase water resources by the following methods. First, Mesa Water® has the capability of utilizing additional groundwater capacity from the existing wells. Second, water conservation efforts and regulations can provide additional water resources.

APPENDIX

APPENDIX A - MESA WATER DISTRICT 2015 URBAN WATER MANAGEMENT PLAN



2015

URBAN WATER MANAGEMENT PLAN

FINAL

JUNE 2016

A large, solid blue graphic element in the bottom right corner of the page, consisting of a right-angled triangle with a white diagonal line running from the bottom-left corner to the top-right corner. A thin white horizontal line extends from the left edge of the page to the start of the blue graphic.

2015 URBAN WATER MANAGEMENT PLAN

Mesa Water District

FINAL



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- I Water Use Efficiency Implementation Report
- J CUWCC BMP Report

ACRONYMS AND ABBREVIATIONS

20x2020	20% water use reduction in GPCD by year 2020
Act	Urban Water Management Planning Act
AF	Acre-Feet
AFY	Acre-Feet per Year
AMR	Automatic Meter Reading
AWWA	American Water Works Association
BEA	Basin Equity Assessment
BMP	Best Management Practice
BPP	Basin Production Percentage
CCC	California Coastal Commission
CDR	Center for Demographic Research
CEC	Constituents of Emerging Concern
CII	Commercial/Industrial/Institutional
CMMS	Computerized Maintenance Management System
CMSD	Costa Mesa Sanitary District
CRA	Colorado River Aqueduct
CUP	Conjunctive Use Program
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DMM	Demand Management Measure
DOF	Department of Finance
DVL	Diamond Valley Lake
DWR	Department of Water Resources
ET	Evapotranspiration
FY	Fiscal Year
GAP	Green Acres Project
GPCD	Gallons per Capita per Day
GPM	Gallons per Minute
GWRS	Groundwater Replenishment System
H ₂ O ₂	Hydrogen Peroxide
HCF	Hundred Cubic Feet
HECW	High Efficiency Clothes Washer
HET	High Efficiency Toilet
IPR	Indirect Potable Reuse
IRP	Integrated Water Resource Plan
IRWD	Irvine Ranch Water District
IWA	International Water Association
LRP	Local Resources Program
LTFP	Long-Term Facilities Plan

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MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
Mesa Water®	Mesa Water District
Metropolitan	Metropolitan Water District of Southern California
MF	Microfiltration
MGD	Million Gallons per Day
MHI	Median Household Income
MOU	Memorandum of Understanding Regarding Urban Water Conservation in California
MTBE	Methyl Tertiary Butyl Ether
MWDOC	Municipal Water District of Orange County
MWRF	Mesa Water Reliability Facility
NDMA	N-nitrosodimethylamine
OC Basin	Orange County Groundwater Basin
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
PCH	Pacific Coast Highway
Poseidon	Poseidon Resources LLC
PPCP	Pharmaceuticals and Personal Care Product
RA	Replenishment Assessment
RHNA	Regional Housing Needs Assessment
RO	Reverse Osmosis
SBx7-7	Senate Bill 7 as part of the Seventh Extraordinary Session
SCAB	South Coast Air Basin
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SDP	Seawater Desalination Program
SWP	State Water Project
SWRCB	California State Water Resources Control Board
TDS	Total Dissolved Solids
UV	Ultraviolet
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
WBIC	Weather Based Irrigation Controller
WEROC	Water Emergency Response Organization of Orange County
WF-21	Water Factory 21
WISG	Water Issues Study Group
WSAP	Water Supply Allocation Plan
WSDM	Water Surplus and Drought Management

1 INTRODUCTION

1.1 Urban Water Management Plan Requirements

Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act) require every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to prepare, adopt, and file an Urban Water Management Plan (UWMP) with the California Department of Water Resources (DWR) every five years in the years ending in zero and five. The 2015 UWMP updates are due to DWR by July 1, 2016.

This 2015 UWMP provides DWR with a detailed summary of present and future water resources and demands within Mesa Water District's (Mesa Water®) service area and assesses its water resource needs. Specifically, the UWMP provides water supply planning for a 25-year planning period in five-year increments and identifies water supplies needed to meet existing and future demands. The demand analysis must identify supply reliability under three hydrologic conditions: a normal year, a single-dry year, and multiple-dry years. Mesa Water®'s 2015 UWMP updates the 2010 UWMP in compliance with the requirements of the Act as amended in 2009, and includes a discussion of:

- Water Service Area and Facilities
- Water Sources and Supplies
- Water Use by Customer Type
- Demand Management Measures (DMM)
- Water Supply Reliability
- Planned Water Supply Projects and Programs
- Water Shortage Contingency Plan
- Recycled Water Use

Since the original Act's passage in 1983, several amendments have been added. The most recent changes affecting the 2015 UWMP include Senate Bill 7 as part of the Seventh Extraordinary Session (SBx7-7) and SB 1087. SBx7-7, or the Water Conservation Act of 2009, is part of the Delta Action Plan that stemmed from the Governor's goal to achieve a 20 percent statewide reduction in urban per capita water use by 2020 (20x2020). Reduction in water use is an important part of this plan that aims to sustainably manage the Bay Delta and reduce conflicts between environmental conservation and water supply; it is detailed in Section 3.2.2. SBx7-7 requires each urban retail water supplier to develop urban water use targets to achieve the 20x2020 goal and the interim ten percent goal by 2015. Each urban retail water supplier must include in its 2015 UWMPs the following information from its target-setting process:

- Baseline daily per capita water use
- 2020 urban water use target
- 2015 interim water use target compliance

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- Compliance method being used along with calculation method and support data
- An implementation plan to meet the targets

The other recent amendment, made to the UWMP on September 19, 2014, is set forth by SB 1420, Distribution System Water Losses. SB 1420 requires water purveyors to quantify distribution system losses for the most recent 12-month period available. The water loss quantification is based on the water system balance methodology developed by the American Water Works Association (AWWA).

The sections in this UWMP correspond to the outline of the Act, specifically Article 2, Contents of Plans, Sections 10631, 10632, and 10633. The sequence used for the required information, however, differs slightly in order to present information in a manner reflecting the unique characteristics of Mesa Water® utility. The UWMP Checklist has been completed, which identifies the location of Act requirements in this Plan and is included in Appendix A. This is an individual UWMP for a retail agency, as shown in Tables 1-1 and 1-2. Table 1-2 also indicates the units that will be used throughout this document.

Table 1-1: Plan Identification

Plan Identification		
Select Only One	Type of Plan	Name of RUWMP or Regional Alliance
<input checked="" type="checkbox"/>	Individual UWMP	
<input type="checkbox"/>	Water Supplier is also a member of a RUWMP	
<input type="checkbox"/>	Water Supplier is also a member of a Regional Alliance	Orange County 20x2020 Regional Alliance
<input type="checkbox"/>	Regional Urban Water Management Plan (RUWMP)	
NOTES:		

Table 1-2: Agency Identification

Agency Identification	
Type of Agency	
<input type="checkbox"/>	Agency is a wholesaler
<input checked="" type="checkbox"/>	Agency is a retailer
Fiscal or Calendar Year	
<input type="checkbox"/>	UWMP Tables Are in Calendar Years
<input checked="" type="checkbox"/>	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
07/01	
Units of Measure Used in UWMP	
Unit	AF
NOTES:	

1.2 Agency Overview

Mesa Water® is located in a community that originated in about 1906. The La Habra Valley Land and Water Company, which drilled the first well in 1910, developed the first water system in the area. In 1913, the Fairview Farms Mutual Water Company constructed a system for agricultural purposes and in 1918; the Newport Heights Irrigation District was formed to serve domestic and irrigation water. These two agencies acquired the facilities of the La Habra Water Company.

With continued growth in the early 1900's the Newport Mesa Irrigation District and Santa Ana Heights Mutual Water Company were created. Fairview Farms Mutual Water Company later became the Fairview County Water District; Newport Mesa Irrigation District became the Newport Mesa County Water District. In 1953, the City of Costa Mesa became an incorporated city and in 1955 created a municipal water system to serve the areas beyond the four existing Mesa Water® boundaries.

On June 30, 1959, the Governor of the State of California signed Senate Bill 1375 (Costa Mesa District Merger Law), as introduced by Senator Murdy. The general provisions of this law called for the consolidation of four predecessor agencies: the Newport Heights Irrigation District, the Fairview County Water District, the Newport Mesa County Water District, and the City of Costa Mesa Water Department.

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

Mesa Water® receives its water from two main sources, the Lower Santa Ana River Groundwater Basin, which is managed by the Orange County Water District (OCWD) and a backup source of imported water from the Municipal Water District of Orange County (MWDOC). MWDOC is Orange County's wholesale supplier and is a member agency of the Metropolitan Water District of Southern California (Metropolitan). Mesa Water®'s location within MWDOC is shown on Figure 1-1.

Board of Directors and Management Team

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

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

The current members of the Board of Directors include:

- Shawn Dewane – President Division 5
- Ethan Temianka – Vice President Division 3
- Jim Atkinson – Director Division 4
- Fred R. Bockmiller, Jr., P.E. – Director Division 1
- James R. Fislser – Director Division 2

Mesa Water® represents a specific geographic area and collects no tax revenues, is not subject to the State's Public Utility Commission, and is not part of any city or the government of the County of Orange. Mesa Water® has maintained strong and cooperative relationships with cities and related public agencies that border or interact with it.

1.3 Service Area and Facilities

1.3.1 Mesa Water District Service Area

The Mesa Water® service area is located along the coast of southern California within the County of Orange. Mesa Water® is between one-eighth of a mile to almost six miles inland of the Pacific Ocean. It is also approximately 37 miles southeast of Los Angeles, 88 miles north of San Diego and 475 miles south of San Francisco. Mesa Water® provides water service to approximately 108,000 customers through approximately 23,760 total metered service connections, of which 699 are fire line services. The service area is an 18 square mile area that includes most of the City of Costa Mesa, portions of the City of Newport Beach and a small portion of unincorporated Orange County. Mesa Water® shares borders with the County of Orange, the Cities of Huntington Beach, Fountain Valley, Irvine, Santa Ana, and Newport Beach.

Mesa Water® is located within the County of Orange, which has one of the most robust economies in California. The Mesa Water® service area includes notable landmarks and major regional facilities such as: the John Wayne Orange County Airport, State of California's Fairview Development Center, Segerstrom Center for the Arts, Orange County Fairgrounds, Orange Coast College, and South Coast Plaza shopping complex. The Mesa Water® service area is illustrated on Figure 1-2.

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

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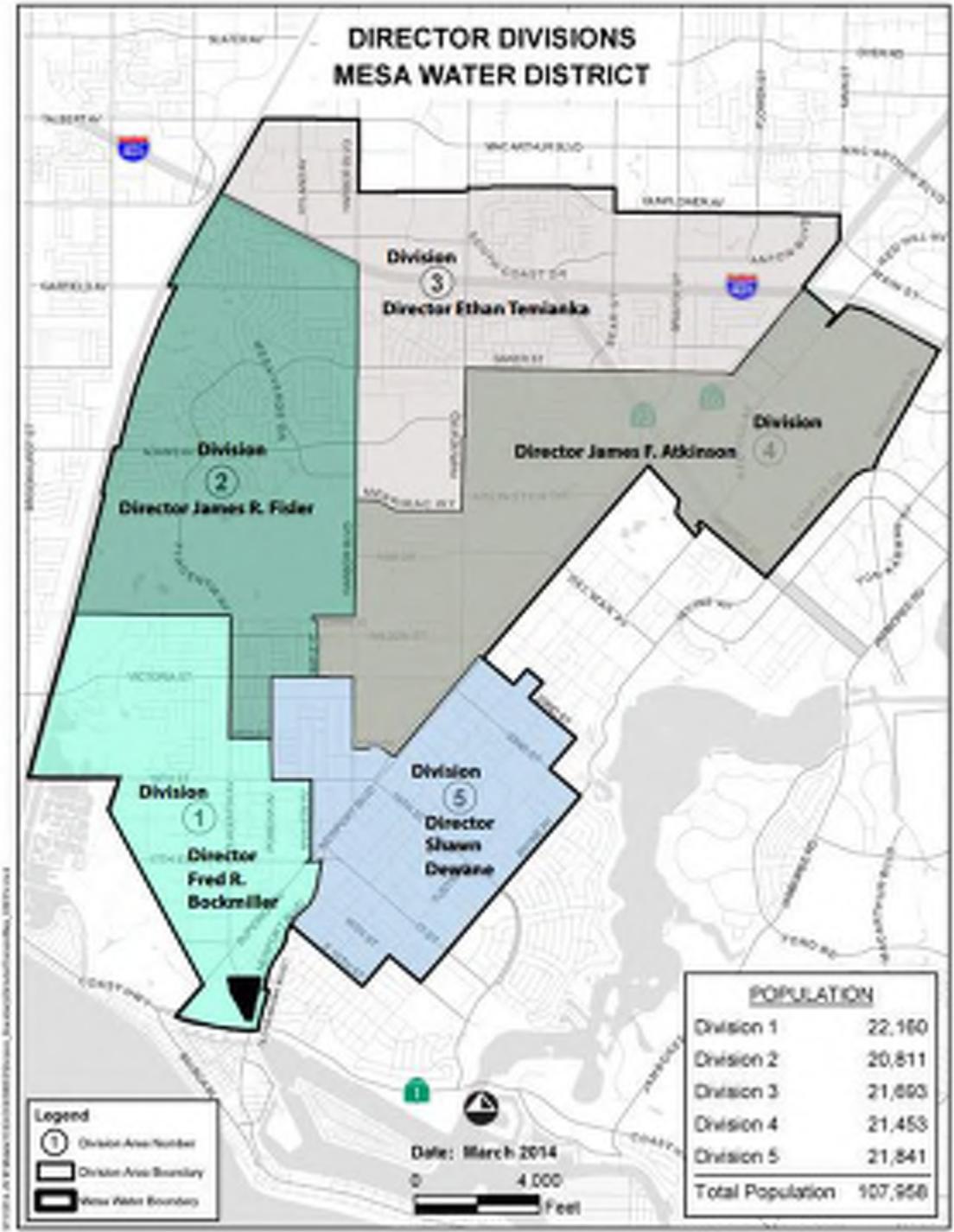


Figure 1-2: Mesa Water District Service Area

1.3.2 Mesa Water District Facilities

Mesa Water® supplies its water demands from a mix of groundwater, imported water when needed and recycled water. The source of groundwater is six wells that pump clear water from the main production aquifer of the OC Basin and two wells that pump amber-tinted water located below the main production aquifer. The amber-tinted water wells are treated at the Mesa Water Reliability Facility (MWRF) before being pumped into the distribution system. Mesa Water® has about 317 miles of pipelines to distribute the water and two reservoirs with pump stations for operational and emergency storage. The reservoirs have a total storage of 28 million gallons. Mesa Water® has two metered interconnections. The two interconnections are with the City of Huntington Beach and IRWD. Additionally, Mesa Water® has four emergency interconnections with the City of Santa Ana, and seven emergency interconnections with the City of Newport Beach, and five emergency interconnections with IRWD. Historically, imported water has been provided from Metropolitan through MWDOC. Recycled water is provided by OCWD via the Green Acres Project (GAP). The system connections and water volume supplied are summarized in Table 1-3, and the wholesalers informed of this water use as required are displayed in Table 1-4.

Table 1-3: Public Water Systems (AF)

Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
CA3010004	Mesa Water District	23,760	18,002
TOTAL		23,760	18,002
NOTES:			

Table 1-4: Water Supplier Information Exchange

Retail: Water Supplier Information Exchange
The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
MWDOC
NOTES:

2 DEMANDS

2.1 Overview

Since the last UWMP update, southern California's urban water demand landscape has been largely shaped by the efforts to comply with SBx7-7. This law requires all of California's retail urban water suppliers serving more than 3,000 acre-feet per year (AFY) or 3,000 service connections to achieve a 20 percent reduction in demands (from a historical baseline) by 2020. Mesa Water® has been actively engaged in efforts to reduce water use in its service area to meet the 2015 interim 10 percent reduction and the 2020 final water use target. Meeting this target is critical to ensure that Mesa Water® remains eligible to receive future state water grants and loans.

In April 2015, Governor Brown issued an Emergency Drought Mandate as a result of one of the most severe droughts in California's record, requiring a collective reduction in statewide urban water use of 25 percent by February 2016. In response to the Governor's mandate, Mesa Water® is carrying out more concentrated conservation efforts. It has also implemented higher (more restrictive) stages of its Water Conservation and Water Supply Emergency Program to achieve its demand reduction target of 20 percent prescribed by the California State Water Resources Control Board (SWRCB).

Water conservation efforts have been employed by Mesa Water® to meet the 2015 interim target and 2020 target for water use reduction as explained above. In addition to local water conservation ordinances, Mesa Water® has engaged in activities that range from being a signatory member of the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMP) Memorandum of Understanding (MOU) since 1994 to water audit and leak detection programs. Mesa Water® has also partnered with MWDOC on educational programs, retrofits, and trainings.

These efforts have been part of statewide water conservation ordinances that require watering landscape watering, serving water in restaurants and bars, and reducing the amount of laundry cleaned by hotels. Further discussion on the Mesa Water® conservation ordinance is covered in Section 5 Water Supplies Contingency Plan.

This section analyzes Mesa Water®'s current water demands by customer type, factors that influence those demands, and projections of future water demands for the next 20 years. In addition, to satisfy SBx7-7 requirements, this section provides details of Mesa Water® SBx7-7 compliance method selection, baseline water use calculation, and 2015 and 2020 water use targets.

2.2 Factors Affecting Demand

Water demands within the Mesa Water® service area is dependent on many factors such as local climate conditions and the evolving hydrology of the region, demographics, land use characteristics, and economics are key factors of affecting demand for Mesa Water®. In addition to local factors, the watersheds of California's imported water are experiencing drought conditions and impacting available and future water supplies.

2.2.1 Climate Characteristics

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

The average temperature ranges from 53.6°F in December to 68.8°F in August. Annual precipitation averages 10.6 inches, occurring mostly between November and March. The average evapotranspiration (ET) is about 45.6 inches per year, which is almost four times the annual average rainfall.

Local rainfall has limited impacts on reducing irrigation demand for Mesa Water®. Water that infiltrates into the soil may enter groundwater supplies depending on the local geography. However, due to the large extent of impervious cover in southern California, rainfall runoff quickly flows to a system of concrete storm drains and channels that lead directly to the ocean. OCWD is one agency that has successfully captured stormwater in the Santa Ana River for years and used it as an additional source of supply for groundwater recharge. There is growing awareness regarding the beneficial use of capturing and using stormwater as a local source and is anticipated to continue developing in the future.

Metropolitan's water supplies come from the State Water Project (SWP) and the Colorado River Aqueduct (CRA), influenced by climate conditions in northern California and the Colorado River Basin, respectively. Both regions have been suffering from multi-year drought conditions with record low precipitation which directly impact water supplies to southern California.

2.2.2 Demographics

Water is delivered to a current population of 107,588 according to the California State University at Fullerton’s Center of Demographics Research (CDR) latest population estimate for Mesa Water® Board boundaries. The Mesa Water® service area population is projected to increase by 3 percent by 2040 representing an average growth rate of 0.1 percent per year. The service area attracts a significant number of visitors during the summer months and contributes to increased water demands.

Growth has increased slightly since the 2010 UWMP as housing is becoming denser and new residential units are multi-storied. Table 2-1 shows the population projections in five-year increments out to 2040 within the Mesa Water® service area.

Table 2-1: Population – Current and Projected

Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	107,588	108,186	109,971	110,805	110,774	110,675
NOTES: Center for Demographic Research, California State University, Fullerton 2015						

2.2.3 Land Use

The Mesa Water® service area can best be described as a predominately residential single and multi-family community located along the coast in central Orange County, close to scenic beaches and natural

preserves. The influx of tourists during the summer months creates higher demands within the Mesa Water® service area, especially at the beach facilities, hotels and restaurants.

2.3 Water Use by Customer Type

An agency's water consumption can be projected by understanding the type of use and customer type creating the demand. Developing local water use profiles helps to identify when, where, how, quantity of water used, and by whom within the agency's service area. A comprehensive profile of the agency's service area enables the impacts of water conservation efforts to be assessed and to project the future benefit of water conservation programs.

The following sections of this UWMP provide an overview of Mesa Water® customer water consumption by customer account type as follows:

- Single-family Residential
- Multi-family Residential
- Commercial
- Institutional/ Government

Other water uses including sales to other agencies and non-revenue water are also discussed in this section.

2.3.1 Overview

There are 23,760 current customer active and inactive service connections in the Mesa Water® distribution system with all existing connections metered. Approximately 61 percent of Mesa Water®'s water demand is residential, CII accounts for 28 percent, dedicated landscape irrigation accounts for 11 percent of the total demand, and the remaining less than one percent for other uses such as construction hydrant meters and fire-line testing.

Table 2-2 contains a summary of the Mesa Water® service area total water demand in fiscal year (FY) 2014-15 for potable water usage.

Table 2-2: Demands for Potable Water - Actual (AF)

Retail: Demands for Potable - Actual		
Use Type	2015 Actual	
	Level of Treatment When Delivered	Volume
Single Family	Drinking Water	5,158
Multi-Family	Drinking Water	5,112
Institutional/Governmental	Drinking Water	1,137
Commercial	Drinking Water	3,242
Industrial	Drinking Water	301
Landscape	Drinking Water	1,879
Other	Drinking Water	15
TOTAL		16,844

Residential water use accounts for 61 percent of the potable water demands and is projected to remain consistent through the 25-year planning horizon.

2.3.2 Non-Residential

Non-residential demands include commercial and dedicated landscape use. Mesa Water® has a mix of commercial uses (markets, shopping centers, restaurants, office complexes, etc.) and public entities (schools, airport, fairgrounds, fire stations, and government offices), that account for 28 percent of total demand. Dedicated landscape for public park facilities, businesses, and golf courses accounts for 11 percent of total potable demand.

2.3.3 Sales to Other Agencies

Mesa Water® does not currently sell water to other agencies.

2.3.4 Non-Revenue Water

Non-revenue water is defined by the International Water Association (IWA) as the difference between distribution systems input volume (i.e. production) and billed authorized consumption. Non-revenue water consists of three components: unbilled authorized consumption (e.g. hydrant flushing, firefighting, and blow-off water from well start-ups), real losses (e.g. leakage in mains and service lines), and apparent losses (unauthorized consumption and metering inaccuracies).

A water loss audit was conducted per AWWA methodology for Mesa Water® to understand the relation between water loss and revenue losses. This audit was developed by the IWA Water Loss Task Force as a universal methodology that could be applied to any water distribution system. This audit meets the requirements of SB 1420 that was signed into law in September 2014. Understanding and controlling water loss from a distribution system is an effective way for Mesa Water® to achieve regulatory standards and manage their existing resources.

Table 2-3 below is a result of the AWWA Water Audit completed for Mesa Water® and the 2015 UWMP. The water loss summary was calculated over a one-year period from available data and the methodology explained above. The volume of water loss calculated for this period represents 4.3 percent of Mesa Water®'s annual water supplied, this presents an opportunity to identify areas of high water loss and develop strategies to minimize it.

Table 2-3: Water Loss Audit Summary (AF)

Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
07/2013	821
NOTES:	

2.4 Demand Projections

Demand projections were developed by Mesa Water® within their service area based on available data as well as land use, population and economic growth per the Master Plan that was adopted in November 2014.

2.4.1 Demand Projection Methodology

The water demand projections were an outcome of Mesa Water®'s Master Plan based on land use within the service area. Future land uses and development projects were individually identified by parcel for the Master Plan through two approaches. The first approach was to review all development plans that were received by the City of Costa Mesa Planning Department in 2012 and 2013. Eight developments of at least 14 units were deemed to be of a sufficient size to impact future water use within the service area and were included in the future demand forecast (Mesa Water® Master Plan, Carollo, November 2014). The second approach used aerial imagery of the service area to identify vacant lots and potential infill sites for future developments. Identified parcels included residential and commercial areas and were assumed to follow the zoning designation from the City of Costa Mesa 2004 General Plan Land Use Map.

Together the two approaches identified over 82 acres of parcels for future development within the service area for a corresponding demand projection of 350 AFY (Mesa Water® Master Plan, Carollo, November 2014). Linear interpolation was used to project demands out to 2040 as shown in Section 2.4.3. The Banning Ranch Development water demand of 614 AFY was evaluated but not included in demand projections as the timing of this development is unknown.

2.4.2 Agency Refinement

Demand projections were developed by Mesa Water® as part of their 2014 Master Plan (Mesa Water® Master Plan, Carollo, November 2014) and used as the basis of this UWMP.

2.4.3 25 Year Projections

A key component of the 2015 UWMP is to provide insight into Mesa Water®'s future water demand outlook. Mesa Water®'s 2015 potable water demand is 16,844 AFY, met through locally pumped groundwater. Table 2-4 is a projection of the potable water demand for the next 25 years.

Table 2-4: Demands for Potable Water - Projected (AF)

Retail: Demands for Potable - Projected					
Use Type	Projected Water Use <i>Report To the Extent that Records are Available</i>				
	2020	2025	2030	2035	2040
Single Family	5,975	5,995	6,015	6,036	6,056
Multi-Family	5,922	5,942	5,962	5,982	6,002
Institutional/Governmental	1,316	1,321	1,325	1,330	1,334
Commercial	3,755	3,767	3,780	3,793	3,806
Industrial	349	350	351	353	354
Landscape	2,176	2,184	2,191	2,198	2,206
Other	17	17	17	17	17
TOTAL	19,510	19,576	19,642	19,709	19,774
NOTES:					

The above demand values were provided by Mesa Water® to MWDOC as part of the UWMP effort. As the regional wholesale supplier of Orange County, MWDOC works in collaboration with each of its retail agencies as well as Metropolitan, its wholesaler, to develop demand projections for imported water, if any. Mesa Water® has decreased its reliance on imported water by pursuing a variety of local groundwater supplies and water conservation strategies and with population expected to increase minimally, Mesa Water® per capita water use is projected to decrease as detailed in section 2.5 below.

Table 2-5: Inclusion in Water Use Projections

Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections?	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc... utilized in demand projections are found.	Section 4.1
Are Lower Income Residential Demands Included In Projections?	Yes
NOTES:	

The demand data presented in this section accounts for passive savings in the future. Passive savings are water savings as a result of Codes, Standards, Ordinances, or Transportation and Land Use Plans as well as public outreach on water conservation and higher efficiency fixtures. Passive savings are

anticipated to continue for the next 25 years and will result in continued water saving and reduced consumption levels.

2.4.4 Total Water Demand Projections

Based on the information provided above, the total demand for potable water is listed below in Table 2-6. Mesa Water® currently provides recycled water in its service area.

Table 2-6: Total Water Demands (AF)

Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable Water	16,844	19,510	19,576	19,642	19,709	19,774
Recycled Water Demand	1,158	1,100	1,100	1,100	1,100	1,100
TOTAL WATER DEMAND	18,802	20,610	20,676	20,742	20,809	20,874
NOTES:						

2.4.5 Water Use for Lower Income Households

Since 2010, the Act has required retail water suppliers to include water use projections for single-family and multi-family residential housing for lower income and affordable households. This will assist Mesa Water® in complying with the requirement under Government Code Section 65589.7 granting priority for providing water service to lower income households. A lower income household is defined as a household earning below 80 percent of the median household income (MHI).

DWR recommends retail suppliers rely on the housing elements of city or county general plans to quantify planned lower income housing within the Mesa Water® service area (DWR, 2015 UWMP Guidebook, February 2016). The Regional Housing Needs Assessment (RHNA) assists jurisdictions in updating general plan's housing elements section. The RHNA identifies housing needs and assesses households by income level for Mesa Water® through 2010 decennial Census and 2005-2009 American Community Survey data. The fifth cycle of the RHNA covers the planning period of October 2013 to October 2021. The Southern California Association of Governments (SCAG) adopted the RHNA Allocation Plan for this cycle on October 4, 2012 requiring housing elements updates by October 15, 2013. The California Department of Housing and Community Development reviewed the housing elements data submitted by jurisdictions in the SCAG region and concluded the data meets statutory requirements for the assessment of current housing needs.

The housing elements from the RHNA includes low income housing broken down into three categories: extremely low (less than 30 percent MHI), very low (31 percent - 50 percent MHI), and lower income (51 percent - 80 percent MHI). Since the majority of the Mesa Water® service area covers the City of Costa Mesa, the household distribution of Costa Mesa for all households of various income levels is shown in Table 2-7. Altogether the Mesa Water® service area has 46.72 percent low income housing (SCAG, RHNA, November 2013).

Table 2-7: Household Distribution Based on Median Household Income

Number of Households by Income	
Extremely Low Income	5,096
Very Low Income	4,737
Lower Income	8,545
Moderate Income	7,986
Above Income	12,969
Total Households	39,333

Table 2-8 provides a breakdown of the projected water needs for low income single family and multifamily units. The projected water demands shown here represent 46.72 percent of the projected water demand for the single-family and multifamily categories provided in Table 2-4 above. For example, the total low income single family residential demand is projected to be 2,791 AFY in 2020 and 2,829 AFY in 2040.

Table 2-8: Projected Water Demands for Housing Needed for Low Income Households (AF)

Water Use Sector	Fiscal Year Ending				
	2020	2025	2030	2035	2040
Total Residential Demand	11,896	11,937	11,977	12,018	12,057
Single-Family Low Income Household Demand	2,791	2,801	2,810	2,820	2,829
Multi-Family Low Income Household Demand	2,767	2,776	2,785	2,795	2,804
Total Low Income Households Demand	5,558	5,577	5,596	5,615	5,633

2.5 SBx7-7 Requirements

SBx7-7, signed into law on February 3, 2010, requires the State of California to reduce urban water use by 20 percent by the year 2020. Mesa Water® must determine baseline water use during their baseline period and water use targets for the years 2015 and 2020 to meet the state’s water reduction goal. Mesa Water® may choose to comply with SBx7-7 individually or as a region in collaboration with other retail water suppliers. Under the regional compliance option, Mesa Water® is still required to report its individual water use targets. Mesa Water® is required to be in compliance with SBx7-7 either individually or as part of the alliance, or demonstrate they have a plan or have secured funding to be in compliance, in order to be eligible for water related state grants and loans on and after July 16, 2016.

For the 2015 UWMP, Mesa Water® must demonstrate compliance with its 2015 water use target to indicate it is on track to meeting the 2020 water use target. Mesa Water® also revised the baseline per capita water use calculations using 2010 U.S. Census data. Changes in the baseline calculations also result in updated per capita water use targets.

DWR also requires the submittal of SBx7-7 Verification Forms, a set of standardized tables to demonstrate compliance with the Water Conservation Act in this 2015 UWMP.

2.5.1 Baseline Water Use

The baseline water use is Mesa Water®'s gross water use divided by its service area population, reported in gallons per capita per day (GPCD). Gross water use is a measure of water that enters the distribution system of the supplier over a 12-month period with certain allowable exclusions. These exclusions are:

- Recycled water delivered within the service area
- Indirect recycled water
- Water placed in long term storage
- Water conveyed to another urban supplier
- Water delivered for agricultural use
- Process water

Water suppliers within the OCWD Groundwater Basin, including Mesa Water®, have the option of choosing to deduct recycled water used for indirect potable reuse (IPR) from their gross water use to account for the recharge of recycled water into the OC Basin by OCWD, historically through Water Factory 21 (WF-21), and now by Groundwater Replenishment System (GWRS).

Water suppliers must report baseline water use for two baseline periods, the 10- to 15-year baseline (baseline GPCD) and the five-year baseline (target confirmation) as described below.

2.5.1.1 Ten to 15-Year Baseline Period (Baseline GPCD)

The first step to calculating the water use targets is to determine Mesa Water® base daily per capita water use (baseline water use). This baseline water use is essentially Mesa Water®'s gross water use divided by its service area population, reported in GPCD. The baseline water use is calculated as a continuous (rolling) 10-year average during a period, which ends no earlier than December 31, 2004 and no later than December 31, 2010. Water suppliers whose recycled water made up 10 percent or more of their 2008 retail water delivery can use up to a 15-year average for the calculation. Recycled water use was less than 10 percent of Mesa Water® retail delivery in 2008; therefore, a 10-year baseline period is used.

Mesa Water®'s baseline water use is 180 GPCD, obtained from the 10-year period July 1, 1995 to June 30, 2005.

2.5.1.2 Five-Year Baseline Period (Target Confirmation)

Water suppliers are required to calculate water use, in GPCD, for a five-year baseline period. This number is used to confirm that the selected 2020 target meets the minimum water use reduction requirements. Regardless of the compliance option adopted by Mesa Water®, it will need to meet a minimum water use target of 5 percent reduction from the five-year baseline water use. This five-year baseline water use is calculated as a continuous five-year average during a period, which ends no earlier than December 31, 2007 and no later than December 31, 2010. Mesa Water®'s five-year baseline water use is 177 GPCD, obtained from the five-year period July 1, 2003 to June 30, 2008.

2.5.1.3 Service Area Population

The Mesa Water® service area boundaries correspond with the boundaries for a city or census designated place. This allows Mesa Water® to use service area population estimates prepared by the Department of Finance (DOF). The Center for Demographic Research, California State University, Fullerton, is the entity which compiles population data for Orange County based on DOF data. The calculation of Mesa Water®'s baseline water use and water use targets in the 2010 UWMP was based on the 2000 U.S. Census population numbers obtained from CDR. The baseline water use and water use targets in this 2015 UWMP have been revised based on the 2010 U.S. Census population obtained from CDR in 2012.

2.5.2 SBx7-7 Water Use Targets

In the 2015 UWMP, Mesa Water® may update its 2020 water use target by selecting a different target method than what was used in 2010. The target methods and determination of the 2015 and 2020 targets are described below.

2.5.2.1 SBx7-7 Target Methods

DWR has established four target calculation methods for urban retail water suppliers to choose from. Mesa Water® is required to adopt one of the four options to comply with SBx7-7 requirements. The four options include:

- *Option 1* requires a simple 20 percent reduction from the baseline by 2020 and 10 percent by 2015.
- *Option 2* employs a budget-based approach by requiring an agency to achieve a performance standard based on three metrics
 - Residential indoor water use of 55 GPCD
 - Landscape water use commensurate with the Model Landscape Ordinance
 - 10 percent reduction in baseline commercial/industrial/institutional (CII) water use
- *Option 3* is to achieve 95 percent of the applicable state hydrologic region target as set forth in the State's 20x2020 Water Conservation Plan.
- *Option 4* requires the subtraction of Total Savings from the baseline GPCD:

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- o Total savings includes indoor residential savings, meter savings, CII savings, and landscape and water loss savings.

With MWDOC’s assistance in the calculation of Mesa Water®’s base daily per capita use and water use targets, Mesa Water® selected to comply with Option 1 consistent with the option selected in 2010.

2.5.2.2 2015 and 2020 Targets

Under Compliance Option 1, the simple 20 percent reduction, the Mesa Water® 2015 target is 162 GPCD and the 2020 target is 144 GPCD as summarized in Table 2-9. The 2015 target is the midway value between the 10-year baseline and the confirmed 2020 target. In addition, the confirmed 2020 target needs to meet a minimum of 5 percent reduction from the five-year baseline water use.

Table 2-9: Baselines and Targets Summary

Baselines and Targets Summary					
Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	1996	2005	180	162	144
5 Year	2004	2008	177		
*All values are in Gallons per Capita per Day (GPCD)					
NOTES:					

Table 2-10 compares Mesa Water® 2015 water use target to its actual 2015 consumption. Based on this comparison, Mesa Water® is in compliance with its 2015 interim target and has already achieved the 2020 water use target, assuming water usage between 2016 and 2020 does not increase beyond the 2020 target.

Table 2-10: 2015 Compliance

2015 Compliance		
Actual 2015 GPCD*	2015 Interim Target GPCD*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
108	162	Yes
*All values are in Gallons per Capita per Day (GPCD)		
NOTES:		

2.5.3 Regional Alliance

A retail supplier may choose to meet the SBx7-7 targets on its own or it may form a regional alliance with other retail suppliers to meet the water use target as a region. Within a Regional Alliance, each retail

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water supplier will have an additional opportunity to achieve compliance under both an individual target and a regional target.

- If the Regional Alliance meets its water use target on a regional basis, all agencies in the alliance are deemed compliant.
- If the Regional Alliance fails to meet its water use target, each individual supplier will have an opportunity to meet their water use targets individually.

Mesa Water® is a member of the Orange County 20x2020 Regional Alliance formed by MWDOC, its wholesaler. This regional alliance consists of 29 retail agencies in Orange County as described in MWDOC's 2015 UWMP. MWDOC provides assistance in the calculation of each retail agency's baseline water use and water use targets.

In 2015, the regional baseline and targets were revised to account for any revisions made by the retail agencies to their individual 2015 and 2020 targets. The regional water use target is the weighted average of the individual retail agencies' targets (by population). The Orange County 20x2020 Regional Alliance weighted 2015 target is 176 GPCD and 2020 target is 158 GPCD. The actual 2015 water use in the region is 125 GPCD. Based on this comparison, the region has already met its 2020 GPCD goal assuming water usage between 2016 and 2020 does not increase beyond the 2020 target.

3 WATER SOURCES AND SUPPLY RELIABILITY

3.1 Overview

Mesa Water® currently relies on a combination of clear and amber-tinted groundwater from the Orange County Groundwater Basin and recycled water. Mesa Water® works together with three primary agencies, Metropolitan, MWDOC, and OCWD to ensure a safe and reliable water supply that will continue to serve the community in periods of drought and shortage. Mesa Water®’s projected water supply portfolio is shown on Figure 3-1.

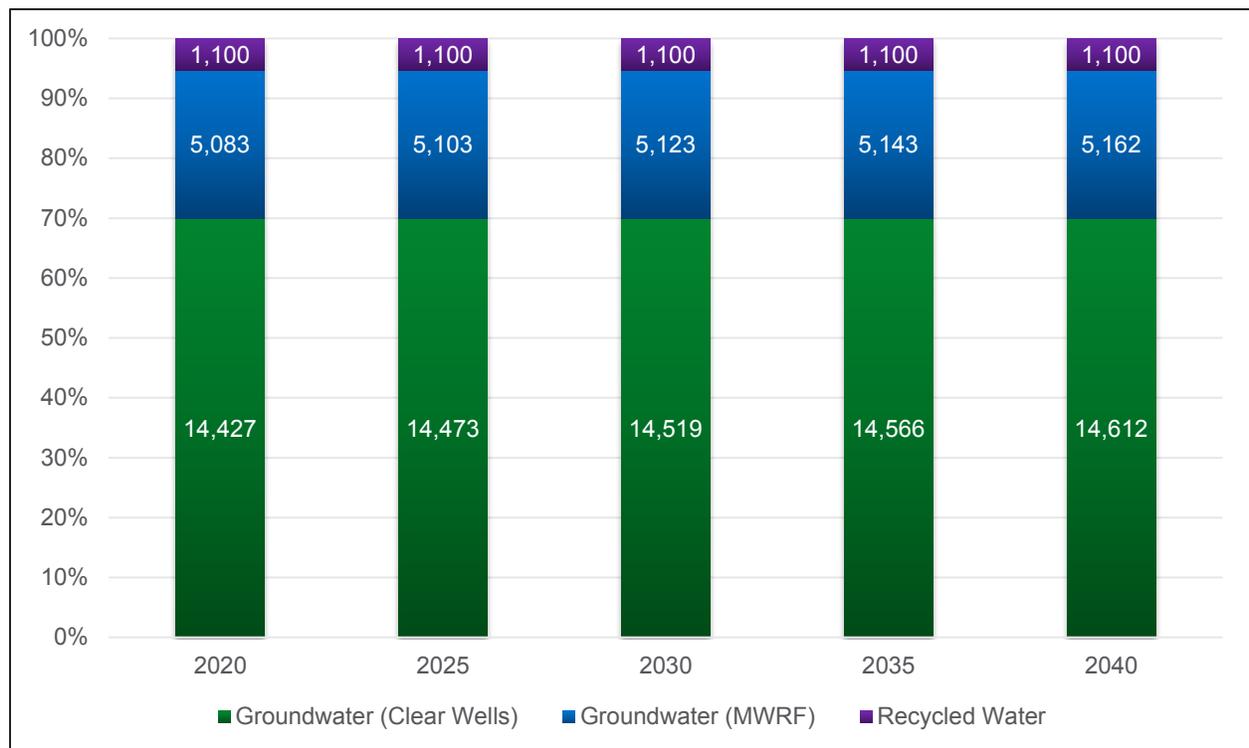


Figure 3-1: Water Supply Sources in Mesa Water® (AF)

The following sections provide a detailed discussion of Mesa Water®’s water sources as well as the future water supply portfolio for the next 25 years. Additionally, Mesa Water®’s projected supply and demand under various hydrological conditions are compared to determine Mesa Water®’s supply reliability for the 25 year planning horizon.

3.2 Imported Water

Mesa Water® has the ability to supplement its local groundwater with imported water purchased from Metropolitan through MWDOC. Metropolitan’s principal sources of water are the Colorado River via the CRA and the Lake Oroville watershed in Northern California through the SWP. The water obtained from these sources is treated at the Robert B. Diemer Filtration Plant located north of Yorba Linda. Typically,

the Diemer Filtration Plant receives a blend of Colorado River water from Lake Mathews through the Metropolitan Lower Feeder and SWP water through the Yorba Linda Feeder. Mesa Water® was able to meet all of its demands with local groundwater and recycled water in FY 2014-15. Although Mesa Water® has historically relied on imported water to supplement its demands, Mesa Water® is projected to meet its future demands using local groundwater and recycled water through 2040.

3.3 Groundwater

Historically, local groundwater has been the cheapest and most reliable source of supply for Mesa Water®. Mesa Water® relies on approximately 17,652 AFY of groundwater from the OC Basin. This source of supply meets approximately 94 percent of Mesa Water®'s total annual demand.

This section provides a description of the OC Basin and the management measures taken by OCWD to optimize local supply and minimize overdraft. This section also provides information on historical groundwater production as well as a 25-year projection of Mesa Water®'s groundwater supply.

3.3.1 Basin Characteristics

The OC Basin underlies the northerly half of Orange County beneath broad lowlands. The OC Basin managed by OCWD covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, and the Pacific Ocean to the southwest. The OC Basin boundary extends to the Orange County-Los Angeles Line to the northwest, where groundwater flows across the county line into the Central Groundwater Basin of Los Angeles County. The total thickness of sedimentary rocks in the OC Basin is over 20,000 feet, with only the upper 2,000 to 4,000 feet containing fresh water. The Pleistocene or younger aquifers comprising this OC Basin are over 2,000 feet deep and form a complex series of interconnected sand and gravel deposits. The OC Basin's full volume is approximately 66 million acre-feet (MAF).

There are three major aquifer systems that have been subdivided by OCWD, the Shallow Aquifer System, the Principal Aquifer System, and the Deep Aquifer System. These three aquifer systems are hydraulically connected as groundwater is able to flow between each other through intervening aquitards or discontinuities in the aquitards. The Shallow Aquifer system occurs from the surface to approximately 250 feet below ground surface. Most of the groundwater from this aquifer system is pumped by small water systems for industrial and agricultural use. The Principal Aquifer system occurs at depths between 200 and 1,300 feet below ground surface. Over 90 percent of groundwater production is from wells that are screened within the Principal Aquifer system. Only a minor amount of groundwater is pumped from the Deep Aquifer system, which underlies the Principal Aquifer system and is up to 2,000 feet deep in the center of the OC Basin. The three major aquifer systems are shown on Figure 3-2.

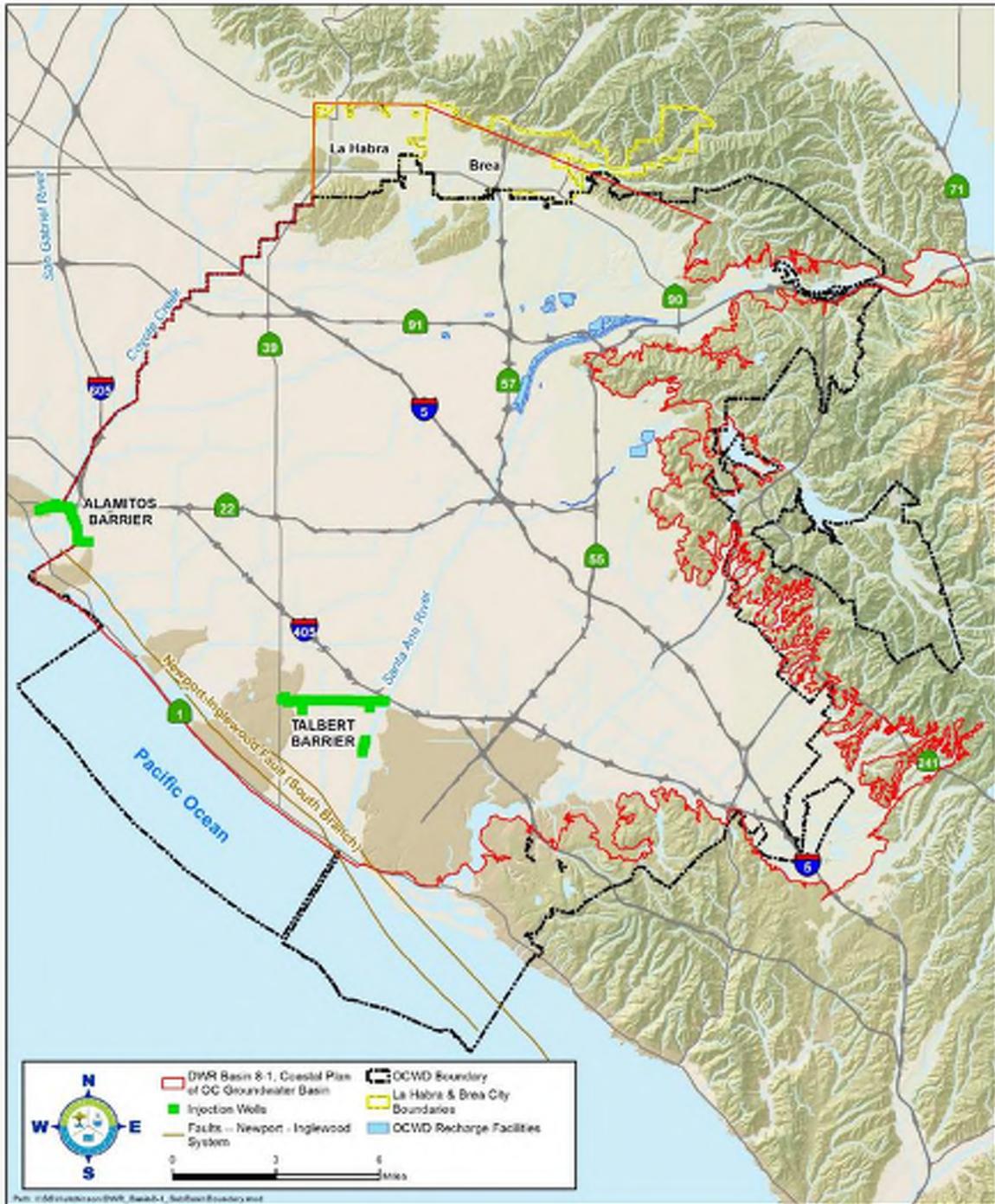


Figure 3-2: Map of the Orange County Groundwater Basin and its Major Aquifer Systems

The OCWD was formed in 1933 by a special legislative act of the California State Legislature to protect and manage the County's vast, natural, groundwater supply using the best available technology and

defend its water rights to the OC Basin. This legislation is found in the State of California Statutes, Water – Uncodified Acts, Act 5683, as amended. The OC Basin is managed by OCWD under the Act, which functions as a statutorily-imposed physical solution.

Groundwater levels are managed within a safe basin operating range to protect the long-term sustainability of the OC Basin and to protect against land subsidence. OCWD regulates groundwater levels in the OC Basin by regulating the annual amount of pumping (OCWD, Groundwater Management Plan 2015 Update, June 2015).

3.3.2 Basin Production Percentage

The OC Basin is not adjudicated and as such, pumping from the OC Basin is managed through a process that uses financial incentives to encourage groundwater producers to pump a sustainable amount of water. The framework for the financial incentives is based on establishing the basin production percentage (BPP), the percentage of each Producer's total water supply that comes from groundwater pumped from the OC Basin. Groundwater production at or below the BPP is assessed a Replenishment Assessment (RA). While there is no legal limit as to how much an agency pumps from the OC Basin, there is a financial disincentive to pump above the BPP. Agencies that pump above the BPP are charged the RA plus the Basin Equity Assessment (BEA), which is calculated so that the cost of groundwater production is greater than MWDOC's full service rate. The BEA can be increased to discourage production above the BPP. The BPP is set uniformly for all Producers by OCWD on an annual basis.

The BPP is set based on groundwater conditions, availability of imported water supplies, and Basin management objectives. The supplies available for recharge must be estimated for a given year. The supplies of recharge water that are estimated are: 1) Santa Ana River stormflow, 2) Natural incidental recharge, 3) Santa Ana River baseflow, 4) GWRS supplies, and 5) other supplies such as imported water and recycled water purchased for the Alamitos Barrier. The BPP is a major factor in determining the cost of groundwater production from the OC Basin for that year.

In some cases, OCWD encourages treating and pumping groundwater that does not meet drinking water standards in order to protect water quality. This is achieved by using a financial incentive called the BEA Exemption. A BEA Exemption is used to clean up and contain the spread of poor quality water. OCWD uses a partial or total exemption of the BEA to compensate a qualified participating agency or Producer for the costs of treating poor quality groundwater. When OCWD authorizes a BEA exemption for a project, it is obligated to provide the replenishment water for the production above the BPP and forgoes the BEA revenue that OCWD would otherwise receive from the producer (OCWD, Groundwater Management Plan 2015 Update, June 2015).

3.3.2.1 2015 OCWD Groundwater Management Plan

OCWD was formed in 1933 by the California legislature to manage and operate the OC Basin in order to protect and increase the OC Basin's sustainable yield in a cost-effective manner. As previously mentioned, the BPP is the primary mechanism used by OCWD to manage pumping in the OC Basin. In 2013, OCWD's Board of Directors adopted a policy to establish a stable BPP with the intention to work toward achieving and maintaining a 75 percent BPP by FY 2015-16. Although BPP is set at 75 percent,

based on discussions with OCWD a conservative BPP of 70 percent is assumed through 2040. Principles of this policy include:

- OCWD's goal is to achieve a stable 75 percent BPP, while maintaining the same process of setting the BPP on an annual basis, with the BPP set in April of each year after a public hearing has been held and based upon the public hearing testimony, presented data, and reports provided at that time.
- OCWD must manage the OC Basin in a sustainable manner for future generations. The BPP will be reduced if future conditions warrant the change.
- Each project and program to achieve the 75 percent BPP goal will be reviewed individually and assessed for their economic viability.

The OC Basin's storage levels would be managed in accordance to the 75 percent BPP policy. It is presumed that the BPP will not decrease as long as the storage levels are between 100,000 and 300,000 AF from full capacity. If the OC Basin is less than 100,000 AF below full capacity, the BPP will be raised. If the OC Basin is over 350,000 AF below full capacity, additional supplies will be sought after to refill the OC Basin and the BPP will be lowered.

The OC Basin is managed to maintain water storage levels of not more than 500,000 AF below full condition to avoid permanent and significant negative or adverse impacts. Operating the OC Basin in this manner enables OCWD to encourage reduced pumping during wet years when surface water supplies are plentiful and increase pumping during dry years to provide additional local water supplies during droughts.

OCWD determines the optimum level of storage for the following year when it sets the BPP each year. Factors that affect this determination include the current storage level, regional water availability, and hydrologic conditions. When the OC Basin storage approaches the lower end of the operating range, immediate issues that must be addressed include seawater intrusion, increased risk of land subsidence, and potential for shallow wells to become inoperable due to lower water levels (OCWD, Groundwater Management Plan 2015 Update, June 2015).

3.3.2.2 OCWD Engineer's Report

The OCWD Engineer's Report reports on the groundwater conditions and investigates information related to water supply and Basin usage within OCWD's service area.

The overall BPP achieved in the 2013 to 2014 water year within OCWD for non-irrigation use was 75.2 percent. However, a BPP level above 75 percent may be difficult to achieve. Therefore, a BPP ranging from 65 percent to 70 percent is currently being proposed for the ensuing FY 2015-16. Analysis of the OC Basin's projected accumulated overdraft, the available supplies to the OC Basin (assuming average hydrology) and the projected pumping demands indicate that this level of pumping can be sustained for 2015-16 without harming the OC Basin.

A BPP of 70 percent corresponds to approximately 320,000 AF of groundwater production including 22,000 AF of groundwater production above the BPP to account for several groundwater quality enhancement projects discussed earlier.

In FY 2015-16 additional production of approximately 22,000 AF above the BPP will be undertaken by the City of Tustin, City of Garden Grove, Mesa Water®, and IRWD. These agencies use the additional pumping allowance in order to accommodate groundwater quality improvement projects. As in prior years, production above the BPP from these projects would be partially or fully exempt from the BEA as a result of the benefit provided to the OC Basin by removing poor-quality groundwater and treating it for beneficial use (OCWD, 2013-2014 Engineer's Report, February 2015).

3.3.3 Basin Equity Assessment Exemption

In some cases, OCWD encourages the pumping of groundwater that does not meet drinking water standards in order to protect water quality. This is achieved by using a financial incentive called the BEA Exemption. A BEA Exemption is used to encourage pumping of groundwater that does not meet drinking water standards in order to clean up and contain the spread of poor quality water. OCWD uses a partial or total exemption of the BEA to compensate a qualified participating agency or Producer for the costs of treating poor-quality groundwater. When OCWD authorizes a BEA exemption for a project, it is obligated to provide the replenishment water for the production above the BPP and forgoes the BEA revenue that OCWD would otherwise receive from the producer.

3.3.4 Groundwater Recharge Facilities

Recharging water into the OC Basin through natural and artificial means is essential to support pumping from the OC Basin. Active recharge of groundwater began in 1949, in response to increasing drawdown of the OC Basin and consequently the threat of seawater intrusion. The OC Basin's primary source of recharge is flow from the Santa Ana River, which is diverted into recharge basins and its main Orange County tributary, Santiago Creek. Other sources of recharge water include natural infiltration, recycled water, and imported water. Natural recharge consists of subsurface inflow from local hills and mountains, infiltration of precipitation and irrigation water, recharge in small flood control channels, and groundwater underflow to and from Los Angeles County and the ocean.

Recycled water for the OC Basin is from two sources. The main source of recycled water is from the GWRS and is recharged in the surface water system and the Talbert Seawater Barrier. The second source of recycled water is the Leo J. Vander Lans Treatment Facility which supplies water to the Alamitos Seawater Barrier. Injection of recycled water into these barriers is an effort by OCWD to control seawater intrusion into the OC Basin. Operation of the injection wells forms a hydraulic barrier to seawater intrusion.

Untreated imported water can be used to recharge the OC Basin through the surface water recharge system in multiple locations, such as Anaheim Lake, Santa Ana River, Irvine Lake, and San Antonio Creek. Treated imported water can be used for in-lieu recharge, as was performed extensively from 1977 to 2007 (OCWD, Groundwater Management Plan 2015 Update, June 2015).

3.3.5 Metropolitan Groundwater Replenishment Program

OCWD, MWDOC, and Metropolitan have developed a successful and efficient groundwater replenishment program to increase storage in the OC Basin. The Groundwater Replenishment Program allows Metropolitan to sell groundwater replenishment water to OCWD and make direct deliveries to

agency distribution systems in lieu of producing water from the groundwater basin when surplus surface water is available. This program indirectly replenishes the OC Basin by avoiding pumping. In the in-lieu program, OCWD requests an agency to halt pumping from specified wells. The agency then takes replacement water through its import connections, which is purchased by OCWD from Metropolitan (through MWDOC). OCWD purchases the water at a reduced rate, and then bills the agency for the amount it would have had to pay for energy and the RA if it had produced the water from its wells. The deferred local production results in water being left in local storage for future use.

3.3.6 Metropolitan Conjunctive Use Program

Since 2004, OCWD, MWDOC, and certain groundwater producers have participated in Metropolitan’s Conjunctive Use Program (CUP). This program allows for the storage of Metropolitan water in the OC Basin. The existing Metropolitan program provides storage up to 66,000 AF of water in the OC Basin in exchange for Metropolitan’s contribution to improvements in basin management facilities. These improvements include eight new groundwater production wells, improvements to the seawater intrusion barrier, and construction of the Diemer Bypass Pipeline. The water is accounted for via the CUP program administered by the wholesale agencies and is controlled by Metropolitan such that it can be withdrawn over a three-year time period (OCWD, 2013-2014 Engineer’s Report, February 2015).

3.3.7 Groundwater Historical Extraction

Pumping limitations set by the BPP and the pumping capacity of the wells are the only constraints affecting the groundwater supply to Mesa Water®.

A summary of the groundwater volume pumped by Mesa Water® is shown in Table 3-2.

Table 3-1: Groundwater Volume Pumped (AF)

Retail: Groundwater Volume Pumped						
Groundwater Type	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	Orange County Groundwater Basin	12,193	10,852	15,558	18,457	17,652
TOTAL		12,193	10,852	15,558	18,457	17,652
NOTES:						

3.3.8 Overdraft Conditions

Annual groundwater basin overdraft, as defined in OCWD’s Act, is the quantity by which production of groundwater supplies exceeds natural replenishment of groundwater supplies during a water year. This difference between extraction and replenishment can be estimated by determining the change in volume of groundwater in storage that would have occurred had supplemental water not been used for any groundwater recharge purpose, including seawater intrusion protection, advanced water reclamation, and the in-Lieu Program.

The annual analysis of basin storage change and accumulated overdraft for water year 2013-14 has been completed. Based on the three-layer methodology, an accumulated overdraft of 342,000 AF was calculated for the water year ending June 30, 2014. The accumulated overdraft for the water year ending

June 30, 2013 was 242,000 AF, which was also calculated using the three-layer storage method. Therefore, an annual decrease of 100,000 AF in stored groundwater was calculated as the difference between the June 2013 and June 2014 accumulated overdrafts (OCWD, 2013-2014 Engineer’s Report, February 2015).

3.4 Summary of Existing and Planned Sources of Water

The actual sources and volume of water for the year 2015 is displayed in Table 3-3.

Table 3-2: Water Supplies, Actual (AF)

Retail: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	2015	
		Actual Volume	Water Quality
Groundwater	Orange County Groundwater Basin	16,844	Drinking Water
Recycled Water	OCWD	1,158	Recycled Water
Total		18,002	
NOTES:			

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A summary of the current and planned sources of water for Mesa Water® is shown in Table 3-4.

Table 3-3: Water Supplies, Projected (AF)

Retail: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply				
		2020	2025	2030	2035	2040
		Reasonably Available Volume				
Groundwater	Clear Wells	14,427	14,473	14,519	14,566	14,612
Groundwater	MWRF	5,083	5,103	5,123	5,143	5,162
Recycled Water	OCWD	1,100	1,100	1,100	1,100	1,100
Total		20,610	20,676	20,742	20,809	20,874
NOTES:						

3.5 Recycled Water

Mesa Water® supports efforts of the regional water management agencies to use recycled water. More information concerning Mesa Water®'s recycled water usage can be found in Section 6.

3.6 Supply Reliability

3.6.1 Overview

Every urban water supplier is required to assess the reliability of their water service to its customers under normal, dry, and multiple dry water years. Mesa Water® depends on 100 percent local supplies to meet its water demands and has taken numerous steps to ensure it has adequate supplies. While Mesa Water® does not project the delivery of imported water, the development of numerous local projects increase the reliability of the imported water system. There are various factors that may impact reliability of supplies such as legal, environmental, water quality and climatic which are discussed below. The water supplies are projected to meet full-service demands; Metropolitan's 2015 UWMP finds that Metropolitan is able to meet, full-service demands of its member agencies starting 2020 through 2040 during normal years, single dry year, and multiple dry years, in case Mesa Water® should need to supplement its local supplies with imported water.

Metropolitan's 2015 Integrated Water Resources Plan (IRP) update describes the core water resources that will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2020 through 2040. The foundation of Metropolitan's resource strategy for achieving regional water supply reliability has been to develop and implement water resources programs and activities through its IRP preferred resource mix. This preferred resource mix includes conservation, local resources such as water recycling and groundwater recovery, Colorado River supplies and transfers, SWP supplies and transfers, in-region surface reservoir storage, in-region groundwater storage, out-of-region banking, treatment, conveyance and infrastructure improvements.

3.6.2 Factors Impacting Reliability

The Act requires a description of the reliability of the water supply and vulnerability to seasonal or climatic shortage. The following are some of the factors identified by Metropolitan and Mesa Water® that may have an impact on the reliability of Metropolitan supplies and local supplies.

3.6.2.1 Legal

The addition of more species under the Endangered Species Act and new regulatory requirements could impact SWP operations by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations.

3.6.2.2 Water Quality

3.6.2.2.1 *Imported Water*

Metropolitan is responsible for providing high quality potable water throughout its service area. Over 300,000 water quality tests are performed per year on Metropolitan's water to test for regulated contaminants and additional contaminants of concern to ensure the safety of its waters. Metropolitan's supplies originate primarily from the CRA and from the SWP. A blend of these two sources, proportional to each year's availability of the source, is then delivered throughout Metropolitan's service area.

Metropolitan's primary water sources face individual water quality issues of concern. The CRA water source contains higher total dissolved solids (TDS) and the SWP contains higher levels of organic matter, lending to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's high level of organic matter, Metropolitan blends CRA and SWP supplies and has upgraded all of its treatment facilities to include ozone treatment processes. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium VI while also investigating the potential water quality impact of emerging contaminants, N-nitrosodimethylamine (NDMA), and pharmaceuticals and personal care products (PPCP). While unforeseeable water quality issues could alter reliability, Metropolitan's current strategies ensure the deliverability of high quality water.

The presence of Quagga Mussels in water sources is a water quality concern. Quagga Mussels are an invasive species that was first discovered in 2007 at Lake Mead, on the Colorado River. This species of mussels form massive colonies in short periods of time, disrupting ecosystems and blocking water intakes. They are capable of causing significant disruption and damage to water distribution systems. Controlling the spread and impacts of this invasive species within the CRA requires extensive maintenance and results in reduced operational flexibility. It also resulted in Metropolitan eliminating deliveries of CRA water into Diamond Valley Lake (DVL) to keep the reservoir free from Quagga Mussels.

3.6.2.2.2 *Groundwater*

OCWD is responsible for managing the OC Basin. To maintain groundwater quality, OCWD conducts an extensive monitoring program that serves to manage the OC Basin's groundwater production, control groundwater contamination, and comply with all required laws and regulations. A network of nearly 700 wells provides OCWD a source for samples, which are tested for a variety of purposes. OCWD collects 600 to 1,700 samples each month to monitor Basin water quality. These samples are collected and tested according to approved federal and state procedures as well as industry-recognized quality assurance and control protocols.

Salinity is a significant water quality problem in many parts of southern California, including Orange County. Salinity is a measure of the dissolved minerals in water including both TDS and nitrates.

OCWD continuously monitors the levels of TDS in wells throughout the OC Basin. TDS currently has a California Secondary Maximum Contaminant Level (MCL) of 500 mg/L. The portions of the OC Basin with the highest levels are generally located in the Cities of Irvine, Tustin, Yorba Linda, Anaheim, and Fullerton. There is also a broad area in the central portion of the OC Basin where TDS ranges from 500 to 700 mg/L. Sources of TDS include the water supplies used to recharge the OC Basin and from onsite

wastewater treatment systems, also known as septic systems. The TDS concentration in the OC Basin is expected to decrease over time as the TDS concentration of GWRS water used to recharge the OC Basin is approximately 50 mg/L.

Nitrates are one of the most common and widespread contaminants in groundwater supplies, originating from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. The MCL for nitrate in drinking water is set at 10 mg/L. OCWD regularly monitors nitrate levels in groundwater and works with producers to treat wells that have exceeded safe levels of nitrate concentrations. OCWD manages the nitrate concentration of water recharged by its facilities to reduce nitrate concentrations in groundwater. This includes the operation of the Prado Wetlands, which was designed to remove nitrogen and other pollutants from the Santa Ana River before the water is diverted to be percolated into OCWD's surface water recharge system.

Although water from the Deep Aquifer System is of very high quality, it is amber-colored and contains a sulfuric odor due to buried natural organic material. These challenging aesthetic qualities require treatment before use as a source of drinking water. The total volume of the amber-colored groundwater is estimated to be approximately 1 MAF.

Other contaminants that OCWD monitors within the OC Basin include:

- **Methyl Tertiary Butyl Ether (MTBE)** – MTBE is an additive to gasoline that increases octane ratings but became a widespread contaminant in groundwater supplies. The greatest source of MTBE contamination comes from underground fuel tank releases. The primary MCL for MTBE in drinking water is 13 µg/L.
- **Volatile Organic Compounds (VOC)** – VOCs come from a variety of sources including industrial degreasers, paint thinners, and dry cleaning solvents. Locations of VOC contamination within the OC Basin include the former El Toro marine Corps Air Station, the Shallow Aquifer System, and portions of the Principal Aquifer System in the Cities of Fullerton and Anaheim.
- **NDMA** – NDMA is a compound that can occur in wastewater that contains its precursors and is disinfected via chlorination and/or chloramination. It is also found in food products such as cured meat, fish, beer, milk, and tobacco smoke. The California Notification Level for NDMA is 10 ng/L and the Response Level is 300 ng/L. In the past, NDMA has been found in groundwater near the Talbert Barrier, which was traced to industrial wastewater dischargers.
- **1,4-Dioxane** – 1,4-Dioxane is a suspected human carcinogen. It is used as a solvent in various industrial processes such as the manufacture of adhesive products and membranes.
- **Perchlorate** – Perchlorate enters groundwater through application of fertilizer containing perchlorate, water imported from the Colorado River, industrial or military sites that have perchlorate, and natural occurrence. Perchlorate was not detected in 84 percent of the 219 production wells tested between the years 2010 through 2014.
- **Selenium** – Selenium is a naturally occurring micronutrient found in soils and groundwater in the Newport Bay watershed. The bio-accumulation of selenium in the food chain may result in deformities, stunted growth, reduced hatching success, and suppression of immune systems in fish and wildlife. Management of selenium is difficult as there is no off-the-shelf treatment technology available.

- **Constituents of Emerging Concern (CEC)** – CECs are either synthetic or naturally occurring substances that are not currently regulated in water supplies or wastewater discharged but can be detected using very sensitive analytical techniques. The newest group of CECs include PCPPs and endocrine disruptors. OCWD’s laboratory is one of a few in the state of California that continuously develops capabilities to analyze for new compounds (OCWD, Groundwater Management Plan 2015 Update, June 2015).

3.6.2.3 Climate Change

Changing climate patterns are expected to shift precipitation patterns and affect water supply. Unpredictable weather patterns will make water supply planning more challenging. The areas of concern for California include a reduction in Sierra Nevada Mountain snowpack, increased intensity and frequency of extreme weather events, and rising sea levels causing increased risk of Delta levee failure, seawater intrusion of coastal groundwater basins, and potential cutbacks on the SWP and Central Valley Project (CVP). The major impact in California is that without additional surface storage, the earlier and heavier runoff (rather than snowpack retaining water in storage in the mountains), will result in more water being lost to the oceans. A heavy emphasis on storage is needed in the State of California.

In addition, the Colorado River Basin supplies have been inconsistent since about the year 2000, resulting in 13 of the last 16 years of the upper basin runoff being below normal. Climate models are predicting a continuation of this pattern whereby hotter and drier weather conditions will result in continuing lower runoff.

Legal and water quality issues may have impacts on Metropolitan supplies. It is felt, however, that climatic factors would have more of an impact than legal and water quality factors. Climatic conditions have been projected based on historical patterns but severe pattern changes are still a possibility in the future.

3.6.3 Normal-Year Reliability Comparison

Although not projected to be used, Mesa Water® has entitlements to receive imported water from Metropolitan through MWDOC via connection to Metropolitan’s regional distribution system. Pipeline and connection capacity rights do not guarantee the availability of water, per se, but they do guarantee the ability to convey water when it is available to the Metropolitan distribution system. All imported water supplies are assumed available to Mesa Water® from existing water transmission facilities. The demand and supplies listed below also include local groundwater supplies that are available to Mesa Water® through OCWD by a pre-determined pumping percentage. Mesa Water® is 100 percent reliable for normal year demands from 2020 through 2040.

For the 2015 UWMP, the normal year was selected using a range from 1990 through 2014. Due to ongoing drought conditions within California and the increased implementation of mitigation measures, this historical range was determined to represent an average water demand for this UWMP. The water demand forecasting model developed for the Orange County Reliability Study (described in Section 2.4.1), to project the 25-year demand for Orange County water agencies, also isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The explanatory variables of population, temperature, precipitation, unemployment rate, drought restrictions, and conservation measures were used to create the statistical model. The impacts of hot/dry weather

condition are reflected as a percentage increase in water demands from the average condition. The average (normal) demand is represented by the average water demand of 1990 to 2014 (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016).

3.6.4 Single-Dry Year Reliability Comparison

A single-dry year is defined as a single year of no to minimal rainfall within a period that average precipitation is expected to occur. The water demand forecasting model developed for the Orange County Reliability Study (described in Section 2.4.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition (1990-2014). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the OC Basin area where the Mesa Water® service area is located (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016). Detailed information of the model is included in Appendix G.

Mesa Water® has documented that it is 100 percent reliable for single dry year demands from 2020 through 2040 with a demand increase of six percent from normal demand with significant reserves held by Metropolitan, local groundwater supplies, and conservation.

3.6.5 Multiple-Dry Year Period Reliability Comparison

Multiple-dry years are defined as three or more consecutive years with minimal rainfall within a period of average precipitation. The water demand forecasting model developed for the Orange County Reliability Study (described in Section 2.4.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition (1990-2014). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the OC Basin area where the Mesa Water® service area is located (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016). It is conservatively assumed that a three-year multi dry year scenario is a repeat of the single dry year over three consecutive years (FY 2011-12 through FY 2013-14).

Mesa Water® is capable of meeting all customers' demands with significant reserves held by Metropolitan, local groundwater supplies, and conservation in multiple dry years from 2020 through 2040 with a demand increase of six percent from normal demand with significant reserves held by Metropolitan, local groundwater supplies, and conservation. The basis of the water year is displayed in Table 3-4.

Table 3-4: Basis of Water Year Data

Retail: Basis of Water Year Data			
Year Type	Base Year	Available Supplies if Year Type Repeats	
		<input type="checkbox"/>	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location
		<input checked="" type="checkbox"/>	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available	% of Average Supply
Average Year	1990-2014		100%
Single-Dry Year	2014		106%
Multiple-Dry Years 1st Year	2012		106%
Multiple-Dry Years 2nd Year	2013		106%
Multiple-Dry Years 3rd Year	2014		106%

NOTES: Developed by MWDOC as 2015 Bump Methodology

3.7 Supply and Demand Assessment

A comparison between the supply and the demand for projected years between 2010 and 2040 is shown in Table 3-6. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

Table 3-5: Normal Year Supply and Demand Comparison (AF)

Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	20,610	20,676	20,742	20,809	20,874
Demand totals	20,610	20,676	20,742	20,809	20,874
Difference	0	0	0	0	0

NOTES:

A comparison between the supply and the demand in a single dry year is shown in Table 3-7. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

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Table 3-6: Single Dry Year Supply and Demand Comparison (AF)

Retail: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	21,847	21,917	21,987	22,058	22,126
Demand totals	21,847	21,917	21,987	22,058	22,126
Difference	0	0	0	0	0
NOTES:					

A comparison between the supply and the demand in multiple dry years is shown in Table 3-8.

Table 3-7: Multiple Dry Years Supply and Demand Comparison (AF)

Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First year	Supply totals	21,847	21,917	21,987	22,058	22,126
	Demand totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
Second year	Supply totals	21,847	21,917	21,987	22,058	22,126
	Demand totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
Third year	Supply totals	21,847	21,917	21,987	22,058	22,126
	Demand totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
NOTES: Developed by MWDOC as 2015 Bump Methodology						

4 DEMAND MANAGEMENT MEASURES

The goal of the DMM section is to provide a comprehensive description of the water conservation programs that a supplier has implemented, is currently implementing, and plans to implement in order to meet its urban water use reduction targets. The reporting requirements for DMM has been significantly modified and streamlined in 2014 by Assembly Bill 2067. For a retail agency such as Mesa Water® the requirements changed from having 14 specific measures to six more general requirements plus an “other” category.

4.1 Water Waste Prevention Ordinances

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

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

The Conservation Program has a permanent water conservation clause i.e. the Mesa Water® Conservation Program is effective at all times and is not dependent upon a water shortage for implementation. In an event of a water supply shortage, the Conservation Program established provisions for three levels of water supply shortage response actions associated with increasingly restrictive prohibitions to be implemented during a declared shortage. Level 1 corresponds to a water supply shortage alert; Level 2 corresponds to a water supply shortage warning; and Level 3 corresponds to a

water supply shortage emergency. The provisions and water conservation measures to be implemented in response to each shortage phase are described in Section 5 of the UWMP. The Mesa Water® Conservation and Water Supply Emergency Program Ordinance is included in Appendix D. Table 4-1 summarizes Mesa Water®'s water waste prohibition efforts in the past five years and the projected number of site visits and expenditures related to the Water Conservation and Water Supply Emergency Program.

Table 4-1: Water Waste Prohibition

Actual	2011	2012	2013	2014	2015
Waste Ordinance in Effect	Y	Y	Y	Y	Y
# of On-Site Visits	84	74	40	31	1,510
Actual Expenditures (\$)	\$7,500	\$6,500	\$3,500	\$2,800	\$136,170

Planned	2016	2017	2018	2019	2020
Waste Ordinance in Effect	Y	Y	Y	Y	Y
# of On-Site Visits	750	75	75	75	75
Planned Expenditures (\$)	\$66,750	\$6,750	\$6,750	\$6,750	\$6,750

4.2 Metering

All water service connections supplied by Mesa Water® are fully metered and customers are billed by volume of water used. Mesa Water® requires individual metering for all new connections. Mesa Water® has a program to replace meters every 15 year as well as replacement of any meters that fail due to malfunctions and under-registration. Calibration testing is performed along with the water loss audit every year. All three inch and larger meters are tested every two years to AWWA calibration standards. Mesa Water® evaluates the property's water usage versus the meter's efficiency to determine whether meters should be rebuilt and/or replaced. Mesa Water® does not have statutory authority to mandate submeters but requires dedicated irrigation meters that are read and billed by Mesa Water® for all CII and Multi-Family developments with irrigated landscape over 1,000 square feet.

Mesa Water® has implemented an Automatic Meter Reading (AMR) pilot project and is currently reviewing its progress and effectiveness, and plans to implement a permanent program in a cost-effective manner.

4.3 Conservation Pricing

Mesa Water®'s water rate schedule is based on a uniform rate structure for commodity charges. Table 4-2 shows Mesa Water®'s water rates effective as of January 1, 2016.

Table 4-2: Mesa Water District Residential Water Usage Rates

Type of Water	Water Rate (per 100 cubic feet)
Potable Water	\$3.51
Recycled Water	\$2.32
Construction Water	\$5.26
Fireline Water	\$7.02

4.4 Public Education and Outreach

The Mesa Water® public education and outreach program is supplemented by regional programs administered by MWDOC. MWDOC has established an extensive public education and outreach program to assist retail agencies in Orange County to promote water use efficiency awareness within their service areas. MWDOC’s public education and outreach programs consist of five primary activities as described below.

In addition to the primary programs it administers, MWDOC also maintains a vibrant public website (www.mwdoc.com) as well as a social media presence on Facebook, Twitter and Instagram. MWDOC’s Facebook page has more than 1,200 followers. The social media channels are used to educate the public about water-efficiency, rates and other water-related issues.

MWDOC’s public education and outreach programs are described below:

School Education Programs

MWDOC school education programs reach more than 100,000 students per year. The program is broken into elementary and high school components.

- *Elementary School Program* reaches 60,000 students throughout Orange County through assemblies hosted by the Discovery Science Center. MWDOC holds a \$220,000 contract with the Discovery Science Center, funded proportionally by the participating MWDOC retail agencies.
- *High School Program* is new in 2015-16 and will reach students in 20 high schools in Orange County. The program is administered by MWDOC and operated by two contractors, the Orange County Department of Education and the Ecology Center. Through the three-year contract, those agencies will train more than 100 county teachers on water education on topics such as, water sources, water conservation, water recycling, watersheds, and ecological solutions for the benefit of their current and future students. Teachers will learn a variety of water conservation methods, such as irrigation technology, rainwater harvesting, water recycling, and water foot-printing through a tour at the Ecology Center facility. These trainings allow teachers to support student -led conservation efforts. The program will reach a minimum of 25,000 students by providing in-classroom water education and helping students plan and implement campus wide “Water Expos” that will allow peer-to-peer instruction on water issues. The \$80,000 program is funded by participating agencies.

Value of Water Communication Program

MWDOC administers this program on behalf of 14 agencies. The \$190,000 program involves the water agencies developing 30 full news pages that will appear weekly in the Orange County Register, the largest newspaper in the county, with a Sunday readership of 798,000. The campaign will educate Orange County residents and business leaders on water infrastructure issues and water efficiency measures, as well as advertise water related events and other pertinent information.

Quarterly Water Policy Dinners

The Water Policy Dinner events attract 225 to 300 water and civic leaders every quarter. The programs host speakers topical to the Orange County water industry, with recent addresses from Felicia Marcus of the state water board and Dr. Lucy Jones, a noted expert on earthquakes and their potential impact on infrastructure.

Annual Water Summit

The annual Water Summit brings together 300 Orange County water and civic leaders with state and national experts on water infrastructure and governance issues. The half-day event has a budget of \$80,000 per year. Portions of the cost are covered by attendance and sponsorships, while MWDOC splits a portion with its event partner, the OCWD.

Water Inspection Trips

Water Inspection trips take stakeholders on tours of the CRA, California Delta and other key water infrastructure sites. The public trips are required under Metropolitan's regulations. While Metropolitan covers the cost of the trips, MWDOC has two members of the public affairs staff that work diligently on identifying Orange County residents and leaders to attend. MWDOC staff also attends each trip. In the past year, MWDOC participated in a dozen trips, each taking an average of 30 residents. MWDOC also works with Metropolitan on special trips to educate County Grand Jurors about the key water infrastructure.

Supplemental Programs

Mesa Water® hosts an annual Water Issues Study Group (WISG) that is a three-part adult education program to teach community members about local, regional, and statewide water issues. WISG features Mesa Water® staff, guest speakers, and a tour of one reservoir and the MWRP.

4.5 Programs to Assess and Manage Distribution System Real Loss

Mesa Water® consistently monitors water production with SCADA and performs a formal water audit each year. Additionally, when a leak is discovered, Mesa Water® staff typically responds immediately to make repairs. The Mesa Water® prescreening audit has determined that over 95 percent of total supply into the system (pumped groundwater) is typically captured in sales.

Mesa Water® performs the AWWA Water Audit each year and routine maintenance is tracked in a Computerized Maintenance Management System (CMMS). The CMMS plans, schedules, and values all

mainline, hydrant, meter, valve, and other infrastructure replacement and maintenance. Mesa Water® also allocates a budget and systematic workplan for the replacement and maintenance of the infrastructure, and by following this workplan has spent over \$1 million each year replacing routine capital infrastructure including hydrants, valves, and service lines. Mesa Water® is currently completing a pipeline integrity program to determine the strength, quality, and remaining useful service life of the distribution system. This will also direct Mesa Water® where leak detection should be increased.

Senate Bill 1420 signed into law in September 2014 requires urban water suppliers that submit UWMPs to calculate annual system water losses using the water audit methodology developed by AWWA. AB 1420 requires the water loss audit be submitted to DWR every five years as part of the urban water supplier's UWMP. Water auditing is the basis for effective water loss control. DWR's UWMP Guidebook include a water audit manual intended to help water utilities complete the AWWA Water Audit on an annual basis. A Water Loss Audit was completed for Mesa Water® which identified areas for improvement and quantified total loss. Based on the data presented, the three priority areas identified were volume from own sources, unauthorized consumption, and systematic data handling errors. Multiple criteria are a part of each validity score and a system wide approach will need to be implemented for Mesa Water®'s improvement. Quantified water loss for the FY 2013-14 was 821 AF; Mesa Water has been actively exploring ways to not only reduce the water loss volume but increase their validity score.

4.6 Water Conservation Program Coordination and Staffing Support

Mesa Water® has maintained a full-time Conservation Coordinator position since 2001 and continues to provide support staff as necessary. The Conservation Coordinator is responsible for coordinating all conservation program activities and acts as the liaison between Mesa Water® and MWDOC, Metropolitan, CUWCC, and others. The following list highlights areas of responsibility of the Conservation Coordinator.

- Plans, prioritizes, assigns, supervises, and reviews the work of staff responsible for providing services related to Mesa Water®'s water conservation programs and office and field customer service activities; coordinates the operations of the section.
- Participates in the selection of assigned water conservation and office and field customer service staff; provides or coordinates staff training.
- Participates in the preparation and administration of the conservation/customer service program budget; submits budget recommendations; monitors expenditures.
- Analyzes, develops, and implements cost-effective water conservation programs consistent with the BMPs, including the identification, evaluation, and implementation of measures essential to the efficient use of Mesa Water®'s water supplies; tracks customer contact and program progress; reports on progress.
- Represents Mesa Water® on water conservation issues to committees, meetings, community groups, and the general public; attends various regional meetings; speaks to various groups; conducts interviews with the media as needed.
- Plans, develops, implements, evaluates, and promotes landscape water conservation programs consistent with current state/federal laws, develops printed materials and conducts customer

workshops on water efficient landscape and irrigation system design; coordinates with City of Costa Mesa and other public agencies.

- Oversees a variety of conservation and water use efficiency functions including water surveys, investigations, and evaluations of residential and CII customers; assesses the efficiency of water use, particularly for landscape irrigation; provides recommendations on water usage and conservation techniques, equipment improvements, and other methods of achieving more efficient water use.
- Serves as liaison between Mesa Water® and other government agencies at the local, state, and federal levels; works with Metropolitan and MWDOC in the implementation of water efficiency policies and programs; coordinates various rebate programs with MWDOC and various vendors.
- Prepares the Mesa Water® UWMP and BMP Report through data collection and analysis in the areas of demand forecasting, historical trends in water use and hydrology, water conditions and quality, water savings, rate structures, and water supply economics; enters data results from all efficiency programs; query data for selected reporting ranges; analyzes and screens data for reporting accuracy.
- Monitors and provides guidance for landscape maintenance to the Facilities Maintenance section regarding landscape projects at all Mesa Water® sites including the water demonstration garden; adjusts all Mesa Water® irrigation clocks at various sites based on climate data; conducts soil analysis and observes landscape conditions and makes recommendations based on observations; provides customers detailed information about the Mesa Water® demonstration garden.

Regional programs are funded by Metropolitan and MWDOC and receive supplemental funding from Mesa Water®.

4.7 Other Demand Management Measures

From FY 2010-15, Mesa Water®, with the assistance of MWDOC, has implemented many water use efficiency programs for its residential, CII, and landscape customers as described below. Appendix I provides quantities of rebates and installations achieved under each program since program inception. Mesa Water® will continue to implement all applicable programs through 2020.

4.7.1 Residential Programs

Mesa Water® offers Water Efficient Landscape Workshops (classroom style workshops at the Mesa Water® offices) and Water-Wise House Calls (indoor and outdoor home water use surveys) to residential customers. Customers may also visit the Water-Wise Demonstration Gardens at Mesa Water® administrative offices, MWRF, and Orange County Fairgrounds. Residential programs offered through MWDOC are described below.

High Efficiency Clothes Washer Rebate Program

The High Efficiency Clothes Washer (HECW) Rebate Program provides residential customers with rebates for purchasing and installing WaterSense labeled HECWs. HECWs use 35-50 percent less water than standard washer models, with savings of approximately 9,000 gallons per year, per device. Devices

must have a water factor of 4.0 or less, and a listing of qualified products can be found at ocwatersmart.com. There is a maximum of one rebate per home.

High Efficiency Toilet Rebate Program

The largest amount of water used inside a home, 30 percent, goes toward flushing the toilet. The High Efficiency Toilet (HET) Rebate Program offers incentives to residential customers for replacing their standard, water-guzzling toilets with HETs. HETs use just 1.28 gallons of water or less per flush, which is 20 percent less water than standard toilets. In addition, HETS save an average of 38 gallons of water per day while maintaining high performance standards.

4.7.2 CII Programs

Mesa Water® offers landscape irrigation audits for CII customers in addition to the MWDOC programs described below.

Water Smart Hotel Program

Water used in hotels and other lodging businesses accounts for approximately 15 percent of the total water use in commercial and institutional facilities in the United States. The Water Smart Hotel Program provides water use surveys, customized facility reports, technical assistance, and enhanced incentives to hotels that invest in water use efficiency improvements. Rebates available include HETs, ultralow volume urinals, air-cooled ice machines, weather-based irrigation controllers, and rotating nozzles.

Socal Water\$mart Rebate Program for CII

Mesa Water® through MWDOC offers financial incentives under the Socal Water\$mart Rebate Program which offers rebates for various water efficient devices to CII customers, such as HETs, ultralow volume urinals, connectionless food steamers, air-cooled ice machines, pH-cooling towers controller, and dry vacuum pumps.

4.7.3 Landscape Programs

Turf Removal Program

The Orange County Turf Removal Program offers incentives to remove non-recreational turf grass from commercial properties throughout the County. This program is a partnership between MWDOC, Metropolitan, and local retail water agency. The goals of this program are to increase water use efficiency within Orange County, reduce runoff leaving the properties, and evaluate the effectiveness of turf removal as a water-saving practice. Participants are encouraged to replace their turf grass with drought-tolerant landscaping, diverse plant palettes, and artificial turf, and they are encouraged to retrofit their irrigation systems with Smart Timers and drip irrigation (or to remove it entirely).

Water Smart Landscape Program

MWDOC's Water Smart Landscape Program is a free water management tool for homeowner associations, landscapers, and property managers. Participants in the program use the Internet to track their irrigation meter's monthly water use and compare it to a custom water budget established by the program. This enables property managers and landscapers to easily identify areas that are over/under watered and enhances their accountability to homeowner association boards.

Smart Timer Rebate Program

Smart Timers are irrigation clocks that are either weather-based irrigation controllers (WBIC) or soil moisture sensor systems. WBICs adjust automatically to reflect changes in local weather and site-specific landscape needs, such as soil type, slopes, and plant material. When WBICs are programmed properly, turf and plants receive the proper amount of water throughout the year. During the fall months, when property owners and landscape professionals often overwater, Smart Timers can save significant amounts of water.

Rotating Nozzles Rebate Program

The Rotating Nozzle Rebate Program provides incentives to residential and commercial properties for the replacement of high-precipitation rate spray nozzles with low-precipitation rate multi-stream, multi-trajectory rotating nozzles. The rebate offered through this Program aims to offset the cost of the device and installation.

Spray to Drip Rebate Program

The Spray to Drip Pilot Rebate Program offers residential and commercial customers rebates for converting planting areas irrigated by spray heads to drip irrigation. Drip irrigation systems are very water-efficient. Rather than spraying wide areas, drip systems use point emitters to deliver water to specific locations at or near plant root zones. Water drips slowly from the emitters either onto the soil surface or below ground. As a result, less water is lost to wind and evaporation.

SoCal Water\$mart Rebate Program for Landscape

Mesa Water® through MWD OC also offers financial incentives under the SoCal Water\$mart Rebate Program for a variety of water efficient landscape devices, such as Central Computer Irrigation Controllers, large rotary nozzles, and in-stem flow regulators.

5 WATER SHORTAGE CONTINGENCY PLAN

5.1 Overview

In connection to recent water supply challenges, the State Water Board found that California has been subject to multi-year droughts in the past, and the American Southwest is becoming drier, increasing the probability of prolonged droughts in the future. Due to current and potential future water supply shortages, Governor Brown issued a drought emergency proclamation in January 2014 and signed the 2014 Executive Order which directs urban water suppliers to implement drought response plans to limit outdoor irrigation and wasteful water practices if they are not already in place. Pursuant to California Water Code Section 106, it is the declared policy of the State that the use of water for domestic use is the highest use of water and that the next highest use is for irrigation. In southern California, the development of such policies has occurred at both the wholesale and retail level. This section describes the water supply shortage policies Metropolitan, MWDOC, and Mesa Water® have in place to respond to events including catastrophic interruption and up to a 50 percent reduction in water supply.

5.2 Shortage Actions

5.2.1 Metropolitan Water Surplus and Drought Management Plan

Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage annually. Each stage is associated with specific resource management actions to avoid extreme shortages to the extent possible and minimize adverse impacts to retail customers should an extreme shortage occur. The sequencing outlined in the Water Surplus and Drought Management (WSDM) Plan reflects anticipated responses towards Metropolitan's existing and expected resource mix.

Surplus stages occur when net annual deliveries can be made to water storage programs. Under the WSDM Plan, there are four surplus management stages that provides a framework for actions to take for surplus supplies. Deliveries in DVL and in SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage.

The WSDM Plan distinguishes between shortages, severe shortages, and extreme shortages. The differences between each term is listed below.

- Shortage: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands using stored water or water transfers as necessary.
- Severe Shortage: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation.
- Extreme Shortage: Metropolitan must allocate available supply to full-service customers.

There are six shortage management stages to guide resource management activities. These stages are defined by shortfalls in imported supply and water balances in Metropolitan's storage programs. When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a

shortage condition. Figure 5-1 gives a summary of actions under each surplus and shortage stages when an allocation plan is necessary to enforce mandatory cutbacks. The goal of the WSDM Plan is to avoid Stage 6, an extreme shortage.

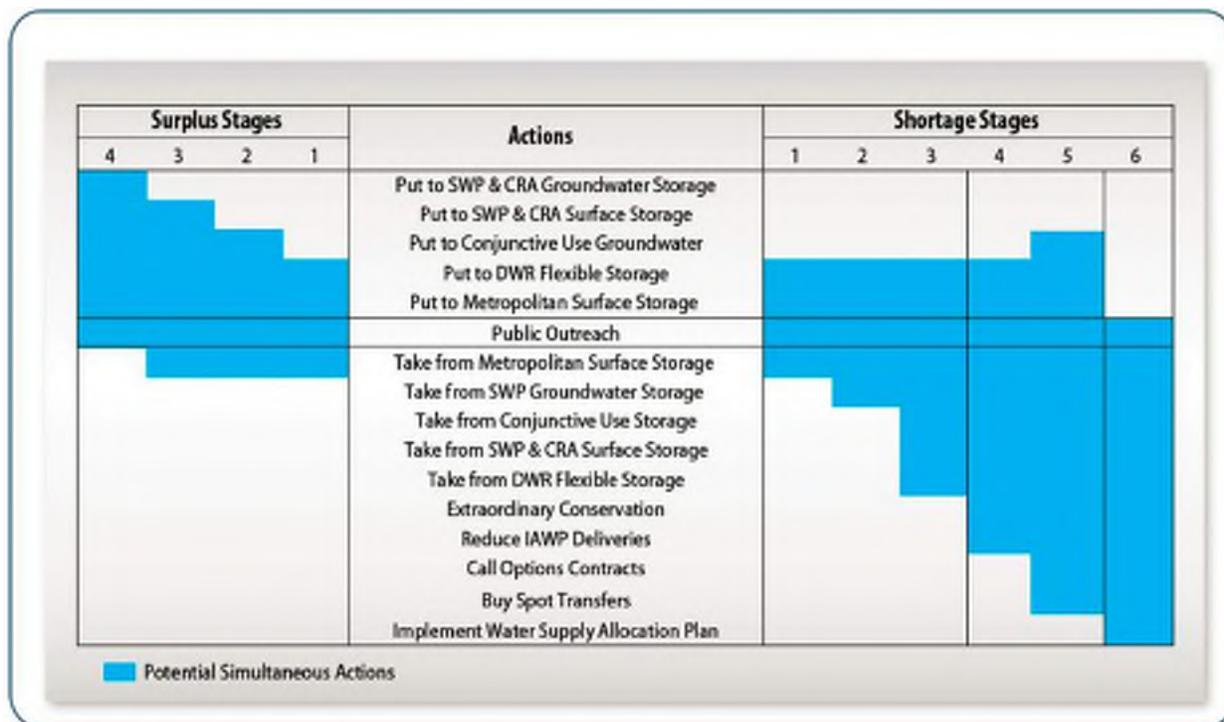


Figure 5-1: Resource Stages, Anticipated Actions, and Supply Declarations

Metropolitan’s Board of Directors adopted a Water Supply Condition Framework in June 2008 in order to communicate the urgency of the region’s water supply situation and the need for further water conservation practices. The framework has four conditions, each calling increasing levels of conservation. Descriptions for each of the four conditions are listed below:

- Baseline Water Use Efficiency: Ongoing conservation, outreach, and recycling programs to achieve permanent reductions in water use and build storage reserves.
- Condition 1 Water Supply Watch: Local agency voluntary dry-year conservation measures and use of regional storage reserves.
- Condition 2 Water Supply Alert: Regional call for cities, counties, member agencies, and retail water agencies to implement extraordinary conservation through drought ordinances and other measures to mitigate use of storage reserves.
- Condition 3 Water Supply Allocation: Implement Metropolitan’s Water Supply Allocation Plan (WSAP)

As noted in Condition 3, should supplies become limited to the point where imported water demands cannot be met, Metropolitan will allocate water through the WSAP (Metropolitan, 2015 Final UWMP, May 2016).

5.2.2 Metropolitan Water Supply Allocation Plan

Metropolitan's imported supplies have been impacted by a number of water supply challenges as noted earlier. In case of extreme water shortage within the Metropolitan service area the response is the implementation of its WSAP.

Metropolitan's Board of Directors adopted the WSAP in February 2008 to fairly distribute a limited amount of water supply and to apply it through a detailed methodology to reflect a range of local conditions and needs of the region's retail water consumers.

The WSAP includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation. Metropolitan's WSAP is the foundation for the urban water shortage contingency analysis required under Water Code Section 10632 and is part of Metropolitan's 2015 UWMP.

Metropolitan's WSAP was developed in consideration of the principles and guidelines in Metropolitan's 1999 WSDM Plan with the core objective of creating an equitable "needs-based allocation". The WSAP's formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies of up to 50 percent. The formula takes into account a number of factors, such as the impact on retail customers, growth in population, changes in supply conditions, investments in local resources, demand hardening aspects of water conservation savings, recycled water, extraordinary storage and transfer actions, and groundwater imported water needs.

The formula is calculated in three steps: 1) based period calculations, 2) allocation year calculations, and 3) supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations – The first step in calculating a member agency's water supply allocation is to estimate their water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of supply and demand is calculated using data from the two most recent non-shortage fiscal years ending 2013 and 2014.

Step 2: Allocation Year Calculations – The next step in calculating the member agency's water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population growth and changes in local supplies.

Step 3: Supply Allocation Calculations – The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2.

In order to implement the WSAP, Metropolitan's Board of Directors makes a determination on the level of the regional shortage, based on specific criteria, typically in April. The criteria used by Metropolitan includes, current levels of storage, estimated water supplies conditions, and projected imported water demands. The allocations, if deemed necessary, go into effect in July of the same year and remain in effect for a 12-month period. The schedule is made at the discretion of the Board of Directors.

Although Metropolitan's 2015 UWMP forecasts that Metropolitan will be able to meet projected imported demands throughout the projected period from 2020 to 2040, uncertainty in supply conditions can result

in Metropolitan needing to implement its WSAP to preserve dry-year storage and curtail demands (Metropolitan, 2015 UWMP, May 2016).

5.2.3 MWDOC Water Supply Allocation Plan

To prepare for the potential allocation of imported water supplies from Metropolitan, MWDOC worked collaboratively with its 28 retail agencies to develop its own WSAP that was adopted in January 2009 and amended in 2015. The MWDOC WSAP outlines how MWDOC will determine and implement each of its retail agency's allocation during a time of shortage.

The MWDOC WSAP uses a similar method and approach, when reasonable, as that of the Metropolitan's WSAP. However, MWDOC's plan remains flexible to use an alternative approach when Metropolitan's method produces a significant unintended result for the member agencies. The MWDOC WSAP model follows five basic steps to determine a retail agency's imported supply allocation.

Step 1: Determine Baseline Information – The first step in calculating a water supply allocation is to estimate water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the last two non-shortage fiscal years ending 2013 and 2014.

Step 2: Establish Allocation Year Information – In this step, the model adjusts for each retail agency's water need in the allocation year. This is done by adjusting the base period estimates for increased retail water demand based on population growth and changes in local supplies.

Step 3: Calculate Initial Minimum Allocation Based on Metropolitan's Declared Shortage Level – This step sets the initial water supply allocation for each retail agency. After a regional shortage level is established, MWDOC will calculate the initial allocation as a percentage of adjusted Base Period Imported water needs within the model for each retail agency.

Step 4: Apply Allocation Adjustments and Credits in the Areas of Retail Impacts and Conservation– In this step, the model assigns additional water to address disparate impacts at the retail level caused by an across-the-board cut of imported supplies. It also applies a conservation credit given to those agencies that have achieved additional water savings at the retail level as a result of successful implementation of water conservation devices, programs and rate structures.

Step 5: Sum Total Allocations and Determine Retail Reliability – This is the final step in calculating a retail agency's total allocation for imported supplies. The model sums an agency's total imported allocation with all of the adjustments and credits and then calculates each agency's retail reliability compared to its Allocation Year Retail Demand.

The MWDOC WSAP includes additional measures for plan implementation, including the following:

- **Appeal Process** – An appeals process to provide retail agencies the opportunity to request a change to their allocation based on new or corrected information. MWDOC anticipates that under most circumstances, a retail agency's appeal will be the basis for an appeal to Metropolitan by MWDOC.
- **Melded Allocation Surcharge Structure** – At the end of the allocation year, MWDOC would only charge an allocation surcharge to each retail agency that exceeded their allocation if MWDOC exceeds its total allocation and is required to pay a surcharge to Metropolitan. Metropolitan enforces

allocations to retail agencies through an allocation surcharge to a retail agency that exceeds its total annual allocation at the end of the 12-month allocation period. MWDOC's surcharge would be assessed according to the retail agency's prorated share (AF over usage) of MWDOC amount with Metropolitan. Surcharge funds collected by Metropolitan will be invested in its Water Management Fund, which is used to in part to fund expenditures in dry-year conservation and local resource development.

- Tracking and Reporting Water Usage – MWDOC will provide each retail agency with water use monthly reports that will compare each retail agency's current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.
- Timeline and Option to Revisit the Plan – The allocation period will cover 12 consecutive months and the Regional Shortage Level will be set for the entire allocation period. MWDOC only anticipates calling for allocation when Metropolitan declares a shortage; and no later than 30 days from Metropolitan's declaration will MWDOC announce allocation to its retail agencies.

5.2.4 Mesa Water District

The Board of Directors adopted the Water Conservation and Water Supply Emergency Program, Ordinance No. 26, on May 14, 2015. Ordinance No. 26 establishes a comprehensive staged water conservation program that will encourage reduced water consumption within the Mesa Water® service area through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within Mesa Water®. Along with permanent water conservation requirements, the Mesa Water® Comprehensive Water Conservation Program consists of the following three (3) stages found in Table 5-1 to respond to a reduction in potable water available to Mesa Water® for distribution to its customers with year round requirements in effect at all times unless a mandatory conservation stage has been implemented by the Board of Directors (Mesa Water District, Ordinance No. 26, May 2015).

Table 5-1: Stages of Water Shortage Contingency Plan

Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction ¹	Water Supply Condition
1	Up to 20%	A Level 1 Water Supply Shortage exists when Mesa Water® determines, in its sole discretion, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.
2	Up to 30%	A Level 2 Water Supply Shortage exists when Mesa Water® determines, in its sole discretion, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.
3	Up to 50%	A Level 3 Water Supply Shortage condition is also referred to as an "Emergency" condition. A Level 3 condition exists when Mesa Water® declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to maintain sufficient water supplies for public health and safety.
¹ One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.		
NOTES:		

5.3 Three-Year Minimum Water Supply

As a matter of practice, Metropolitan does not provide annual estimates of the minimum supplies available to its member agencies. As such, Metropolitan member agencies must develop their own estimates for the purposes of meeting the requirements of the Act.

Section 135 of the Metropolitan Water District Act declares that a member agency has the right to invoke its “preferential right” to water, which grants each member agency a preferential right to purchase a percentage of Metropolitan’s available supplies based on specified, cumulative financial contributions to Metropolitan. Each year, Metropolitan calculates and distributes each member agency’s percentage of preferential rights. However, since Metropolitan’s creation in 1927, no member agency has ever invoked these rights as a means of acquiring limited supplies from Metropolitan.

As an alternative to invoking preferential rights, Metropolitan and its member agencies accepted the terms and conditions of Metropolitan’s shortage allocation plan, which allocated imported water under

limited supply conditions. In fact, in FY 2015-2016, Metropolitan implemented its WSAP at a stage level 3 (seeking no greater than a 22.25 percent regional reduction of water use), which is the largest reduction Metropolitan has ever imposed on its member agencies. This WSAP level 3 reduction was determined when Metropolitan water supplies from the SWP was at its lowest levels ever delivered and water storage declined greater than 1 MAF in one year.

MWDOC has adopted a shortage allocation plan and accompanying allocation model that estimates firm demands on MWDOC. Assuming MWDOC would not be imposing mandatory restrictions if Metropolitan is not, the estimate of firm demands in MWDOC’s latest allocation model has been used to estimate the minimum imported supplies available to each of MWDOC’s retail agencies for 2015-2018. Thus, the estimate of the minimum imported supplies available to Mesa Water® is 18,526 AF, as a backup to its groundwater supplies as shown in Table 5-2 (MWDOC, Water Shortage Allocation Model, November 2015).

Table 5-2: Minimum Supply Next Three Years (AF)

Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	18,526	18,526	18,526
NOTES:			

5.4 Catastrophic Supply Interruption

Given the great distances that imported supplies travel to reach Orange County, the region is vulnerable to interruptions along hundreds of miles aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, the infrastructure in place to deliver supplies are susceptible to damage from earthquakes and other disasters. Although Mesa Water is not projected to rely on imported water sources in the future, this information is included from a regional standpoint.

5.4.1 Metropolitan

Metropolitan has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM Plan and WSAP. Metropolitan also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the southern California region, including seismic events along the San Andreas Fault. In addition, Metropolitan is working with the state to implement a comprehensive improvement plan to address catastrophic occurrences outside of the southern California region, such as a maximum probable seismic event in the Delta that would cause levee failure and disruption of SWP deliveries. For greater detail on Metropolitan’s planned responses to catastrophic interruption, please refer to Metropolitan’s 2015 UWMP.

5.4.2 Water Emergency Response of Orange County

In 1983, the Orange County water community identified a need to develop a plan on how agencies would respond effectively to disasters impacting the regional water distribution system. The collective efforts of

these agencies resulted in the formation of the Water Emergency Response Organization of Orange County (WEROC) to coordinate emergency response on behalf of all Orange County water and wastewater agencies, develop an emergency plan to respond to disasters, and conduct disaster training exercises for the Orange County water community. WEROC was established with the creation of an indemnification agreement between its member agencies to protect each other against civil liabilities and to facilitate the exchange of resources. WEROC is unique in its ability to provide a single point of contact for representation of all water and wastewater utilities in Orange County during a disaster. This representation is to the county, state, and federal disaster coordination agencies. Within the Orange County Operational Area, WEROC is the recognized contact for emergency response for the water community.

5.4.3 Mesa Water District

5.4.3.1 Water Shortage Emergency Response

In 1991, in accordance with the requirements of Assembly Bill IIX, Mesa Water® developed a comprehensive water shortage contingency plan as an amendment to the 1990 UWMP. The plan included all of the information necessary to meet the requirements of subdivision (e) of California Water Code Section 10631.

Public meetings and the availability of copies of the draft Water Shortage Contingency Plan were properly noticed in the local newspaper and were available for public review.

In addition to droughts, earthquakes, hazardous material spills or leaks, severe storms or floods, and widespread power outages can cause water supply shortages. Mesa Water® keeps abreast of water supply situations and has always taken a proactive approach in responding to water shortages. It is Mesa Water®'s policy to inform customers of current and projected water supply situations long before Mesa Water®, or its suppliers, declare water shortages.

All of the Mesa Water® customers will immediately be notified, through a variety of media, of the implementation of any phase of the Mesa Water® Water Conservation Ordinance. All customers using water, regardless of whether service is by contract or otherwise, will be required to comply.

5.5 Prohibitions, Penalties and Consumption Reduction Methods

5.5.1 Prohibitions

The Water Conservation Ordinance No. 26 lists water conservation requirements which shall take effect upon implementation by the Board of Directors. These prohibitions shall promote the efficient use of water, reduce or eliminate water waste, complement the Mesa Water® Water Quality regulations and urban runoff reduction efforts, and enable implementation of the Mesa Water® Water Shortage Contingency Measures. A list of Mesa Water®'s prohibitions can be found in Table 5-3.

MESA WATER DISTRICT 2015 URBAN WATER MANAGEMENT PLAN

Table 5-3: Restrictions and Prohibitions on End Uses

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
Permanent Year-Round	Landscape - Limit landscape irrigation to specific times	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.	No
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation	-	No
Permanent Year-Round	Other - Prohibit use of potable water for washing hard surfaces	This restriction does not apply in situations necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a handheld hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high pressure water broom.	No
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than seven (7) days of receiving notice from Mesa Water®.	No
Permanent Year-Round	Water Features - Restrict water use for decorative water	Operating a water fountain or other decorative water feature that does not use recirculated water is prohibited.	No

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Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
	features, such as fountains		
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	-	No
Permanent Year-Round	CII - Restaurants may only serve water upon request	-	No
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service	-	No
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water®.	No
Permanent Year-Round	Other	Installation of non-recirculating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	No
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves	-	No
Permanent Year-Round	Other	All commercial conveyor car wash systems must use re-circulating water systems, or must secure a waiver of this requirement from Mesa Water®.	No

MESA WATER DISTRICT 2015 URBAN WATER MANAGEMENT PLAN

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water®. This provision does not apply to watering or irrigating by use of a handheld bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than seventy-two (72) hours of receiving notice from Mesa Water®.	Yes
1	Landscape - Other landscape restriction or prohibition	Irrigation is prohibited during rain events	Yes
2	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water®. This provision does not apply to watering or irrigating by use of a handheld bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than forty-eight (48) hours of receiving notice from Mesa Water®.	Yes

MESA WATER DISTRICT 2015 URBAN WATER MANAGEMENT PLAN

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
2	Other water feature or swimming pool restriction	Filling or refilling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level.	Yes
3	Landscape - Prohibit all landscape irrigation	This does not apply towards the following circumstances: 1) maintenance of vegetation that are watered using a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, 2) maintenance of existing landscape necessary for fire protection, 3) maintenance of existing landscape for soil erosion, and 4) maintenance of landscape within active public parks, playing fields, day care centers, golf course greens, and school grounds provided irrigation does not exceed two (2) days per week.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than twenty-four (24) hours of receiving notice from Mesa Water®.	Yes
3	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	-	Yes
3	Other water feature or swimming pool restriction	Filling and refilling of residential swimming pools or outdoor spas with water is prohibited.	Yes

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
3	Other	No new potable water service, new temporary meters, and statement of immediate ability to serve or provide water service will be issued except under the following circumstances: 1) a valid, unexpired building permit has been issued for the project, 2) the project is necessary to protect the public health, safety, and welfare, or the applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of Mesa Water®.	Yes
NOTES:			

5.5.2 Penalties

Any customer who violates provisions of the Water Conservation Program by either excess use of water or by specific violation of one or more of the applicable water use restrictions for a particular mandatory conservation stage may be cited by Mesa Water® and subject to written notices, surcharges, fines, flow restrictions, and/or service termination.

The first and second violations will result in a written warning issued by Mesa Water®. During effective periods of Level 1, Level 2, and Level 3-Water Supply Shortages, the third violation will result in a written violation along with a conservation fee of one hundred dollars (\$100). A fourth and any subsequent violation will receive in a written warning along with a conservation fee of (\$200). In addition to any fines, Mesa Water® may install a flow restricting device and/or disconnect a customer's water service for a willful violation of mandatory restrictions (Mesa Water District, Ordinance No. 26, May 2015).

5.5.3 Consumption Reduction Methods

Table 5-4 lists the consumption reduction methods that will be used to reduce water use in restrictive stages.

Table 5-4: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods

Retail Only: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference
1	Other	Stage 1 Water Conservation Measures
2	Other	Stage 2 Water Conservation Measures
3	Other	Stage 3 Water Conservation Measures
NOTES:		

5.6 Impacts to Revenue

During a catastrophic interruption of water supplies, prolonged drought, or water shortage of any kind, Mesa Water® will experience a reduction in revenue due to reduced water sales. Throughout this period of time, expenditures may increase or decrease with varying circumstances. Expenditures may increase in the event of significant damage to the water system, resulting in emergency repairs. Expenditures may also decrease as less water is pumped through the system, resulting in lower power costs.

Mesa Water® receives water revenue from a service charge and a commodity charge based on consumption. The service charge recovers costs associated with providing water to the serviced property. The service charge does not vary with consumption and the commodity charge is based on water usage. Rates have been designed to recover the full cost of water service in the charges. Therefore, the total cost of purchasing water would decrease as the usage or sale of water decreases.

However, there are significant fixed costs associated with maintaining a minimal level of service. Mesa Water® will monitor projected revenues and expenditures should an extreme shortage and a large reduction in water sales occur for an extended period of time. To overcome these potential revenue losses and/or expenditure impacts, Mesa Water® may use reserves. If necessary, Mesa Water® may reduce expenditures by delaying implementation of its Capital Improvement Program and equipment purchases, and/or adjust the work force, implement a drought surcharge, and/or make adjustments to its water rate structure.

MESA WATER DISTRICT 2015 URBAN WATER MANAGEMENT PLAN

Table 5-5: Revenue Impacts

Demand	Baseline	10%	25%	50%
Water Produced (HCF)	8,264,055	7,437,650	6,198,042	4,132,028
Water Losses (HCF)	306,662	275,996	229,997	153,331
Water Sales (HCF)	7,957,393	7,161,654	5,968,045	3,978,697
Potable (%)	92.8%	92.8%	92.8%	92.8%
Construction (%)	0.3%	0.3%	0.3%	0.3%
Fire (%)	0.6%	0.6%	0.6%	0.6%
Recycled (%)	6.3%	6.3%	6.3%	6.3%
Potable (HCF)	7,383,856	6,645,470	5,537,892	3,691,928
Construction (HCF)	20,506	18,455	15,380	10,253
Fire (HCF)	48,171	43,354	36,128	24,086
Recycled (HCF)	504,860	454,374	378,645	252,430
Total	7,957,393	7,161,654	5,968,045	3,978,697
Revenue				
Potable (Revenue)	\$24,351,114	\$21,916,003	\$18,263,336	\$12,175,557
Construction (Revenue)	\$104,582	\$94,124	\$78,437	\$52,291
Fire (Revenue)	\$327,564	\$294,808	\$245,673	\$163,782
Recycled (Revenue)	\$1,397,919	\$1,258,127	\$1,048,439	\$698,960
Total	\$26,181,179	\$23,563,061	\$19,635,884	\$13,090,590
Fixed Monthly/Bimonthly Charge Revenue	\$5,803,271	\$5,803,271	\$5,803,271	\$5,803,271
Total Revenue	\$31,984,450	\$29,366,332	\$25,439,155	\$18,893,861
Revenue Lost		(\$2,618,118)	(\$6,545,295)	(\$13,090,590)
Variable Costs				
Sources of Supply, Pumping, Treatment	\$13,993,401	\$12,594,061	\$10,495,051	\$6,996,701
Avoided Costs		\$1,399,340	\$3,498,350	\$6,996,701
Net Revenue Change		(\$1,218,778)	(\$3,046,945)	(\$6,093,889)
Rate Revenue Increase Required		5.17%	15.52%	46.55%

5.7 Reduction Measuring Mechanism

Mesa Water®'s system is monitored by a modern computer-based Supervisory Control and Data Acquisition (SCADA) system. This system allows Mesa Water® staff to monitor the status and control all elements of the Mesa Water® system from one central and various remote locations. The SCADA system continuously records data and printed reports of system conditions can be generated on demand.

All customer-billing records are maintained on a SQL database system using Cogsdale Customer Information Software. Mesa Water®'s customer information and billing software has the capability to generate usage reports in formats necessary to monitor customer usage.

MWDOC will provide each member agency with monthly water use reports that will compare each member agency's current cumulative retail usage to their allocation baseline from Metropolitan. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.

6 RECYCLED WATER

Recycled water opportunities have continued to grow in southern California as public acceptance and the need to expand local water resources continues to be a priority. Recycled water also provides a degree of flexibility and added reliability during drought conditions when potable water supplies are restricted.

Recycled water is wastewater that is treated through primary, secondary and tertiary processes and is acceptable for most non-potable water purposes such as irrigation, and commercial and industrial process water per Title 22 requirements.

6.1 Agency Coordination

Mesa Water® does not own or operate any wastewater collection or treatment facilities. Wastewater collected in the service area goes to Orange County Sanitation District (OCSD) for treatment and disposal. Mesa Water® relies on the OC Basin for the majority of its water supply. OCWD is the manager of the OC Basin and strives to maintain and increase the reliability of the OC Basin through replenishment with imported water, stormwater, and advanced treated wastewater. OCWD and OCSD have jointly constructed and expanded two water recycling projects to meet this goal that include: 1) OCWD GAP and 2) OCWD GWRS.

6.1.1 OCWD Green Acres Project

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

6.1.2 OCWD Groundwater Replenishment System

OCWD's GWRS receives secondary treated wastewater from OCSD and purifies it to levels that meet and exceed all state and federal drinking water standards. The GWRS Phase 1 plant has been operational since January 2008, and uses a three-step advanced treatment process consisting of microfiltration (MF), reverse osmosis (RO), and ultraviolet (UV) light with hydrogen peroxide. A portion of the treated water is injected into the seawater barrier to prevent seawater intrusion into the groundwater basin. The other portion of the water is pumped to ponds where the water percolates into deep aquifers and becomes part of Orange County's water supply. The treatment process described on OCWD's website is provided below (OCWD, GWRS, 2015).

GWRS Treatment Process

The first step of the treatment process after receiving the secondary treated wastewater is a separation process called MF that uses hollow polypropylene fibers with 0.2 micron diameter holes in the sides. Suspended solids, protozoa, bacteria and some viruses are filtered out when drawing water through the holes to the center of the fibers.

The second step of the process consists of RO, semi-permeable polyamide polymer (plastic) membranes that water is forced through under high pressure. RO removes dissolved chemicals, viruses and pharmaceuticals in the water resulting in near-distilled-quality water that requires minerals be added back in to stabilize the water. This process was used by OCWD from 1975 to 2004 at their WF-21 to purify treated wastewater from OCSD for injection into the seawater intrusion barrier.

The third step of the process involves water being exposed to high-intensity UV light with hydrogen peroxide (H₂O₂) for disinfection and removal of any trace organic compounds that may have passed through the RO membranes. The trace organic compounds may include NDMA and 1-4 Dioxane, which have been removed to the parts-per trillion level. UV disinfection with H₂O₂ is an effective disinfection/advanced oxidation process that keeps these compounds from reaching drinking water supplies.

OCWD's GWRS has a current production capacity of 112,100 AFY with the expansion that was completed in 2015. Approximately 39,200 AFY of the highly purified water is pumped into the injection wells and 72,900 AFY is pumped to the percolation ponds in the City of Anaheim where the water is naturally filtered through sand and gravel to deep aquifers of the groundwater basin. The OC Basin provides approximately 72 percent of the potable water supply for north and central Orange County.

The design and construction of the first phase (78,500 AFY) of the GWRS project was jointly funded by OCWD and OCSD; Phase 2 expansion (33,600 AFY) was funded solely by OCWD. Expansion beyond this is currently in discussion and could provide an additional 33,600 AFY of water, increasing total GWRS production to 145,700 AFY. The GWRS is the world's largest water purification system for IPR.

6.2 Wastewater Description and Disposal

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

OCSD has an extensive system of gravity flow sewers, pump stations, and pressurized sewers. OCSD's Plant No. 1 in Fountain Valley has a capacity of 320 million gallons per day (MGD) and Plant No. 2 in Huntington Beach has a capacity of 312 MGD. Both plants share a common ocean outfall, but Plant No. 1 currently provides all of its secondary treated wastewater to OCWD's GWRS for beneficial reuse. The 120-inch diameter ocean outfall extends 4 miles off the coast of Huntington Beach. A 78-inch diameter emergency outfall also extends 1.3 miles off the coast.

6.3 Current Recycled Water Uses

Currently, Mesa Water® has 42 recycled water service connections. Some of the recycled water customers include the City of Costa Mesa, the County of Orange, Cal Trans, Costa Mesa Country Club, Orange Coast Community College, and several shopping and business centers. In FY 2014-15, 1,158 AF of recycled water from OCWD's GAP was used in the Mesa Water® service area for landscape irrigation. Recycled water use accounts for approximately six percent of annual demand.

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Current and projected recycled water use through 2040 are shown in Table 6-1, and the 2010 projected 2015 recycled water use compared to the 2015 actual use is shown in Table 6-2. Tertiary recycled water usage is limited to landscape irrigation.

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Table 6-1: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area (AF)

Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area								
Name of Agency Producing (Treating) the Recycled Water:		OCWD						
Name of Agency Operating the Recycled Water Distribution System:		OCWD						
Beneficial Use Type	General Description of 2015 Uses	Level of Treatment	2015	2020	2025	2030	2035	2040
Agricultural irrigation								
Landscape irrigation (excludes golf courses)		Tertiary	648	1,100	1,100	1,100	1,100	1,100
Golf course irrigation		Tertiary	510					
Commercial use								
Industrial use								
Geothermal and other energy production								
Seawater intrusion barrier								
Recreational impoundment								
Wetlands or wildlife habitat								
Groundwater recharge (IPR)*								
Surface water augmentation (IPR)*								
Direct potable reuse								
Other (Provide General Description)								
		Total:	1,158	1,100	1,100	1,100	1,100	1,100
*IPR - Indirect Potable Reuse								
NOTES:								

Table 6-2: 2010 UWMP Recycled Water Use Projections Compared to 2015 Actual (AF)

Retail: Methods to Expand Future Recycled Water Use		
Use Type	2010 Projection for 2015	2015 Actual Use
Agricultural irrigation		
Landscape irrigation (excludes golf courses)	1,100	648
Golf course irrigation		510
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Surface water augmentation (IPR)		
Direct potable reuse		
Other	<i>Type of Use</i>	
	Total	1,158
NOTES:		

6.4 Potential Recycled Water Uses

Mesa Water® supports, encourages, and contributes to the continued development of recycled water and potential uses throughout the region with OCWD’s GWRS. Currently, recycled water use is expected to remain at 1,100 AFY through the 25 year period, with landscape irrigation as its sole use.

6.4.1 Direct Non-Potable Reuse

Mesa Water® uses recycled water from OCWD’s GAP for direct non-potable reuse such as landscape irrigation.

6.4.2 Indirect Potable Reuse

Mesa Water® benefits from OCWD’s GWRS system that provides IPR through replenishment of Orange County’s Groundwater Basin with water that meets and exceeds state and federal drinking water standards.

6.5 Optimization Plan

Mesa Water® and OCWD recognize that the public acceptance of recycled water requires education, public involvement, and prior planning. Mesa Water®’s efforts and preparations for gaining public acceptance of recycled water include the following:

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- Maintaining strong working relationships with OCWD, the City of Costa Mesa and the SWRCB Division of Drinking Water.
- Incorporating information regarding the safety, reliability, and benefits of recycled water into Mesa's public information programs.
- Preparing and distributing printed materials regarding recycled water such as brochures and articles in the Mesa Water® bimonthly newsletter.
- Discussing recycled water at various speaking engagements.
- Meetings with potential recycled water customers to discuss the benefits of recycled water.
- Groundbreaking ceremonies and press coverage for various events associated with bringing recycled water to Mesa Water®.
- Providing on-site user training and assistance to recycled customers.

In Orange County, the majority of direct use recycled water is for landscape irrigation. Future recycled water use could be increased by requiring dual piping in new developments, retrofitting existing landscaped areas and constructing recycled water pump stations and transmission pipelines to reach areas that are further from treatment plants.

In order to determine if additional projects are feasible, studies must be performed to determine if the project should be pursued. Feasibility studies should include evaluation of alternatives with a present worth analysis consisting of capital costs (design, environmental reviews, construction, etc.) and operations and maintenance costs (electrical costs for pumps and equipment and maintenance required for the system).

Mesa Water® will continue to conduct cost/benefit analyses for recycled various water projects, and seek creative solutions and a balance to recycled water use, in coordination with OCWD, Metropolitan, MWDOC and other cooperative agencies. These include solutions for funding, regulatory requirements, institutional arrangements and public acceptance.

7 FUTURE WATER SUPPLY PROJECTS AND PROGRAMS

7.1 Water Management Tools

Resource optimization such as desalination and IPR would further increase Mesa Water®'s local supplies portfolio and reduce regional reliance on imported water. Optimization efforts are typically lead by the regional agencies in collaboration with local/retail agencies.

7.2 Transfer or Exchange Opportunities

Interconnections with other agencies result in the ability to share water supplies during short term emergency situations or planned shutdowns of major imported and local distribution systems. Mesa Water® maintains two metered interconnections with the City of Huntington Beach and the IRWD and 15 emergency interconnections with the City of Santa Ana, City of Newport Beach, and IRWD.

MWDOC continues to help its retail agencies develop transfer and exchange opportunities that promote reliability within the system. Therefore, MWDOC will look to help its retail agencies navigate the operational and administrative issues of wheeling water through the Metropolitan distribution system.

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

7.3 Planned Water Supply Projects and Programs

The Mesa Water® 2014 Water Master Plan Update identifies planned design and construction projects as described below.

New Wells A and B - Mesa Water® is actively looking to purchase two parcels of land to site two new wells. Mesa Water® expects each new well to produce approximately 2,500 gallons per minute (GPM) of new potable water supply that will be subject to OCWD's BPP. These two new wells would allow Mesa Water® to achieve 115 percent reliability of its BPP limits.

Well Automation and Rehabilitation - Mesa Water® plans to rehabilitate their wells that will increase the water supply by 20 percent.

7.4 Desalination Opportunities

Desalination of ocean water provides a potentially large supply of drought-proof water that is restricted by coastal siting issues, system integration from the coastal areas inland and cost competitiveness.

In 2001, Metropolitan developed a Seawater Desalination Program (SDP) to provide incentives for development of new seawater desalination projects in Metropolitan's service area. In 2014, Metropolitan modified the provisions of the Local Resources Program (LRP) to include incentives for locally produced seawater desalination projects that reduce the need for imported supplies. To qualify for the incentive,

proposed projects must replace an existing demand or prevent new demand on Metropolitan's imported water supplies. In return, Metropolitan offers two incentive formulas under the program:

- Up to \$340 per AF for 25 years, depending on the unit cost of the seawater project cost compared to the cost of Metropolitan supplies
- Up to \$475 per AF for 15 years, depending on the unit cost of the seawater project cost compared to the cost of Metropolitan supplies

Development of local supplies within the Metropolitan service area are part of the overall goal of the IRP to improve water supply reliability in the region by creating new supplies that reduce pressure on imported supplies from the SWP and the Colorado River.

On May 6th, 2015, SWRCB approved an amendment to the state's Water Quality Control Plan for the Ocean Waters of California (California Ocean Plan) to address effects associated with the construction and operation of seawater desalination facilities (Desalination Amendment). The amendment supports the use of ocean water as a reliable supplement to traditional water supplies while protecting marine life and water quality. The California Ocean Plan now formally acknowledges seawater desalination as a beneficial use of the Pacific Ocean and the Desalination Amendment provides a uniform, consistent process for permitting of seawater desalination facilities statewide.

If the following projects are developed, Metropolitan's imported water deliveries to Orange County could be reduced. These projects include the Huntington Beach Seawater Desalination Project, the Doheny Desalination Project, and the Camp Pendleton Seawater Desalination Project.

7.4.1 Groundwater

Mesa Water® currently owns and operates the MWRP with a capacity of 8.6 MGD that removes color from the water using nanofiltration membrane treatment. This facility allows Mesa Water® to achieve 100 percent local reliability and not require the use of imported water under normal operating and supply conditions.

7.4.2 Ocean Water

Huntington Beach Seawater Desalination Project – Poseidon Resources LLC (Poseidon), a private company, is developing the Huntington Beach Seawater Desalination Project to be co-located at the AES Power Plant in the City of Huntington Beach along Pacific Coast Highway (PCH) and Newland Street. The proposed project would produce up to 50 MGD (56,000 AFY) of drinking water to provide approximately 10 percent of Orange County's water supply needs.

Over the past several years, Poseidon has been working with OCWD on the general terms and conditions for selling the water to OCWD. OCWD and MWDOC have proposed a few distribution options to agencies in Orange County. The northern option proposes the water be distributed to the northern agencies closer to the plant within OCWD's service area with the possibility of recharging/injecting a portion of the product water into the OC Groundwater Basin. The southern option builds on the northern option by delivering a portion of the product water through the existing OC-44 pipeline for conveyance to the south Orange County water agencies. A third option is also being explored that includes all of the product water to be recharged into the OC Basin. Currently, a combination of these options could be pursued.

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OCWD's current Long-Term Facilities Plan (LTFP) identifies the Huntington Beach Seawater Desalination project as a priority project and determined the plant capacity of 56,000 AFY as the single largest source of new, local drinking water available to the region. In addition to offsetting imported demand, water from this project could provide OCWD with management flexibility in the OC Basin by augmenting supplies into the Talbert Seawater Barrier to prevent seawater intrusion.

In May 2015, OCWD and Poseidon entered into a Term Sheet that provided the overall partner structure in order to advance the project. Based on the initial Term Sheet, Poseidon would be responsible for permitting, financing, design, construction, and operations of the treatment plant while OCWD would purchase the production volume, assuming the product water quality and quantity meet specific contract parameters and criteria. Furthermore, OCWD would then distribute the water in Orange County using one of the proposed distribution options described above.

Currently, the project is in the late-stages of the regulatory permit approval process and Poseidon hopes to obtain the last discretionary permit necessary to construct the plant from the California Coastal Commission (CCC) in 2016. If the CCC permit is obtained, the plant could be operational as early as 2019.

8 UWMP ADOPTION PROCESS

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, Mesa Water® worked closely with other entities such as MWDOC to develop and update this planning document. Mesa Water® also encouraged public involvement by holding a public hearing for residents to learn and ask questions about their water supply.

This section provides the information required in Article 3 of the Water Code related to adoption and implementation of the UWMP. Table 8-1 summarizes external coordination and outreach activities carried out by Mesa Water® and their corresponding dates. The UWMP checklist to confirm compliance with the Water Code is provided in Appendix A.

Table 8-1: External Coordination and Outreach

External Coordination and Outreach	Date	Reference
Encouraged public involvement (Public Hearing)	5/26/16 & 6/2/16	Appendix E
Notified city or county within supplier’s service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing)	4/5/16	Appendix E
Held public hearing	6/9/16	Appendix E
Adopted UWMP	6/9/16	Appendix F
Submitted UWMP to DWR (by July 1, 2016)	7/1/16	-
Submitted UWMP to the California State Library and city or county within the supplier’s service area	8/1/16	-
Made UWMP available for public review	8/1/16	-

This UWMP was adopted by the Board of Directors on June 9, 2016. A copy of the adopted resolution is provided in Appendix F.

A change from the 2004 legislative session to the 2009 legislative session required Mesa Water® to notify any city or county within its service area at least 60 days prior to the public hearing. As shown in Table 8-2, Mesa Water® sent a Letter of Notification to the County of Orange on April 5, 2016 to state that it was in the process of preparing an updated UWMP (Appendix E).

Table 8-2: Notification to Cities and Counties

Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Costa Mesa	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Newport Beach	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
County Name	60 Day Notice	Notice of Public Hearing
Orange County	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NOTES:		

8.1 Public Participation

Mesa Water® encouraged community and public interest involvement in the plan update through a public hearing and inspection of the draft document on June 9, 2016. Public hearing notifications were published in local newspapers. A copy of the published Notice of Public Hearing is included in Appendix E. The hearing provided an opportunity for all residents and employees in the service area to learn and ask questions about their water supply in addition to Mesa Water® plans for providing a reliable, safe, high-quality water supply. Copies of the draft plan were made available for public inspection at the Mesa Water® office.

8.2 Agency Coordination

Mesa Water®'s water supply planning relates to the policies, rules, and regulations of its regional and local water providers. Mesa Water® is dependent on groundwater from OCWD, the agency that manages the Orange County Groundwater Basin. As such, Mesa Water® involved these water providers in the development of its 2015 UWMP at various levels of contribution.

8.3 UWMP Submittal

8.3.1 Review of 2010 UWMP Implementation

As required by California Water Code, Mesa Water® summarized Water Conservation Programs Implemented to date, and compared them to those planned in its 2010 UWMP.

8.3.2 Comparison of 2010 Planned Water Conservation Programs with 2015 Actual Programs

As a signatory to the MOU regarding urban water use efficiency, Mesa Water®'s commitment to implement BMP-based water use efficiency program continues today. For Mesa Water®'s specific achievements in the area of conservation, please see Section 4 of this Plan.

8.3.3 Comparison of 2010 Projected Recycled Water Use with 2015 Actual Use

Recycled water projections for the Agency in 2015 were accurately forecasted in the 2010 UWMP, as illustrated in Table 6-1.

8.3.4 Filing of 2015 UWMP

The Board of Directors reviewed the Final Draft Plan on June 9, 2016. The five-member Board of Directors approved the 2015 UWMP on June 9, 2016. See Appendix F for the resolution approving the Plan.

Mesa Water® must submit the adopted 2015 UWMP to DWR by no later than July 1, 2016. By August 1, 2016 Mesa Water® will file the Adopted 2015 UWMP with the California State Library, County of Orange, and cities within its service area.

REFERENCES

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- Mesa Water District, California, Municipal Code Ordinance No. 26, (2015).
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- Orange County Water District, 2014. OCWD Engineer's Report.
- Orange County Water District, 2015. OCWD Groundwater Management Plan 2015 Update.
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- San Diego County Water Authority, 2003. Quantification Settlement Agreement.
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- U.S. Department of the Interior Bureau of Reclamation, 2012. Colorado River Basin Study.
- Urban Water Management Planning Act, California Water Code § 10610-10656 (2010).
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- Water Systems Optimization, 2016. California Department of Water Resources: Water Audit Manual.

APPENDIX A

UWMP Checklist



UWMP Checklist

This checklist is developed directly from the Urban Water Management Planning Act and SB X7-7. It is provided to support water suppliers during preparation of their UWMPs. Two versions of the UWMP Checklist are provided – the first one is organized according to the California Water Code and the second checklist according to subject matter. The two checklists contain duplicate information and the water supplier should use whichever checklist is more convenient. In the event that information or recommendations in these tables are inconsistent with, conflict with, or omit the requirements of the Act or applicable laws, the Act or other laws shall prevail.

Each water supplier submitting an UWMP can also provide DWR with the UWMP location of the required element by completing the last column of either checklist. This will support DWR in its review of these UWMPs. The completed form can be included with the UWMP.

If an item does not pertain to a water supplier, then state the UWMP requirement and note that it does not apply to the agency. For example, if a water supplier does not use groundwater as a water supply source, then there should be a statement in the UWMP that groundwater is not a water supply source.

Checklist Arranged by Subject

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location <i>(Optional Column for Agency Use)</i>
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	Section 1.1
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	Section 8.2
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	Plan Preparation	Section 2.5.2	Section 8.1
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Section 1.3.1
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Section 2.2.1
10631(a)	Provide population projections for 2020, 2025, 2030, and 2035.	System Description	Section 3.4	Section 2.2.2
10631(a)	Describe other demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	Section 2.3
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	Section 2.2.2
10631(e)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Section 2.3.1 and 2.4.3
10631(e)(3)(A)	Report the distribution system water loss for the most recent 12-month period available.	System Water Use	Section 4.3	Section 2.3.4 and Appendix H
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	Section 2.4.5
10608.20(b)	Retail suppliers shall adopt a 2020 water use target using one of four methods.	Baselines and Targets	Section 5.7 and App E	Section 2.5.2.1
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and	Baselines and Targets	Chapter 5 and App E	Section 2.5.2.2

	compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.			
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	Section 2.5.2.2
10608.24(a)	Retail suppliers shall meet their interim target by December 31, 2015.	Baselines and Targets	Section 5.8 and App E	Section 2.5.2.2
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.8.2	Section 2.5.2.2
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	N/A
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	Section 2.5.2.2
10631(b)	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.	System Supplies	Chapter 6	Section 3.4
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Section 3.3
10631(b)(1)	Indicate whether a groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	Section 3.3.2.1 and Appendix C
10631(b)(2)	Describe the groundwater basin.	System Supplies	Section 6.2.1	Section 3.3.1
10631(b)(2)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	Section 3.3.2
10631(b)(2)	For unadjudicated basins, indicate whether or not the department has identified the basin as overdrafted, or projected to become overdrafted. Describe efforts by the supplier to eliminate the long-term overdraft condition.	System Supplies	Section 6.2.3	Section 3.3.8
10631(b)(3)	Provide a detailed description and analysis of the location, amount, and sufficiency of	System Supplies	Section 6.2.4	Section 3.3.2

	groundwater pumped by the urban water supplier for the past five years			
10631(b)(4)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Sections 6.2 and 6.9	Section 3.3 and 3.3.2
10631(d)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	Section 7.2
10631(g)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years.	System Supplies	Section 6.8	Section 4, 7
10631(h)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	Section 7.4
10631(j)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) – if any - with water use projections from that source.	System Supplies	Section 2.5.1	Section 3.4
10631(j)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	N/A
10633	For wastewater and recycled water, coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.1	Section 6.1
10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area. Include quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	System Supplies (Recycled Water)	Section 6.5.2	Section 6.2
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5.2.2	Section 6.2
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.3 and 6.5.4	Section 6.3
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4	Section 6.4
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in	System Supplies (Recycled Water)	Section 6.5.4	Section 6.3 and 6.4

	comparison to uses previously projected.			
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5	Section 6.4
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5	Section 6.5
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	Section 3.3
10631(c)(1)	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.	Water Supply Reliability Assessment	Section 7.1	Section 3.6
10631(c)(1)	Provide data for an average water year, a single dry water year, and multiple dry water years	Water Supply Reliability Assessment	Section 7.2	Section 3.6.5
10631(c)(2)	For any water source that may not be available at a consistent level of use, describe plans to supplement or replace that source.	Water Supply Reliability Assessment	Section 7.1	Section 3.6
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1	Section 3.6.2.2
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Section 3.7
10632(a) and 10632(a)(1)	Provide an urban water shortage contingency analysis that specifies stages of action and an outline of specific water supply conditions at each stage.	Water Shortage Contingency Planning	Section 8.1	Section 5.2
10632(a)(2)	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency.	Water Shortage Contingency Planning	Section 8.9	Section 5.3
10632(a)(3)	Identify actions to be undertaken by the urban water supplier in case of a catastrophic interruption of water supplies.	Water Shortage Contingency Planning	Section 8.8	Section 5.4
10632(a)(4)	Identify mandatory prohibitions against specific water use practices during water shortages.	Water Shortage Contingency Planning	Section 8.2	Section 5.5.1
10632(a)(5)	Specify consumption reduction methods in the most restrictive stages.	Water Shortage Contingency Planning	Section 8.4	Section 5.5.3
10632(a)(6)	Indicated penalties or charges for excessive	Water Shortage Contingency	Section 8.3	Section

	use, where applicable.	Planning		5.5.2
10632(a)(7)	Provide an analysis of the impacts of each of the actions and conditions in the water shortage contingency analysis on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts.	Water Shortage Contingency Planning	Section 8.6	Section 5.6
10632(a)(8)	Provide a draft water shortage contingency resolution or ordinance.	Water Shortage Contingency Planning	Section 8.7	Appendix D
10632(a)(9)	Indicate a mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.	Water Shortage Contingency Planning	Section 8.5	Section 5.7
10631(f)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and 9.3	Section 4
10631(f)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	N/A
10631(i)	CUWCC members may submit their 2013-2014 CUWCC BMP annual reports in lieu of, or in addition to, describing the DMM implementation in their UWMPs. This option is only allowable if the supplier has been found to be in full compliance with the CUWCC MOU.	Demand Management Measures	Section 9.5	Section 4 and Appendix J
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Section 10.3	Section 8.1
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	Appendix E
10621(d)	Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	Section 8.3.3
10635(b)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	Section 8.3.3
10642	Provide supporting documentation that the urban water supplier made the plan available for public inspection, published notice of the	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	Section 8.1

	public hearing, and held a public hearing about the plan.			
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Sections 10.2.1	Appendix E
10642	Provide supporting documentation that the plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	Appendix F
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3	Section 8.3.3
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	Section 8.2
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	Section 8.3.3
10645	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 8

APPENDIX B

Standardized Tables



Table 2-1 Retail Only: Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
CA3010004	Mesa Water District	23,760	18,002
TOTAL		23,760	18,002
NOTES:			

Table 2-2: Plan Identification

Select Only One	Type of Plan		Name of RUWMP or Regional Alliance <i>if applicable</i> <i>drop down list</i>
<input checked="" type="checkbox"/>	Individual UWMP		
	<input type="checkbox"/>	Water Supplier is also a member of a RUWMP	
	<input checked="" type="checkbox"/>	Water Supplier is also a member of a Regional Alliance	Orange County 20x2020 Regional Alliance
<input type="checkbox"/>	Regional Urban Water Management Plan (RUWMP)		

NOTES:

Table 2-3: Agency Identification	
Type of Agency (select one or both)	
<input type="checkbox"/>	Agency is a wholesaler
<input checked="" type="checkbox"/>	Agency is a retailer
Fiscal or Calendar Year (select one)	
<input type="checkbox"/>	UWMP Tables Are in Calendar Years
<input checked="" type="checkbox"/>	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
<i>07/01</i>	
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF
NOTES:	

Table 2-4 Retail: Water Supplier Information Exchange

The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.

MWDOC

NOTES:

Table 3-1 Retail: Population - Current and Projected

Population Served	2015	2020	2025	2030	2035	2040
	107,588	108,186	109,971	110,805	110,774	110,675

NOTES: Center for Demographic Research, California State University, Fullerton 2015

Table 4-1 Retail: Demands for Potable - Actual

Use Type <i>(Add additional rows as needed)</i>	2015 Actual	
<u>Use Drop down list</u> <i>May select each use multiple times</i> <i>These are the only Use Types that will be recognized by the WUEdata online submittal tool</i>	Level of Treatment When Delivered <i>Drop down list</i>	Volume
Single Family	Drinking Water	5,158
Multi-Family	Drinking Water	5,112
Institutional/Governmental	Drinking Water	1,137
Commercial	Drinking Water	3,242
Industrial	Drinking Water	301
Landscape	Drinking Water	1,879
Other	Drinking Water	15
TOTAL		16,844
NOTES:		

Table 4-2 Retail: Demands for Potable - Projected

Use Type <i>(Add additional rows as needed)</i>	Projected Water Use <i>Report To the Extent that Records are Available</i>				
<u>Use Drop down list</u> <i>May select each use multiple times</i> <i>These are the only Use Types that will be recognized by the WUEdata online submittal tool</i>	2020	2025	2030	2035	2040
Single Family	5,975	5,995	6,015	6,036	6,056
Multi-Family	5,922	5,942	5,962	5,982	6,002
Institutional/Governmental	1,316	1,321	1,325	1,330	1,334
Commercial	3,755	3,767	3,780	3,793	3,806
Industrial	349	350	351	353	354
Landscape	2,176	2,184	2,191	2,198	2,206
Other	17	17	17	17	17
TOTAL	19,510	19,576	19,642	19,709	19,774
NOTES:					

Table 4-3 Retail: Total Water Demands

	2015	2020	2025	2030	2035	2040
Potable and Raw Water <i>From</i> <i>Tables 4-1 and 4-2</i>	16,844	19,510	19,576	19,642	19,709	19,774
Recycled Water Demand* <i>From</i> <i>Table 6-4</i>	1,158	1,100	1,100	1,100	1,100	1,100
TOTAL WATER DEMAND	18,002	20,610	20,676	20,742	20,809	20,874

NOTES:

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

Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
07/2013	821

NOTES:

Table 4-5 Retail Only: Inclusion in Water Use Projections

<p>Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) <i>Drop down list (y/n)</i></p>	<p>Yes</p>
<p>If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc... utilized in demand projections are found.</p>	<p>Section 4.1</p>
<p>Are Lower Income Residential Demands Included In Projections? <i>Drop down list (y/n)</i></p>	<p>Yes</p>
<p>NOTES:</p>	

Table 5-1 Baselines and Targets Summary
Retail Agency or Regional Alliance Only

Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	1996	2005	180	162	144
5 Year	2004	2008	177		

*All values are in Gallons per Capita per Day (GPCD)

NOTES:

Table 5-2: 2015 Compliance
Retail Agency or Regional Alliance Only

Actual 2015 GPCD*	2015 Interim Target GPCD*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
108	162	Yes
<i>*All values are in Gallons per Capita per</i>		
NOTES:		

Table 6-1 Retail: Groundwater Volume Pumped

Groundwater Type <i>Drop Down List</i> <i>May use each category multiple times</i>	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	Orange County Groundwater Basin	12,193	10,852	15,558	18,457	17,652
TOTAL		12,193	10,852	15,558	18,457	17,652

NOTES:

Table 6-2 Retail: Wastewater Collected Within Service Area in 2015

<input checked="" type="checkbox"/>	There is no wastewater collection system. The supplier will not complete the table below.
-------------------------------------	---

Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2015

<input checked="" type="checkbox"/>	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.
-------------------------------------	--

Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area

Name of Agency Producing (Treating) the Recycled Water:		OCWD						
Name of Agency Operating the Recycled Water Distribution System:		OCWD						
Beneficial Use Type <i>These are the only Use Types that will be recognized by the DWR online submittal tool</i>	General Description of 2015 Uses	Level of Treatment <i>Drop down list</i>	2015	2020	2025	2030	2035	2040
Agricultural irrigation								
Landscape irrigation (excludes golf courses)	landscape irrigation	Tertiary	648	1,100	1,100	1,100	1,100	1,100
Golf course irrigation			510					
Commercial use								
Industrial use								
Geothermal and other energy production								
Seawater intrusion barrier								
Recreational impoundment								
Wetlands or wildlife habitat								
Groundwater recharge (IPR)*								
Surface water augmentation (IPR)*								
Direct potable reuse								
Other (Provide General Description)								
Total:			1,158	1,100	1,100	1,100	1,100	1,100

*IPR - Indirect Potable Reuse

NOTES:

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

Use Type		2010 Projection for 2015	2015 Actual Use
Agricultural irrigation			
Landscape irrigation (excludes golf courses)		1,100	648
Golf course irrigation			510
Commercial use			
Industrial use			
Geothermal and other energy production			
Seawater intrusion barrier			
Recreational impoundment			
Wetlands or wildlife habitat			
Groundwater recharge (IPR)			
Surface water augmentation (IPR)			
Direct potable reuse			
Other	<i>Type of Use</i>		
Total		1,100	1,158
NOTES:			

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

<input checked="" type="checkbox"/>	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.
Section 6.4	Provide page location of narrative in UWMP

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

<input type="checkbox"/>	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.
<input checked="" type="checkbox"/>	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.
Section 7.3	Provide page location of narrative in the UWMP

Table 6-8 Retail: Water Supplies — Actual

Table 6-8 Retail: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	2015	
<i>Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool</i>		Actual Volume	Water Quality <i>Drop Down List</i>
Groundwater	Orange County Groundwater Basin	16,844	Drinking Water
Recycled Water	OCWD	1,158	Recycled Water
Total		18,002	
NOTES:			

Table 6-9 Retail: Water Supplies — Projected

Table 6-9 Retail: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply <i>Report To the Extent Practicable</i>				
<i>Drop down list</i> <i>May use each category multiple times.</i> <i>These are the only water supply categories that will be recognized by the WUEdata online submittal tool</i>		2020	2025	2030	2035	2040
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Groundwater	Clear Wells	14,427	14,473	14,519	14,566	14,612
Groundwater	MWRF	5,083	5,103	5,123	5,143	5,162
Recycled Water	OCWD	1,100	1,100	1,100	1,100	1,100
Total		20,610	20,676	20,742	20,809	20,874
NOTES:						

Table 7-1 Retail: Basis of Water Year Data

Year Type	Base Year <i>If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000</i>	Available Supplies if Year Type Repeats	
		<input type="checkbox"/>	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		<input checked="" type="checkbox"/>	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available	% of Average Supply
Average Year	1990-2014		100%
Single-Dry Year	2014		106%
Multiple-Dry Years 1st Year	2012		106%
Multiple-Dry Years 2nd Year	2013		106%
Multiple-Dry Years 3rd Year	2014		106%

NOTES: Developed by MWDOC as 2015 Bump Methodology

Table 7-2 Retail: Normal Year Supply and Demand Comparison

	2020	2025	2030	2035	2040
Supply totals (<i>autofill from Table 6-9</i>)	20,610	20,676	20,742	20,809	20,874
Demand totals (<i>autofill from Table 4-3</i>)	20,610	20,676	20,742	20,809	20,874
Difference	0	0	0	0	0

NOTES:

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

	2020	2025	2030	2035	2040
Supply totals	21,847	21,917	21,987	22,058	22,126
Demand totals	21,847	21,917	21,987	22,058	22,126
Difference	0	0	0	0	0
NOTES:					

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

		2020	2025	2030	2035	2040
First year	Supply totals	21,847	21,917	21,987	22,058	22,126
	Demand totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
Second year	Supply totals	21,847	21,917	21,987	22,058	22,126
	Demand totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0
Third year	Supply totals	21,847	21,917	21,987	22,058	22,126
	Demand totals	21,847	21,917	21,987	22,058	22,126
	Difference	0	0	0	0	0

NOTES: Developed by MWDOC as 2015 Bump Methodology

**Table 8-1 Retail
Stages of Water Shortage Contingency Plan**

Stage	Complete Both	
	Percent Supply Reduction ¹ <i>Numerical value as a percent</i>	Water Supply Condition <i>(Narrative description)</i>
1	Up to 20%	A Level 1 Water Supply Shortage exists when the District determines, in its sole discretion, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.
2	Up to 30%	A Level 2 Water Supply Shortage exists when the District determines, in its sole discretion, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.
3	Up to 50%	A Level 3 Water Supply Shortage condition is also referred to as an "Emergency" condition. A Level 3 condition exists when the District declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to maintain sufficient water supplies for public health and safety.

¹ One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.

NOTES:

Table 8-2 Retail Only: Restrictions and Prohibitions on End Uses

Stage	Restrictions and Prohibitions on End Users <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUdata online submittal tool</i>	Additional Explanation or Reference <i>(optional)</i>	Penalty, Charge, or Other Enforcement? <i>Drop Down List</i>
Permanent Year-Round	Landscape - Limit landscape irrigation to specific times	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period,	No
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation		No
Permanent Year-Round	Other - Prohibit use of potable water for washing hard surfaces	This restriction does not apply in situations necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a handheld hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high pressure water broom.	No
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than seven (7) days of receiving notice from the District.	No
Permanent Year-Round	Water Features - Restrict water use for decorative water features, such as fountains	Operating a water fountain or other decorative water feature that does not use recirculated water is prohibited.	No
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		No
Permanent Year-Round	CII - Restaurants may only serve water upon request		No
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service		No
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service from the District.	No
Permanent Year-Round	Other	Installation of non-recirculating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	No
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves		No
Permanent Year-Round	Other	All commercial conveyor car wash systems must utilize re-circulating water systems, or must secure a waiver of this requirement from the District.	No

1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by the District. This provision does not apply to watering or irrigating by use of a handheld bucket or similar container, a hand-held hose equipped with a positive self closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than seventy-two (72) hours of receiving notice from the District.	Yes
1	Landscape - Other landscape restriction or prohibition	Irrigation is prohibited during rain events	Yes
2	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by the District. This provision does not apply to watering or irrigating by use of a handheld bucket or similar container, a hand-held hose equipped with a positive self closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than forty-eight (48) hours of receiving notice from the District.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level.	Yes
3	Landscape - Prohibit all landscape irrigation	This does not apply towards the following circumstances: 1) maintenance of vegetation that are watered using a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, 2) maintenance of existing landscape necessary for fire protection, 3) maintenance of existing landscape for soil erosion, and 4) maintenance of landscape within active public parks, playing fields, day care centers, golf course greens, and school grounds provided irrigation does not exceed two (2) days per week.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, and other malfunctions must be corrected in no more than twenty-four (24) hours of receiving notice from the District.	Yes
3	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		Yes
3	Other water feature or swimming pool restriction	Filling and refilling of residential swimming pools or outdoor spas with water is prohibited.	Yes

3	Other	No new potable water service, new temporary meters, and statement of immediate ability to serve or provide water service will be issued except under the following circumstances: 1) a valid, unexpired building permit has been issued for the project, 2) the project is necessary to protect the public health, safety, and welfare, or the applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the District.	Yes
NOTES:			

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

Stage	Consumption Reduction Methods by Water Supplier <i>Drop down list</i> <i>These are the only categories that will be accepted by the WUEdata online submittal tool</i>	Additional Explanation or Reference <i>(optional)</i>
1	Other	Stage 1 Water Conservation Measures
2	Other	Stage 2 Water Conservation Measures
3	Other	Stage 3 Water Conservation Measures
NOTES:		

Table 8-4 Retail: Minimum Supply Next Three Years

	2016	2017	2018
Available Water Supply	18,526	18,526	18,526

NOTES:

Table 10-1 Retail: Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
Costa Mesa	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Newport Beach	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
County Name <i>Drop Down List</i>	60 Day Notice	Notice of Public Hearing
Orange County	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NOTES:		

APPENDIX C

Groundwater Management Plan



A copy of the OCWD GWMP can be found at
<http://www.ocwd.com/what-we-do/groundwater-management/groundwater-management-plan/>

APPENDIX D

Water Conservation Ordinance



ORDINANCE NO. 26

ORDINANCE OF THE MESA WATER DISTRICT BOARD OF DIRECTORS ADOPTING THE MESA WATER DISTRICT WATER CONSERVATION AND WATER SUPPLY EMERGENCY PROGRAM RESCINDING ORDINANCE NOS. 8, 19, 24

WHEREAS, the Mesa Water District (Mesa Water® or District) is a county water district organized and operating according to California law; and

WHEREAS, water is a limited natural resource and the District desires to use this natural resource in the most efficient manner possible; and

WHEREAS, Mesa Water District has the authority to adopt water conservation requirements and programs to promote and effectuate wise water use and avoid water wastage; and

WHEREAS, the Board of Directors (Board) of Mesa Water District has previously adopted, and supplemented, Ordinance No. 8 adopting an Emergency Water Conservation Program, which was adopted on March 21, 1991 (Ordinance No.8); and

WHEREAS, Ordinance No. 8 was further supplemented by the adoption of Ordinance No. 19 on December 10, 2007, and Ordinance No. 24 on August 28, 2014 (Ordinance No. 8, as supplemented, Ordinance Nos. 19 and 24 are collectively in certain cases referred to herein as the "Prior Ordinances"); and

WHEREAS, the District desires to repeal its existing Water Conservation Programs and establish an updated and consolidated Water Conservation and Water Supply Emergency Program (Conservation Program) to conform to additional State Water Resources Control Board (SWRCB) Regulations; and

WHEREAS, periodic droughts are a historic fact in the State of California; and

WHEREAS, the District's service area is located in a region with a Mediterranean climate, densely populated demographics, and a mixed economic base of residential, commercial, industrial, and institutional consumers; and

WHEREAS, Mesa Water District derives the water which it delivers to its customers from local groundwater and supplemental waters imported from outside District boundaries; and

WHEREAS, the quality and quantity of supplemental imported water is under the control of other agencies, and may be subject to conditions beyond the control of those other agencies or Mesa Water District; and

WHEREAS, pursuant to California Water Code Section 31026, Mesa Water District may restrict the use of water it provides during any emergency caused by drought, or other threatened or existing water shortage, and to prohibit the wastage of water or the use of water it provides during such periods, for any purpose other than domestic uses or such other restricted uses as may be determined to be necessary by the District and may prohibit use of water it provides during such periods for specific uses which it may from time to time find to be non-essential; and

WHEREAS, pursuant to the applicable provisions of California law, Mesa Water District is required to periodically prepare and update an Urban Water Management Plan in order to address certain water supply and planning requirements; and

WHEREAS, Water Code Section 10632 requires the Urban Water Management Plan to provide an urban water shortage contingency analysis, which includes stages of action to be undertaken by an urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage; and

WHEREAS, pursuant to California Water Code Sections §§31020, and 375-377, inclusive, Mesa Water District may establish additional guidelines, surcharges, cost recovery systems, enforcement procedures, and other rules and regulations to assist in the conservation of water; and

WHEREAS, the Board of Directors of Mesa Water District finds and determines that a water shortage or threat of a water shortage may be found to exist based upon the occurrence of one or more of the following conditions or circumstances:

- A. A general water supply shortage due to increased demand and/or limited supplies.**
- B. Distribution or storage facilities of Mesa Water District or any agency supplying water to the District, become inadequate or are restricted.**
- C. A major failure of the supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to the District.**
- D. Contamination of the water supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to the District.**
- E. Acts of nature which in the opinion of Mesa Water District constitute an emergency situation or which require special water conservation actions.**

WHEREAS, prior to the adoption of this Ordinance, the Board has conducted a noticed public hearing to receive public comments concerning the subject matter hereof; and

WHEREAS, the purpose of this Ordinance is to adopt and enact the Conservation Program within the District's service area.

NOW, THEREFORE, BE IT ORDAINED BY THE MESA WATER DISTRICT BOARD OF DIRECTORS AS FOLLOWS:

Section 1. Recitals. The foregoing recitals are true and correct and are incorporated herein by this reference.

Section 2. Findings. The Board hereby finds and determines as follows:

- a. A reliable minimum supply of potable water is essential to the public health, safety, and welfare of the people, and economy of the southern California region.
- b. Water management that includes active water use efficiency measures not only in times of drought, but at all times, is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.
- c. California Water Code Section 375 authorizes water suppliers to adopt and enforce a comprehensive water conservation program to reduce water consumption and conserve supplies.
- d. Mesa Water District has the authority, pursuant to California Water Code Sections 31026-31029 to take action(s) relative to the use and conservation of water within its service area.
- e. The adoption and enforcement of a permanent water conservation program is necessary to help to manage the District's potable water supply in the short and long-term and to avoid or minimize the effects of periodic drought and shortage conditions within, or affecting its service area and potable water supplies. Such program is essential to ensure a reliable and sustainable minimum supply of water for the public health, safety and welfare.
- f. The Board does hereby find that the following circumstances may constitute an emergency condition or a threatened or existing water shortage condition within or affecting Mesa Water District:
 - i. A general water supply shortage due to increased demand and/or limited supplies.

- ii. Distribution or storage facilities of Mesa Water District or any agency supplying water to the District, become inadequate.
- iii. A major failure of the supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to its service area.
- iv. Contamination of the water supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to its service area.
- v. Acts of nature which in the opinion of the District constitute an emergency situation.

Section 3. Program Designation; Purpose; Intent and Integration.

- a. The purpose of the Conservation Program enacted by this Ordinance is to establish a water conservation and water supply emergency program that will reduce water consumption within the District's service area through water conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within the District's service area to avoid and minimize the effect and hardship of water shortages to the greatest extent possible.
- b. This Conservation Program enacted by this Ordinance establishes permanent water conservation standards intended to alter behavior related to water use efficiency at all times and further establishes three levels of water supply shortage response actions to be implemented during times of declared water shortage or declared water shortage emergency, with increasing restrictions on water use in response to worsening drought or emergency conditions and decreasing supplies as determined by the Board.
- c. This Ordinance, and the Conservation Program enacted hereby, is intended solely to further the conservation of water. It is not intended to implement any provision of federal, State, or local statutes, ordinances, or regulations relating to protection of water quality or control of drainage or runoff. This Ordinance, and the Conservation Program enacted hereby, shall not act to repeal, supersede or amend any federal, State or local law, ordinance or regulation relating to protection of water quality or control of drainage or runoff (including, but not limited to, any and all NPDES permits or requirements which

may be applicable in such instance) or exempt any person or party from compliance therewith.

- d. Mesa Water's prior Water Conservation Programs, as adopted, supplemented, and amended pursuant to the Prior Ordinances, are rescinded and superseded upon this Ordinance becoming effective.

Section 4. Conservation Program Provisions.

- a. The Conservation Program provisions are set forth in Exhibit A to this Ordinance and are incorporated herein by this reference.
- b. The Conservation Program shall be referred to in Mesa Water's Rules and Regulations for Water Service.
- c. The Board reserves the right to amend, revise, and/or supplement this Ordinance and/or the Conservation Program provisions in the future based upon the District's needs, circumstances and requirements.
- d. This Ordinance and the Conservation Program are adopted by this Board pursuant to the provisions and authority set out in the California Constitution and California law as referenced herein.
- e. All penalties set forth in the Conservation Program are administrative and regulatory penalties and are not fees or charges for water service or water capacity.

Section 5. CEQA Exemption.

The Board finds that this Ordinance, the Water Conservation and Water Supply Emergency Program (Conservation Program), and actions taken hereafter pursuant to the Conservation Program are exempt from the California Environmental Quality Act as specific actions necessary to prevent or mitigate an emergency pursuant to 14 California Code of Regulations, Sections 15269, 15273, and 15321, and the applicable statutes of the Public Resources Code.

The General Manager is hereby authorized and directed to file a Notice of Exemption as soon as possible following the adoption of this Ordinance.

Section 6. Terms and Provisions. The terms and provisions of this Ordinance, and the Conservation Program enacted hereby, shall be subject to, and shall be interpreted pursuant to, State law.

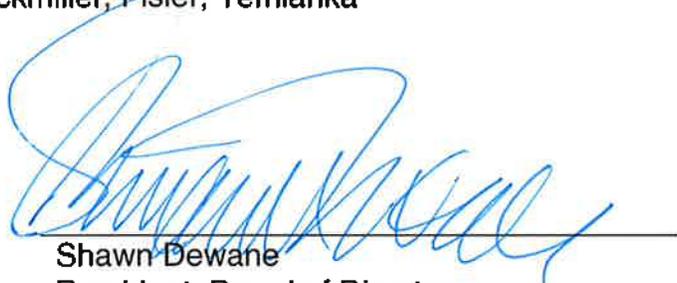
Section 7. Notice and Provisions: Notice of the adoption of this Ordinance, and the provisions hereof, shall be provided as set out in State law, including, but not limited to, Water Code Section 31027.

Section 8. Other Actions. Mesa Water District staff and officers are hereby authorized and directed to take such other and further action(s) as may be reasonably necessary to carry out the determinations, findings and directives set forth herein, and in the Conservation Program enacted hereby, within the limits set forth by, and in accordance with, direction of the Board.

Section 9. Effective Date. This Ordinance No. 26, and the Conservation Program enacted hereby, shall take effect on May 14, 2015.

ADOPTED, SIGNED, AND APPROVED this 14th day of May 2015 by a roll call vote:

AYES: DIRECTORS: Atkinson, Bockmiller, Fisler, Temianka
NOES: DIRECTORS:
ABSENT: DIRECTORS: Dewane
ABSTAIN: DIRECTORS:



Shawn Dewane
President, Board of Directors

ATTEST:



Coleen L. Monteleone
District Secretary

ORDINANCE NO. 26

EXHIBIT A

**ORDINANCE OF THE
MESA WATER DISTRICT BOARD OF DIRECTORS
ADOPTING THE MESA WATER DISTRICT
WATER CONSERVATION AND
WATER SUPPLY EMERGENCY PROGRAM
RESCINDING ORDINANCE NOS. 8, 19, 24**

Mesa Water District
Water Conservation and
Water Supply Emergency Program

Adopted: May 14, 2015

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Section 1: **Title.** This program is designated as the Water Conservation and Water Supply Emergency Program (Conservation Program).

Section 2. **Authority.** The Conservation Program is adopted pursuant to California law and the provisions of Mesa Water District Ordinance No. 26. The General Manager is hereby authorized and directed to implement the provisions of this Conservation Program as provided for herein.

Section 3. **Definitions.** The following words and phrases whenever used in this Conservation Program have the meaning(s) defined in this section:

- a. **“Board”** means the Board of Directors of Mesa Water District.
- b. **“Conservation Program”** means the Mesa Water District Water Conservation and Water Supply Emergency Program.
- c. **“Conservation Fee”** means any monetary fee assessed by Mesa Water District for violations of the Conservation Program.
- d. **“Customer”** means any person, persons, firm, corporation, association, or agency receiving water or services from Mesa Water District.
- e. **“General Manager”** means the duly appointed and acting General Manager of the Mesa Water District, or an authorized agent.
- f. **“Landscape Irrigation System”** means an irrigation system with pipes, hoses, spray heads, or sprinkling devices that are operated by hand or through an automated system.
- g. **“Large Landscape Areas”** means a lawn, landscape, or other vegetated area, or combination thereof, equal to more than 5,000 square feet of irrigable land.
- h. **“Mesa Water® or District”** means the Mesa Water District, a county water district organized pursuant to California Water Code Sections 33200 and following and operating pursuant to Water Code Sections 30000 and following. References to Mesa Water® or the District also include its Directors, officers, agents, and employees, as applicable.
- i. **“Person”** means any natural person or persons, corporation, public or private entity, governmental agency or institution, including Mesa Water District, or any other user of water provided by the District.
- j. **“Potable Water”** means water that is suitable for drinking.

- k. **“Recycled Water”** means the reclamation and reuse of non-potable water for beneficial use as defined in Title 22 of the California Code of Regulations.
- l. **“Single Pass Cooling Systems”** means equipment where water is circulated only once to cool equipment before being disposed.
- m. **“Water Conservation Coordinator”** means the person (who may be an officer or employee of Mesa Water District) charged with the principal enforcement of this Conservation Program. The Water Conservation Coordinator may be the General Manager or another person so designated in writing by the General Manager.
- n. **“Water Flow Restrictor”** means a device that is inserted into the service connection and is designed to limit the water flow capacity.

Section 4. Application.

- a. The provisions of this Conservation Program apply to any customer, Person, and property using water provided by Mesa Water District.
- b. The provisions of this Conservation Program do not apply to uses of water necessary to protect public health and safety or for essential government services, such as police, fire, and other similar emergency services.
- c. The provisions of this Conservation Program do not apply to the use of Recycled Water, with the exception of Sections 6(b), 6(d), 6(m), 6(n), 7(b)(2), 8(b)(2), and 9(b)(2).
- d. The provisions of this Conservation Program do not apply to the use of water by commercial nurseries and commercial growers to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale, with the exception of Section 6(b).
- e. This Conservation Program is intended solely to further the conservation of water.

Section 5. Procedures for Determination of Water Supply Shortage and Level Implementation.

The existence of a Level 1, Level 2 or Level 3 Water Supply Shortage condition may be declared by resolution adopted by the Board at a regular, adjourned regular, or special Board meeting.

The Board shall determine the extent of the Water Supply Shortage condition, and the corresponding conservation required through the implementation and/or termination of particular levels, which may be made upon recommendation by the General Manager.

In the event of an extreme emergency, requiring immediate action that cannot be delayed until the next regular, adjourned regular, or special Board meeting, the General Manager shall determine the extent of the conservation required and implement the appropriate level necessary to achieve the required level of conservation. In such event, the General Manager shall notify the Board as soon thereafter as practical and shall consult with the Board President with regard to the calling of an emergency meeting of the Board.

The General Manager will provide a plan to the Board that specifies a timeline for noticing of customers and the implementation of the Water Supply Shortage Level determined by the Board. In addition, the Board of Directors shall be notified at the next regular, adjourned regular, or special Board Meeting of any action taken by the General Manager under this Conservation Program.

A Water Supply Shortage Level shall be deemed to be effective upon the date of adoption and shall remain in place until rescinded, superseded, or modified by further action of the Board.

Section 6: Permanent Water Conservation Requirements – Prohibition Against Waste.

This Section is intended to provide for up to a 10 percent reduction in water usage.

The following water conservation requirements shall be effective at all times as prescribed by the Board and shall be permanent. Violations of this Section constitute waste and an unreasonable use of water.

- a. **Limits on Watering Hours:** Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.

- b. **No Excessive Water Flow or Runoff:** No person shall cause or allow watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive runoff from the property. Additionally, to the extent prohibited by any Statewide statute, or regulation adopted by any State agency with jurisdiction to adopt such regulations, including, but not limited to, the State Water Resources Control Board, no person shall cause or allow water to flow or runoff their property onto adjacent property, non-irrigated areas, private and public walkways, driveways, roadways, gutters or ditches, parking lots, or structures.
- c. **No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.
- d. **Obligation to Fix Leaks, Breaks or Malfunctions:** Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than seven (7) days of receiving notice from the District, is prohibited.
- e. **Re-circulating Water Required for Water Fountains and Decorative Water Features:** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.
- f. **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device that causes it to cease dispensing water immediately when not in use. This subsection does not apply to any commercial car washing facility.
- g. **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, or other public place where food or drinks are sold,

served, or offered for sale, are encouraged not to provide drinking water to any person unless expressly requested.

- h. **Commercial Lodging Establishments Must Provide Guests Option to Decline Daily Linen Services:** Hotels, motels and other commercial lodging establishments must provide customers the option of not having towels and linen laundered daily. Commercial lodging establishments shall prominently display notice of this option in each bathroom using clear and easily understood language.
- i. **No Installation of Single Pass Cooling Systems:** Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water District.
- j. **No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.
- k. **Restaurants Required to Use Water Conserving Dish Wash Spray Valves:** Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.
- l. **Commercial Car Wash Systems:** All commercial conveyor car wash systems must utilize re-circulating water systems, or must secure a waiver of this requirement from Mesa Water District.
- m. **Recycled Water Use Required if Available:** After the District has provided to the user an analysis demonstrating that Recycled Water is available, cost effective, and safe for the intended use, and the user has been given a reasonable time to make the conversion to recycled water, the use of potable water, is prohibited.
- n. **Water Recycling – New Service:** Prior to the connection of any new commercial, industrial, or multi-residential water service, the District shall perform an evaluation to determine whether recycled water is available, cost effective, and safe for the intended use to supply all or some of the water needed by the new user. If available, cost effective, and safe for the intended use, recycled water must be used.

Section 7: Level 1 Water Supply Shortage: Water Alert.

This Section is intended to provide for up to a 20 percent reduction in water usage.

- a. A Level 1 Water Supply Shortage exists when Mesa Water District determines, in its sole discretion, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration of a Level 1 Water Supply Shortage condition, the District will implement all of the mandatory Level 1 conservation measures identified in this Section.
- b. **Additional Water Conservation Measures:** In addition to the prohibited uses of water identified in Section 6, the following water conservation requirements shall apply during a declared Level 1 Water Supply Shortage as prescribed by the Board:
 - 1. **Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.
 - 2. **Obligation to Fix Leaks, Breaks or Malfunctions:** All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within seventy-two (72) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.
 - 3. **Irrigation During Rain Events:** Irrigation is prohibited during rain events.
- c. **Other Measures Available for Consideration:** In addition to the conservation requirements specified in Sections 6 and 7(b), other measures are available for additional consideration by the Board that may be necessary to achieve immediate or short term water conservation, and are referenced in Section 10.

Section 8. Level 2 Water Supply Shortage: Water Warning.

This Section is intended to provide for up to a 30 percent reduction in water usage.

- a. A Level 2 Water Supply Shortage exists when Mesa Water District determines, in its sole discretion, that due to drought or other water

supply conditions, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration of a Level 2 Water Supply Shortage condition, the District will implement all of the mandatory Level 2 conservation measures identified in this Section.

- b. **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Sections 6 and 7, the following additional water conservation requirements shall apply during a declared Level 2 Water Supply Shortage as prescribed by the Board:
 1. **Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.
 2. **Obligation to Fix Leaks, Breaks or Malfunctions:** All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within forty-eight (48) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.
 3. **Limits on Filling Ornamental Fountains, Lakes, and Ponds:** Filling or re-filling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level under this Conservation Program.
- c. **Other Measures Available for Consideration:** In addition to the conservation requirements specified in Sections 6, 7, and 8, other measures are available for additional consideration by the Board that may be necessary to achieve immediate or short term water conservation, and are referenced in Section 10.

Section 9. Level 3 Water Supply Shortage – Water Emergency.

This Section is intended to provide for up to a 50 percent reduction in water usage.

- a. A Level 3 Water Supply Shortage condition is also referred to as an “Emergency” condition. A Level 3 condition exists when Mesa Water District declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to maintain sufficient water supplies for public health and safety. Upon the declaration of a Level 3 Water Supply Shortage condition, the District may implement all of the mandatory Level 3 conservation measures identified in this section as prescribed by the Board.
- b. **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Sections 6, 7, and 8, the following water conservation requirements shall apply during a declared Level 3 Water Supply Shortage Emergency:
 1. **No Watering or Irrigating:** Watering or irrigating of lawn, landscape, or other vegetated area is prohibited. This restriction does not apply to the following categories of use:
 - i. Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self-closing water shut-off nozzle or device.
 - ii. Maintenance of existing landscape necessary for fire protection.
 - iii. Maintenance of existing landscape for soil erosion control.
 - iv. Maintenance of plant materials identified to be rare or essential to the well-being of protected species.
 - v. Maintenance of landscape within active public parks and playing fields, day care centers, golf course greens, and school grounds, provided that such irrigation does not exceed a maximum of two (2) days per week according to the schedule established in Section 8(b)(1) and time restrictions in Section 6(a).
 - vi. Actively irrigated environmental mitigation projects.

2. **Obligation to Fix Leaks, Breaks or Malfunctions:** All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within twenty four (24) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.
3. **Car Washing at Commercial Facilities Only:** Washing of motor vehicles, trailers, boats, aircraft and other types of mobile equipment shall be done only at a commercial car wash with water recycling facilities. No restrictions apply where the healthy, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables.
4. **No Initial Filling or Re-Filling of Swimming Pools & Spas:** Filling and Re-Filling of residential swimming pools or outdoor spas with water is prohibited.
5. **No New Potable Water Service:** No new potable water service will be provided, no new temporary meters or permanent meters will be provided, and no statements of immediate ability to serve or provide potable water service (such as, will-serve letters, certificates, or letters of availability) will be issued, except under the following circumstances:
 - i. A valid, unexpired building permit has been issued for the project; or
 - ii. The project is necessary to protect the public health, safety, and welfare; or
 - iii. A parcel that has or previously had a water meter; or
 - iv. The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the District.

This provision does not preclude the resetting or turn-on of meters to provide continuation of water service or the restoration of service that has been interrupted prior to declaration of a supply shortage level under this Conservation Program.

- c. **Other Measures Available for Consideration:** In addition to the conservation requirements specified in Sections 6, 7, 8, and 9, other measures are available for additional consideration by the Board that

may be necessary to achieve immediate or short term water conservation, and are referenced in Section 10.

Section 10. Other Conservation Measures Available for Implementation.

The following water conservation measures may be implemented at any Water Supply Shortage Level, in addition to, or supplementary to, the Water Conservation Measures set out in Sections 6-9, inclusive, pursuant to the directive(s) of the Board.

- a. **Large Landscape Areas – Rain Sensors:** Large landscape areas, such as parks, cemeteries, golf courses, school grounds, and playing fields, that use landscape irrigation systems to water or irrigate, must use landscape irrigation systems with rain sensors that automatically shut off such systems during periods of rain or irrigation timers which automatically use information such as evapotranspiration sensors to set an efficient water use schedule.
- b. **Recycled Water for Construction Purposes:** Recycled or non-potable water must be used for construction purposes when available, feasible, and cost-effective.
- c. **Water Conserving Plumbing Standards – Change in Service:** Upon the establishment of new water service or a new customer of record for an existing service, all existing plumbing fixtures (including but not limited to: toilets, showerheads, and faucets) must be retrofitted exclusively with water-conserving plumbing fixtures. The water use standards permitted will be those current standards approved by the California Energy Commission.
- d. **Irrigation During Rain Events:** The application of potable water to outdoor landscapes during and up to forty-eight (48) hours after measurable rainfall is prohibited.
- e. **Irrigated Medians:** The use of potable water to irrigate ornamental turf on public street medians is prohibited.
- f. **Irrigated Parkways:** The use of potable water to irrigate ornamental turf on public street parkways is prohibited.
- g. **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, or other public place where food or drinks are sold, served, or offered for sale, are prohibited from providing drinking water to any person unless expressly requested.

- h. **Other Measures:** Other measures as may be required by the State or deemed necessary by the Board.

Section 11. Penalties, Violations, and Enforcement.

During Effective Period of Permanent Water Conservation Requirements

- a. **Penalties:** Penalties for failure to comply with any provisions of the Conservation Program while Mesa Water District is enforcing the Permanent Water Conservation stage are as follows:
 - 1. **First Violation:** Mesa Water District will issue a written warning and deliver a copy of this Conservation Program to the service address and/or by mail.
 - 2. **Second Violation:** A second violation within the preceding twelve (12) calendar months will receive a second written warning and an attempt to contact the customer of record via telephone.
 - 3. **Third Violation:** A third violation within the preceding twelve (12) calendar months will receive a third written warning with reference to the previous two violations and possibility of future actions including, but not limited to, water flow restriction and discontinued water service.
 - 4. **Fourth and Subsequent Violations:** A fourth and any subsequent violation within the preceding twelve (12) calendar months may result in the installation of a water flow restrictor.
 - 5. **Water Flow Restrictor:** In addition to any written warnings, Mesa Water District may install a water flow restrictor device of approximately one gallon per minute capacity for services up to one and one-half inch size and comparatively sized restrictors for larger services after written notice of intent to install a flow restrictor until the prohibited actions or practices have been deemed by the District to be satisfactorily discontinued or remedied and for a minimum of forty-eight (48) hours.
 - 6. **Discontinuing Service:** In addition to any fines and the installation of a water flow restrictor, Mesa Water District may disconnect a customer's water service for willful violations of mandatory restrictions in this Conservation Program.

During Effective Period of Level 1, Level 2, and Level 3 – Water Supply Shortage(s)

- b. **Penalties:** Penalties for failure to comply with any provisions of the Conservation Program while Mesa Water District is enforcing Water Supply Shortage Level 1, Level 2, or Level 3 are as follows:
1. **First Violation:** A written warning will be issued and a copy of this Conservation Program delivered to the service address and/or by mail.
 2. **Second Violation:** A second violation within the preceding twelve (12) calendar months will receive a second written warning and an attempt to contact the customer of record via telephone.
 3. **Third Violation:** A third violation within the preceding twelve (12) calendar months will receive a third written warning with reference to the previous two violations and a Conservation Fee of \$100, or the current charge per the schedule of fees and charges as then in effect, will be assessed to the customer's water account.
 4. **Fourth and Subsequent Violations:** A fourth and any subsequent violation within the preceding twelve (12) calendar months will receive an additional written warning with reference to the previous violations and a Conservation Fee of \$200, or the current charge per the schedule of fees and charges as then in effect, will be assessed to the customer's water account.
 5. **Discontinuing Service:** In addition to any fines, Mesa Water District may disconnect a customer's water service for a willful violation of mandatory restrictions in this Conservation Program.
- c. **Cost of Flow Restrictor, Conservation Fees, and Disconnecting Service:** A person or entity that violates this Conservation Program is responsible for payment of charges for installing and/or removing any flow restricting device, Conservation Fees, and for disconnecting and/or reconnecting service per the schedule of fees and charges as then in effect. The charge for installing and/or removing any flow restricting device must be paid before the device is removed. Nonpayment thereof will be subject to the same remedies as nonpayment of water rates.
- d. **Separate Offenses:** Each day that a violation of this Conservation Program occurs is a separate offense.

e. **Notice and Hearing:**

1. Mesa Water District will issue a Notice of Violation by mail or personal delivery at least ten (10) days before taking enforcement action on a particular violation. Such notice shall describe the violation and the date by which corrective action(s) must be taken. A customer may appeal the Notice of Violation by filing a written notice of appeal attention the District Secretary no later than the close of business on the day before the date scheduled for enforcement action. Any Notice of Violation not timely appealed will be final. Upon receipt of a timely appeal, a hearing on the appeal will be scheduled by the General Manager, and a written notice of the hearing date will be mailed to the customer at least ten (10) days before the date of the hearing.

f. **Additional Actions, Penalties:** The Board may prescribe additional action(s) and/or penalties for violation of the prohibited actions or practices described herein. Mesa Water District may also implement additional actions or programs to educate its customers, ratepayers, and Persons in the District's service area as to the on-going need to conserve and use water wisely.

g. **Application of Penalties:** The General Manager or Water Conservation Coordinator, as applicable, shall have discretion as to the application of penalties and enforcement actions set forth herein. The overall intention of this Conservation Program is to implement water conservation actions as described herein.

h. The penalties established and set forth herein are regulatory and administrative in nature. Such penalties are not imposed for water service or water capacity to any particular customer or person.

Section 12. Hardship Waiver.

a. **Undue and Disproportionate Hardship:** If, due to unique circumstances, a specific requirement of this Conservation Program would result in undue hardship to a Person using water or to property upon which water is used, then the Person may apply for a waiver to the requirements as provided in this Section.

b. **Written Finding:** The waiver may be granted or conditionally granted only upon a written finding of the existence of facts demonstrating an undue hardship to a person using water or to property upon which water is used.

1. **Application:** An application for a waiver must be on a form prescribed by Mesa Water District and is available upon request from the Water Conservation Coordinator. The application must be submitted to the Water Conservation Coordinator and be accompanied by a written statement of the applicant.
2. **Approval Authority:** The Water Conservation Coordinator, as applicable, must act upon any completed application no later than ten (10) days after submittal and may approve, conditionally approve, or deny the waiver. The applicant requesting the waiver will be promptly notified in writing of any action taken. Unless specified otherwise at the time the waiver is approved, the waiver will apply to the subject property or person during the period of the mandatory water supply shortage condition, or a period not to exceed one (1) calendar year.
3. **Right of Appeal:** Any aggrieved applicant, who remains dissatisfied with the decision of the Water Conservation Coordinator, can appeal, in writing, such final decision to the General Manager. The General Manager shall hear such appeal and render his or her decision. The decision of the General Manager shall be final.

Section 13. Other Provisions.

Mesa Water® may provide water efficiency devices either directly or through supported programs. Such devices should remain within the District's service area at all times. Devices provided by the District should be used with the intent to conserve water and not be modified in any way or sold.

Section 14. Severability. If any section, subsection, sentence, clause or phrase in this Conservation Program is for any reason held invalid, the validity of the remainder of the Conservation Program will not be affected. The Board hereby declares it would have passed this Conservation Program and each section, subsection, sentence, clause or phrase thereof, irrespective of the fact that one or more sections, subsections, sentences, clauses, or phrases is declared invalid.

APPENDIX E

Notification of Public and Service Area Suppliers





*Dedicated to
Satisfying our Community's
Water Needs*

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*Vice President
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*Director
Division II*

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General Manager

Phil Lauri, P.E.
Assistant General Manager

Coleen L. Monteleone
*Assistant General Manager
District Secretary*

Andrew N. Hamilton
District Treasurer

**Bowie, Arneson,
Wiles & Giannone**
Legal Counsel

1965 Placentia Avenue
Costa Mesa, CA 92627
tel 949.631.1200
fax 949.574.1036
info@MesaWater.org
MesaWater.org

**NOTICE OF PREPARATION OF
MESA WATER DISTRICT'S
2015 URBAN WATER MANAGEMENT PLAN**

April 5, 2016

Tom Hatch, CEO
City of Costa Mesa
88 Fair Drive
Costa Mesa, CA 92626

Mesa Water District (Mesa Water®) is now preparing its 2015 Urban Water Management Plan (UWMP). UWMPs are prepared by California's urban water suppliers to support their long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands. Every urban water supplier that either provides over 3,000 acre-feet of water annually or serves 3,000 or more connections is required to prepare an UWMP every five years.

Pursuant to the requirement of California Water Code, Division 6, Part 2.6 Urban Water Management Planning, Section 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies, that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify your agency that Mesa Water® is in the process of preparing the 2015 UWMP. Based on Mesa Water's current schedule, a draft will be available for review prior to the public hearing, which is tentatively scheduled for June 9, 2016.

If your agency would like more information or if you have any questions, please direct inquiries to:

Justin Finch, MPP
Resource Efficiency Specialist
949.207.5439
JustinF@MesaWater.org



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**Bowie, Arneson,
Wiles & Giannone**
Legal Counsel

**NOTICE OF PREPARATION OF
MESA WATER DISTRICT'S
2015 URBAN WATER MANAGEMENT PLAN**

April 5, 2016

Dave Kiff, City Manager
City of Newport Beach
100 Civic Center Dr.
Newport Beach, CA 92660

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949.207.5439
JustinF@MesaWater.org

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MesaWater.org

NOTICE OF PREPARATION OF MESA WATER DISTRICT'S 2015 URBAN WATER MANAGEMENT PLAN

April 5, 2016

Hugh Nguyen, Clerk-Recorder
County of Orange
12 Civic Center Plaza, Room 101
Santa Ana, CA 92701

Mesa Water District (Mesa Water®) is now preparing its 2015 Urban Water Management Plan (UWMP). UWMPs are prepared by California's urban water suppliers to support their long-term resource planning and ensure adequate water supplies are available to meet existing and future water demands. Every urban water supplier that either provides over 3,000 acre-feet of water annually or serves 3,000 or more connections is required to prepare an UWMP every five years.

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Resource Efficiency Specialist
949.207.5439
JustinF@MesaWater.org

**PROOF OF PUBLICATION
(2015.5 C.C.P.)**

**STATE OF ILLINOIS
County of Cook**

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the action for which the attached notice was published.

I am a principal clerk of the Orange Coast Daily Pilot, which was adjudged a newspaper of general circulation on Jan 14, 1938, Cases A6214 for the City of Costa Mesa, County of Orange, and State of California. Attached to this Affidavit is a true and complete copy as was printed and published on the following date(s):

Jun 02, 2016; May 26, 2016

**I certify (or declare) under penalty of perjury
under the laws of the State of California that the foregoing is true and correct.**

Dated at Chicago, Illinois
on this 02 day of 06, 2016.



[signature]

435 N. Michigan Ave.
Chicago, IL 60611

Los Angeles Times

MEDIA GROUP

Sold To:

Mesa Water - CU00244411
1965 Placentia Ave
Costa Mesa, CA 92627

Bill To:

Mesa Water - CU00244411
1965 Placentia Ave
Costa Mesa, CA 92627

**PUBLIC HEARING
NOTICE OF PUBLIC
HEARING MESA WATER
DISTRICT Thursday,
June 9, 2016 6:00 p.m.
or as soon thereafter
as the agenda permits
Board Meeting Room
Mesa Water District
1965 Placentia Avenue
Costa Mesa, California**

The Board of Directors of Mesa Water District invites the community to attend a public hearing for the purpose of receiving public comments regarding the 2015 Urban Water Management Plan. Any person desiring to make comments or present information to the Board may make an oral presentation at the public hearing, or submit written comments for the Board's consideration by sending or delivering them to the District office prior to the time of the hearing.

A copy of the draft 2015 Urban Water Management Plan will be available for review at Mesa Water's District office beginning May 26, 2016. For more information, or if you would like assistance in presenting your comments to the Board, please contact Coleen L. Monteleone, District Secretary, at (949) 631-1205. Published Daily Pilot May 26 and June 2, 2016.

APPENDIX F

Adopted UWMP Resolution



RESOLUTION NO. 1477

**RESOLUTION OF THE
MESA WATER DISTRICT BOARD OF DIRECTORS
APPROVING THE ADOPTION OF THE
2015 URBAN WATER MANAGEMENT PLAN**

WHEREAS, the Mesa Water District (Mesa Water®) is a county water district organized and operating according to California Law; and

WHEREAS, the California Legislature enacted Assembly Bill 797 (Water Code Section 10610 *et seq.*, known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, as amended, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan ("Plan"), the primary objective of which is to ensure the appropriate level of reliability in its water service to meet the needs of its customers during normal, dry, and multiple dry years, and to ensure the conservation and efficient use of water; and

WHEREAS, Mesa Water® is an urban water supplier providing water to a population over 100,000; and

WHEREAS, the Plan shall be periodically reviewed at least once every five years and Mesa Water® shall make amendments or changes to its Plan which are indicated by the review; and

WHEREAS, the Plan must be updated, adopted, and submitted to the California Department of Water Resources by July 1, 2016; and

WHEREAS, the Plan must be submitted to the California Department of Water Resources, the California State Library, and the cities and county within which Mesa Water® provides water supplies a copy of the Plan no later than 30 days after adoption; and

WHEREAS, Mesa Water® prepared for public review a draft Urban Water Management Plan and held a properly noticed public hearing on June 9, 2016, regarding such Plan, during which Mesa Water® received community input on the Plan, considered the economic impacts of the Plan, and adopted a method for determining Mesa Water's urban water use target.

NOW, THEREFORE, THE BOARD OF DIRECTORS OF THE MESA WATER DISTRICT DOES HEREBY RESOLVE, DETERMINE, AND ORDER AS FOLLOWS:

Section 1. The foregoing recitals are true and correct and are incorporated herein by this reference.

Section 2. The Board of Directors hereby adopts the Plan, which Plan is incorporated herein by this reference, and will implement the Plan in accordance with the terms set forth therein.

Section 3. The Secretary of Mesa Water® is hereby directed to submit the Plan to the Department of Water Resources, the California State Library, and any city or county within which Mesa Water® provides water supplies no later than 30 days from the date of adoption hereof, in accordance with California Water Code Section 10644(a)(1).

ADOPTED, SIGNED, and APPROVED this 9th day of June 2016 by a roll call vote.

AYES: DIRECTORS: Atkinson, Bockmiller, Fidler, Temianka, Dewane
NOES: DIRECTORS:
ABSENT: DIRECTORS:
ABSTAIN: DIRECTORS:



Shawn Dewane
President, Board of Directors



Coleen L. Monteleone
District Secretary

APPENDIX G

Bump Methodology





Final Technical Memorandum #1

*To: Karl Seckel, Assistant Manager/District Engineer
Municipal Water District of Orange County*

From: Dan Rodrigo, Senior Vice President, CDM Smith

Date: April 20, 2016

Subject: Orange County Reliability Study, Water Demand Forecast and Supply Gap Analysis

1.0 Introduction

In December 2014, the Municipal Water District of Orange County (MWDOC) initiated the Orange County Reliability Study (OC Study) to comprehensively evaluate current and future water supply and system reliability for all of Orange County. To estimate the range of potential water supply gap (difference between forecasted water demands and all available water supplies), CDM Smith developed an OC Water Supply Simulation Model (OC Model) using the commercially available Water Evaluation and Planning (WEAP) software. WEAP is a simulation model maintained by the Stockholm Environment Institute (<http://www.sei-us.org/weap>) that is used by water agencies around the globe for water supply planning, including the California Department of Water Resources.

The OC Model uses indexed-sequential simulation to compare water demands and supplies now and into the future. For all components of the simulation (e.g., water demands, regional and local supplies) the OC Model maintains a given index (e.g., the year 1990 is the same for regional water demands, as well as supply from Northern California and Colorado River) and the sequence of historical hydrology. The planning horizon of the model is from 2015 to 2040 (25 years). Using the historical hydrology from 1922 to 2014, 93 separate 25-year sequences are used to generate data on reliability and ending period storage/overdraft. For example, sequence one of the simulation maps historical hydrologic year 1922 to forecast year 2015, then 1923 maps to 2016 ... and 1947 maps to 2040. Sequence two shifts this one year, so 1923 maps to 2015 ... and 1948 maps to 2040.

The OC Model estimates overall supply reliability for MET using a similar approach that MET has utilized in its 2015 Draft Integrated Resources Plan (MET IRP). The model then allocates available imported water to Orange County for direct and replenishment needs. Within Orange County, the OC Model simulates water demands and local supplies for three areas: (1) Brea/La Habra; (2) Orange County Basin; (3) South County; plus a Total OC summary (see Figure 1).



Figure 1. Geographic Areas for OC Study

The OC Model also simulates operations of the Orange County Groundwater Basin (OC Basin) managed by the Orange County Water District (OCWD). Figure 2 presents the overall model schematic for the OC Model, while Figure 3 presents the inflows and pumping variables included in the OC Basin component of the OC Model. A detailed description of the OC Model, its inputs, and all technical calculations is documented in Technical Memorandum #2: Development of OC Supply Simulation Model.

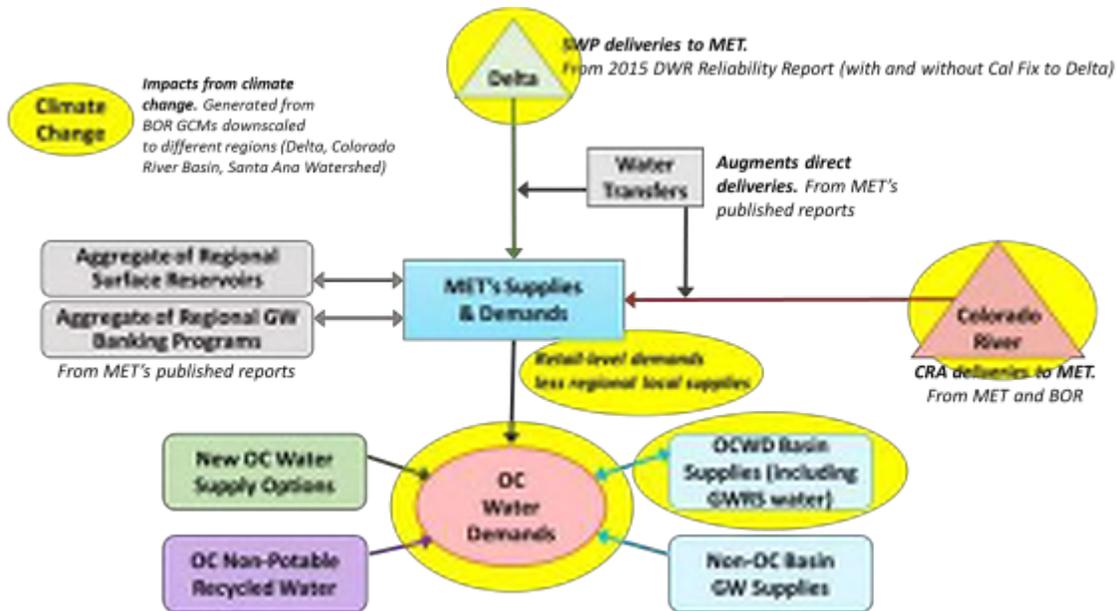


Figure 2. Overall Schematic for OC Model

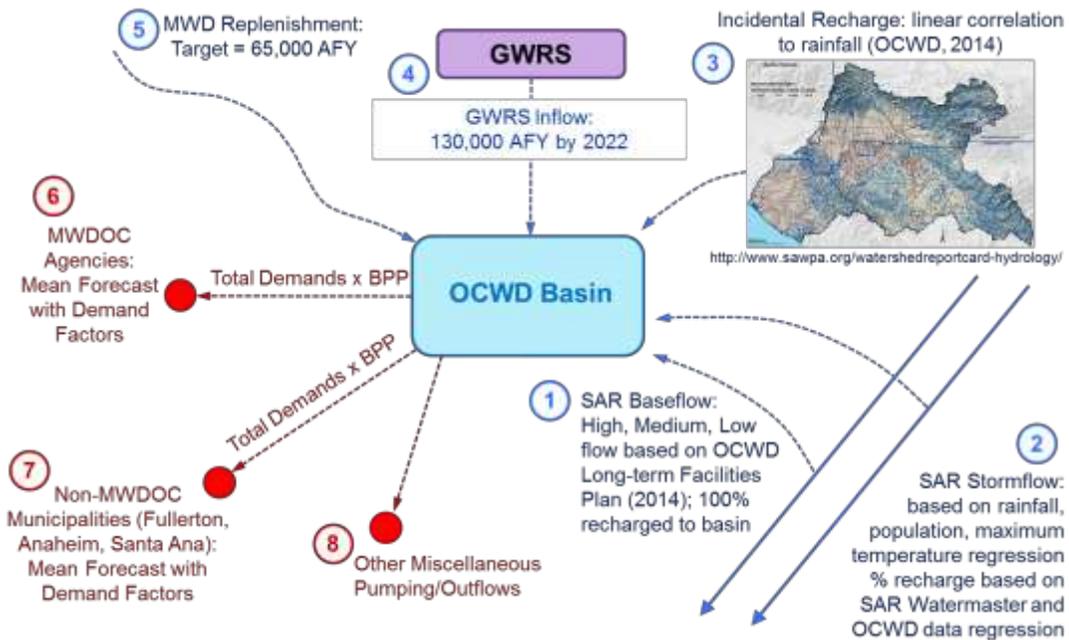


Figure 3. Inflows and Pumping Variables for OC Basin Component of OC Model

The modeling part of this evaluation is a necessity to deal with the number of issues impacting water supply reliability to Orange County. Reliability improvements in Orange County can occur due to water supply investments made by MET, the MET member agencies outside of Orange County, or by Orange County agencies. In this sense, future decision-making regarding reliability of supplies should not take place in a vacuum, but should consider the implications of decisions being made at all levels.

This technical memorandum summarizes the water demand forecast for Orange County and the water supply gap analysis that was generated using the OC Model. The outline for this technical memorandum is as follows:

- Section 1: Water Demand Forecast for Orange County
- Section 2: Planning Scenarios
- Section 3: Water Supply Gap
- Section 4: Conclusions
- Section 5: References

2.0 Water Demand Forecast for Orange County

The methodology for the water demand forecast uses a modified water unit use approach. In this approach, water unit use factors are derived from a baseline condition using a sample of water agency billing data and demographic data. In early 2015, a survey was sent by MWDOC to all water agencies in Orange County requesting Fiscal Year (FY) 2013-14 water use by billing category (e.g., single-family residential, multifamily residential, and non-residential). In parallel, the Center for Demographic Research (CDR) in Orange County provided current and projected demographics for each water agency in Orange County using GIS shape files of agency service areas. Water agencies were then placed into their respective areas (Brea/La Habra, OC Basin, South County), and water use by billing category were summed and divided by the relevant demographic (e.g., single-family water use ÷ single-family households) in order to get a water unit use factor (expressed as gallons per day/demographic unit).

In addition, the water agency survey collected information on total water production. Where provided, the difference between total water production and billed water use is considered non-revenue water. Table 1 summarizes the results of the water agency survey information and calculates the water unit use factors for the three areas within Orange County.

Table 1. Water Use Factors from Survey of Water Agencies in Orange County (FY 2013-14)

	SF Res		MF Res		Com/Instit.		Indust.		Non Revenue	
	Units ¹	Unit Use ²	Units	Unit Use	Units	Unit Use	Units	Unit Use	total acc	%
Basin Area										
ANAHEIM	50,030	441	58,618	193	169,902	90	19,260	160	63,004	7%
BUENA PARK	16,455	346	8,600	224	31,566	137	4,837	39	19,004	11%
FOUNTAIN VALLEY	12,713	336	6,964	141	30,282	124	2,093	134	17,149	13%
FULLERTON	26,274	454	22,575	176	60,839	115	6,251	398	31,557	5%
GARDEN GROVE	31,400	422	17,580	295	48,394	134	7,221	163		
GSWC	38,038	383	17,218	215	58,901	122	6,857	68	No data	
HUNTINGTON BEACH	44,605	297	35,964	154	69,266	99	10,355	58	52,855	6%
IRVINE RANCH WATER DISTRICT	39,182	444	80,854	196	263,393	80	39,484	207	85,508	9%
MESA WATER DISTRICT	16,585	320	23,173	215	80,999	97	4,832	87	No data	
NEWPORT BEACH	19,455	329	15,517	177	59,754	86			26,517	5%
ORANGE	28,545	470	15,483	246	96,606	97	No data		35,363	9%
SANTA ANA	35,547	461	42,027	288	151,008	96			No data	
TUSTIN	11,788	505	9,435	253	25,265	79	1,293	92	14,178	3%
WESTMINSTER	17,648	318	10,973	215	24,148	109	976	84	20,379	5%
YORBA LINDA WATER DISTRICT	22,046	586	3,746	249	22,164	120	2,745	230	No data	
Weighted Average		411		211		97		167		7.3%
South County										
IRVINE RANCH WATER DISTRICT	16,581	444	12,864	196	32,554	80			22,730	9%
MOULTON NIGUEL WATER DISTRICT	47,673	345	17,077	189	70,067	156	Included in		55,149	10%
SAN CLEMENTE	12,047	361	9,045	186	22,921	119	commerical/ institutional		No data	
SAN JUAN CAPISTRANO	7,176	502	6,146	206	16,483	158	category		11,277	3%
SANTA MARGARITA WATER DISTRICT	36,022	436	19,885	268	37,241	254			54,129	2%
Weighted Average		397		216		158				65%
Brea/La Habra										
BREA	9,094	425	6,898	160	42,654	93	5,931	140	No data	
LA HABRA	11,995	436	8,051	177	17,331	90	680	135	13,674	6%
Weighted Average		431.06		169.31		92.13		139.49		6%

¹Units represent:
 SF Res = SF accounts or SF housing (CDR) if SF account data looks questionable.
 MF Res = total housing (CDR) minus SF units.
 Com/Instit = total employment (CDR) minus industrial employment (CDR).
 Industrial = industrial employment (CDR).

²Unit Use represents billed water consumption (gallons/day) divided by units.

To understand the historical variation in water use and to isolate the impacts that weather and future climate has on water demand, a statistical model of monthly water production was developed. The explanatory variables used for this statistical model included population, temperature, precipitation, unemployment rate, presence of mandatory drought restrictions on water use, and a cumulative measure of passive and active conservation. Figure 4 presents the results of the statistical model for the three areas and the total county. All models had relatively high correlations and good significance in explanatory variables. Figure 5 shows how well the statistical model performs using the OC Basin model as an example. In this figure, the solid blue line represents actual per capita water use for the Basin area, while the dashed black line represents what the statistical model predicts per capita water use to be based on the explanatory variables.

Using the statistical model, each explanatory variable (e.g., weather) can be isolated to determine the impact it has on water use. Figure 6 presents the impacts on water use that key explanatory variables have in Orange County.

Regression Parameters	Basin Area	South Orange County	Brea / La Habra	OC Total
Adjusted R ² *	0.90	0.91	0.89	0.91
Standard Error **	0.07	0.09	0.09	0.07
Explanatory Variable Significance ***	All at <0.0001	All at <0.0001	All at <0.0001	All at <0.0001

* Adjusted R² greater than 0.70 considered good overall correlation.
 ** Standard Errors less than 0.10 considered good overall predictive models.
 *** Explanatory Variables are considered statistically significant (valid) at the 0.05 level or less.

Figure 4. Results of Statistical Regression of Monthly Water Production

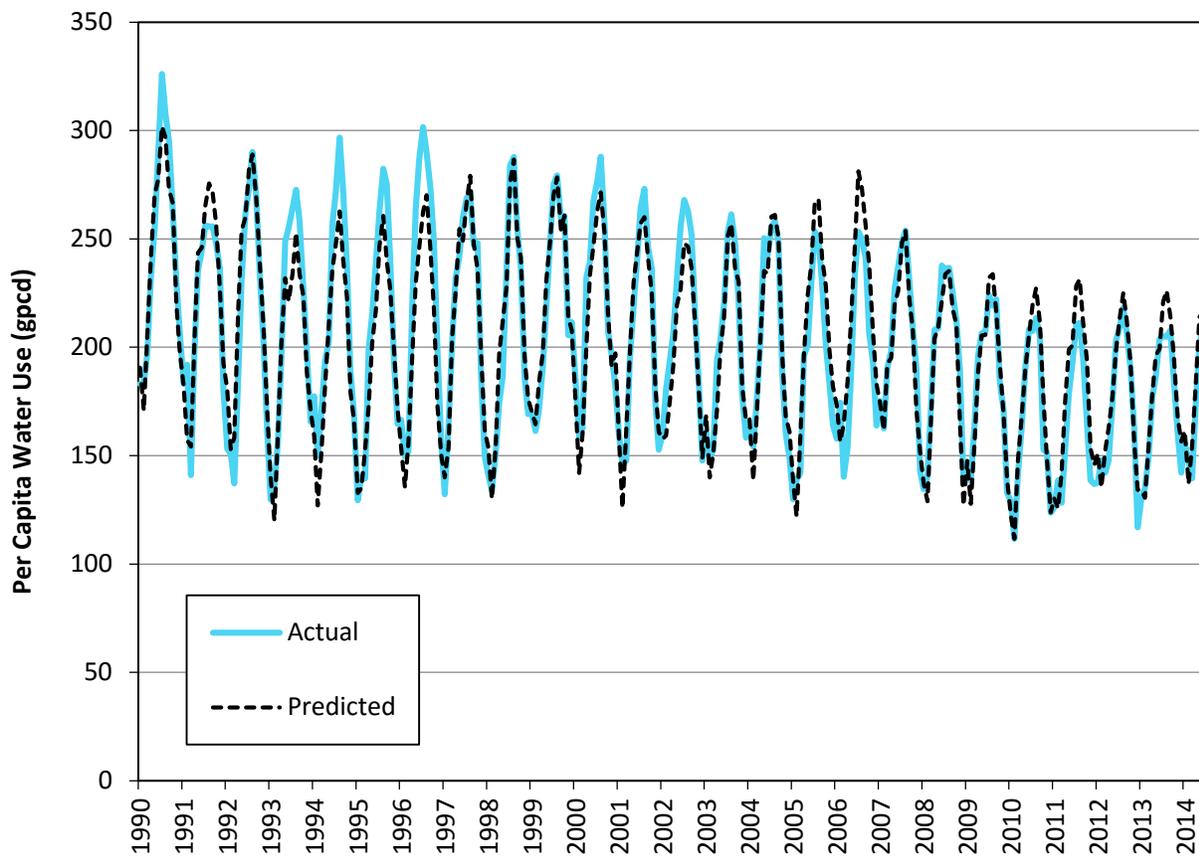


Figure 5. Verification of Statistical Water Use Model

Impacts (% impact on per capita use)	Basin Area	South Orange County	Brea / La Habra	OC Total
Hot/Dry Weather*	+6%	+9%	+6%	+6%
Cool/Wet Weather**	-4%	-7%	-5%	-5%
Economic Recession***	-13%	-12%	-13%	-13%
Drought Conservation	-6%	-5%	-5%	-6%
Passive/Active Cons. (Since 1990)	-20%	-17%	-7%	-19%

*FY 2013-14 for Hot/Dry Weather, relative to average (1990-2014).

**FY 1997-98 for Cool/Wet Weather, relative to average (1990-2014).

*** Comparing unemployment for FY 2009-10 to average (1990-2014).

Figure 6. Impacts of Key Variables on Water Use

2.1 Base Demand Forecast (No Additional Conservation post 2014)

For the purposes of this analysis three types of water conservation were defined. The first type is passive conservation, which results from codes and ordinances, such plumbing codes or model landscape water efficient ordinances. This type of conservation requires no financial incentives and grows over time based on new housing stock and remodeling of existing homes. The second type is active conservation, which requires incentives for participation. The SoCal WaterSmart grant that is administered by MET, through its member agencies, provides financial incentives for approved active water conservation programs such as high efficiency toilets and clothes washer retrofits. The third type is extraordinary conservation that results from mandatory restrictions on water use during extreme droughts. This type of conservation is mainly behavioral, in that water customers change how and when they use water in response to the mandatory restrictions. In droughts past, this type of extraordinary conservation has completely dissipated once water use restrictions were lifted—in other words curtailed water demands fully “bounced back” (returned) to pre-curtailed use levels (higher demand levels, within a relatively short period of time (1-2 years)).

The great California Drought, which started around 2010, has been one of the worst droughts on record. It has been unique in that for the last two years most of the state has been classified as extreme drought conditions. In response to this epic drought, Governor Jerry Brown instituted the first-ever statewide call for mandatory water use restrictions in April 2015, with a target reduction of 25 percent. Water customers across the state responded to this mandate, with most water agencies seeing water demands reduced by 15 to 30 percent during the summer of 2015. Water agencies in Southern California also ramped up incentives for turf removal during this time. Because of the unprecedented nature of the drought, the statewide call for mandatory water use restrictions, and the success of turf removal incentives it was assumed that the bounce back in water use after water use restrictions are lifted would take longer and not fully recover. For this study, it was assumed (hypothesized) that unit use rates would take 5 years to get to 85 percent

and 10 years to get to 90 percent of pre-drought water use levels. After 10 years, it was assumed that water unit use rates would remain at 90 percent of pre-drought use levels throughout the planning period—reflecting a long-term shift in water demands. Table 2 presents the assumed bounce back in water unit use rates (derived from Table 1) for this drought.

Table 2. Bounce Back in Water Unit Use from Great California Drought

Water Billing Sector	Time Period	Brea/La Habra Unit Use (gal/day)	OC Basin Unit Use (gal/day)	South County Unit Use (gal/day)
Single-Family Residential	2015	431	411	397
	2020	366	349	337
	2025 to 2040	388	369	357
Multifamily Residential	2015	169	211	216
	2020	144	179	183
	2025 to 2040	152	190	194
Commercial <i>(or combined commercial/ industrial for South County)</i>	2015	92	97	158
	2020	78	83	134
	2025 to 2040	83	87	142
Industrial	2015	139	167	NA
	2020	119	142	NA
	2025 to 2040	126	150	NA

* Units for single-family and multifamily are households, units for commercial and industrial are employment.

Table 3 presents the demographic projections from CDR for the three areas. These projections were made right after the most severe economic recession in the United States and might be considered low given that fact. In fact, *draft* 2015 demographic forecasts do show higher numbers for 2040.

Table 3. Demographic Projections

Demographic	Time Period	Brea/La Habra	OC Basin	South County	Total Orange County
Single-Family Housing	2020	20,463	386,324	133,989	540,776
	2030	20,470	389,734	138,709	548,913
	2040	20,512	392,387	142,008	554,907
Multifamily Housing	2020	18,561	453,758	118,306	590,625
	2030	19,113	468,972	125,030	613,115
	2040	19,585	478,362	126,736	624,683
Commercial Employment <i>(or combined commercial/ industrial employment for South County)</i>	2020	63,909	1,254,415	255,050	1,573,374
	2030	64,961	1,304,353	266,553	1,635,867
	2040	65,743	1,343,509	271,808	1,681,060
Industrial Employment	2020	6,583	138,474	NA	145,057
	2030	6,552	137,763	NA	144,315
	2040	6,523	137,066	NA	143,589

To determine the water demand forecast with no additional (post 2014) water conservation, the water unit use factors in Table 2 are multiplied by the demographic projections in Table 3; then a non-revenue percentage is added to account for total water use (see Table 1 for non-revenue water percentage). These should be considered normal weather water demands. Using the statistical results shown back in Figure 4, demands during dry years would be 6 to 9 percent greater; while during wet years demands would be 4 to 7 percent lower. Table 4 summarizes the demand forecast with no additional conservation post 2014. In year 2040, the water demand with no additional conservation for the total county is forecasted to be 617,466 acre-feet per year (afy). In 2014, the actual county water demand was 609,836; in 2015, the demand was 554,339 and the projected forecast for 2016 is 463,890. This represents a total water demand growth of only 1.25 percent from 2014 to 2040. In contrast, total number of households for the county is projected to increase 4.24 percent for the same period; while county employment is projected to increase by 6.22 percent.

Table 4. Normal Weather Water Demand Forecast with No Additional Conservation Post 2014

Brea / La Habra

	Baseline Demand Forecast (no new conservation)					
	SF	MF	COM	IND	Non Rev	Total
	AFY	AFY	AFY	AFY	AFY	AFY
2015	9,404	3,140	6,190	1,033	1,186	20,953
2020	8,397	2,992	5,605	874	1,072	18,941
2025	8,894	3,262	6,033	921	1,147	20,257
2030	8,913	3,342	6,105	917	1,157	20,434
2035	8,913	3,501	6,163	913	1,169	20,659
2040	8,919	3,513	6,205	909	1,173	20,719

South County

	Baseline Demand Forecast (no new conservation)					
	SF	MF	COM	IND	Non Rev	Total
	AFY	AFY	AFY	AFY	AFY	AFY
2015	56,181	26,940	41,990		7,507	132,616
2020	50,644	24,300	38,355		6,798	120,097
2025	55,512	27,191	42,443		7,509	132,655
2030	56,832	27,562	43,280		7,660	135,335
2035	57,350	27,884	43,970		7,752	136,956
2040	57,635	28,047	44,459		7,809	137,950

OC Basin

	Baseline Demand Forecast (no new conservation)					
	SF	MF	COM	IND	Non Rev	Total
	AFY	AFY	AFY	AFY	AFY	AFY
2015	175,544	100,997	127,252	26,027	30,087	459,907
2020	150,978	91,182	116,082	22,015	26,618	406,874
2025	161,270	99,782	127,803	23,190	28,843	440,889
2030	162,368	101,780	131,640	23,073	29,320	448,181
2035	162,772	103,766	134,543	22,958	29,683	453,722
2040	162,969	105,890	137,083	22,840	30,015	458,797

Total Orange County

	Baseline Demand Forecast (no new conservation)					
	SF	MF	COM	IND	Non Rev	Total
	AFY	AFY	AFY	AFY	AFY	AFY
2015	241,129	131,076	175,431	27,059	38,780	613,476
2020	210,019	118,473	160,042	22,889	34,488	545,911
2025	225,676	130,236	176,279	24,111	37,499	593,801
2030	228,113	132,685	181,025	23,990	38,137	603,950
2035	229,034	135,151	184,676	23,871	38,604	611,338
2040	229,524	137,450	187,747	23,750	38,996	617,466

2.2 Future Passive and Baseline Active Water Conservation

2.2.1 Future Passive Water Conservation

The following future passive water conservation estimates were made:

- High efficiency toilets – affecting new homes and businesses (post 2015) and remodels
- High efficiency clothes washers – affecting new homes (post 2015)
- Model Water Efficient Landscape Ordinance – affecting new homes and businesses (post 2015)

High Efficiency Toilets

A toilet stock model was built tracking different flush rates over time. All new homes (post 2015) are assumed to have one gallon per flush toilets. This model also assumes a certain amount of turn-over of older toilets due to life of toilet and remodeling rates. This analyses was done for single-family, multifamily and non-residential sectors. The following assumptions were made:

- Number of toilet flushes is 5.5 per person per day for single-family and multifamily homes.
- Household size is calculated from CDR data on persons per home. In single-family, household size decreases over time.
- Number of toilet flushes is 2.5 per employee per day for non-residential.
- Replacement/remodeling rates are 7% per year for 5 gal/flush toilet; 6% per year for 3.5 gal/flush toilets; and 5% per year for 1.6 gal/flush toilets.

Table 5 shows this toilet stock model for the OC Basin for single-family and non-residential sectors as an example.

Table 5. Toilet Stock Model for OC Basin (example)

OC Basin Single-Family										
# Flushes	Year	Total Housing	Portion of Homes with Gal/Flush Toilets						Savings (GPD/H)	Savings (AFY)
			7	5	3.5	1.6	1	Av Flush		
17.40	2000	348,114	3,133	53,261	123,232	168,487	-	2.84		
17.40	2013	379,999	-	4,794	27,111	348,094	-	1.78		
17.40	2015	381,806	-	4,122	23,858	313,285	40,541	1.69		
17.37	2020	386,324	-	2,680	16,700	234,964	131,980	1.50	3.32	1,435
17.31	2025	389,734	-	-	11,690	176,223	201,821	1.35	5.98	2,610
17.23	2030	392,387	-	-	8,183	132,167	252,037	1.25	7.54	3,312
17.14	2035	393,363	-	-	5,728	99,125	288,509	1.19	8.64	3,806
17.05	2040	393,840	-	-	4,010	74,344	315,486	1.14	9.43	4,159

OC Basin Non-Residential										
# Flushes	Year	Empl	Portion of Emp with Gal/Flush Toilets						Savings (GPD/E)	Savings (AFY)
			7	5	3.5	1.6	1	Av Flush		
3,298,440	2015	1,319,376	-	13,194	131,938	461,782	712,463	1.50		
3,510,508	2020	1,404,203	-	8,576	92,356	346,336	956,935	1.34	0.41	641
3,633,438	2025	1,453,375	-	5,574	64,649	259,752	1,123,399	1.23	0.67	1,083
3,729,448	2030	1,491,779	-	3,623	45,255	194,814	1,248,087	1.16	0.84	1,404
3,801,693	2035	1,520,677	-	2,355	31,678	146,111	1,340,533	1.12	0.96	1,635
3,864,600	2040	1,545,840	-	1,531	22,175	109,583	1,412,551	1.08	1.04	1,808

High Efficiency Clothes Washers

It was assumed that all new clothes washers sold after 2015 would be high efficiency and roughly save 0.033 afy per washer¹. These savings would only apply to new homes (post 2015), and only for the single-family sector.

Model Water Efficient Landscape Ordinance (2015)

The new California Model Water Efficient Landscape Ordinance (MWELO) will take place in 2016. For single-family and multifamily homes it will require that 75 percent of the irrigable area be California Friendly landscaping with high efficiency irrigation systems, with an allowance that the remaining 25 percent can be turf (high water using landscape). For non-residential establishments it will require 100 percent of the irrigable area to be California Friendly landscaping with high efficiency irrigation systems (and no turf areas). There are exemptions for non-potable recycled water systems and for parks and open space. To calculate the savings from this ordinance a parcel database provided by MWDOC was analyzed. This database had the total irrigable area and turf area delineated for current parcels. For each parcel, a target water savings was set depending on the sector. For residential parcels, 25 percent of the total irrigable area was assumed to be turf and the savings from a non-compliant parcel was estimated. For each square feet of turf conversion the estimate savings is 0.00013 afy¹. Table 6 summarizes the per parcel savings for the total county using this method.

Table 6. Estimated Parcel Savings from MWELO for Total Orange County

Parcel Type	Number of Parcels	Total Irrigable Area (sq. feet)	Current Turf Area (sq. feet)	Turf Conversion (sq. feet)*	Turf Conversion (sq. ft / parcel)	Conservation Savings (afy/parcel)
Single-Family Residential	527,627	2,114,679,368	897,177,779	368,507,937	698	0.091
Multifamily Residential	555,255	155,315,983	51,697,361	12,868,365	23	0.003
Businesses (Non-Residential)	1,623,307	499,127,269	212,043,667	212,043,667	131	0.017

* Assumes 25% turf conversion for single-family and multifamily, and 100% for businesses.

The conservation savings in afy/parcel where then multiplied by new homes and businesses (post 2015), assuming a 75 percent compliance rate.

2.2.2 Future Baseline Active Water Conservation

To estimate a baseline water savings from future active water conservation measures, the actual average annual water savings for the last seven years for the SoCal WaterSmart program within Orange County were analyzed. A continuation of this program through 2040 at similar annual implementation rates was assumed to be representative of a baseline estimate for active water conservation into the future.

¹ Per MET's SoCal WaterSmart conservation estimates, table provided by MWDOC (2015).

New active conservation measures or more aggressive implementation of existing active conservation will be evaluated as part of a portfolio analysis of water demand and supply options in Phase 2 of the OC Study.

2.2.3 Total Future Water Conservation Savings

Combining future passive and active water conservation results in a total estimated water savings, which is summarized in Table 7. The total passive and active conservation for the total Orange County is shown in Figure 7.

Table 7. Future Passive and Baseline Active Water Conservation Savings

Brea/La Habra Area

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWEL0	HEC Pass	Toilets	Active	Total	MWEL0	Toilets	Active	Total	MWEL0	Toilets	Active	Total
2020	186	32	78	8	304	11	51	5	67	63	32	17	112
2025	169	33	131	15	348	13	85	10	108	79	52	34	166
2030	166	34	163	30	394	16	106	20	142	91	67	68	226
2035	156	34	186	61	437	21	127	40	188	101	77	136	314
2040	149	34	203	79	465	21	137	53	211	108	85	177	370

OC Basin

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWEL0	HEC Pass	Toilets	Active	Total	MWEL0	Toilets	Active	Total	MWEL0	Toilets	Active	Total
2020	272	148	1,435	221	2,076	61	1,217	171	1,449	759	641	556	1,956
2025	430	260	2,610	441	3,742	96	2,165	342	2,603	1,199	1,083	1,112	3,394
2030	542	347	3,312	883	5,084	118	2,738	684	3,540	1,542	1,404	2,224	5,170
2035	557	379	3,806	1,766	6,509	139	3,182	1,369	4,690	1,801	1,635	4,447	7,883
2040	544	395	4,159	2,472	7,570	162	3,537	1,916	5,615	2,026	1,808	6,226	10,059

South County

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWEL0	HEC Pass	Toilets	Active	Total	MWEL0	Toilets	Active	Total	MWEL0	Toilets	Active	Total
2020	558	251	507	116	1,432	11	335	160	506	582	119	329	1,029
2025	812	406	877	232	2,326	22	599	321	942	960	202	657	1,819
2030	972	514	1,148	463	3,097	25	761	642	1,428	1,133	257	1,314	2,704
2035	990	556	1,332	927	3,805	27	876	1,283	2,187	1,275	298	2,628	4,201
2040	967	580	1,480	1,112	4,139	29	969	1,540	2,537	1,376	327	3,154	4,857

Total County

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWEL0	HEC Pass	Toilets	Active	Total	MWEL0	Toilets	Active	Total	MWEL0	Toilets	Active	Total
2020	1,017	431	2,020	344	3,812	83	1,602	337	2,022	1,404	792	901	3,097
2025	1,411	698	3,618	688	6,416	132	2,848	673	3,653	2,238	1,337	1,803	5,378
2030	1,680	895	4,624	1,377	8,575	159	3,606	1,346	5,111	2,766	1,728	3,606	8,100
2035	1,704	969	5,325	2,754	10,752	188	4,185	2,692	7,065	3,177	2,010	7,212	12,399
2040	1,660	1,009	5,842	3,663	12,175	212	4,643	3,509	8,363	3,510	2,219	9,557	15,286

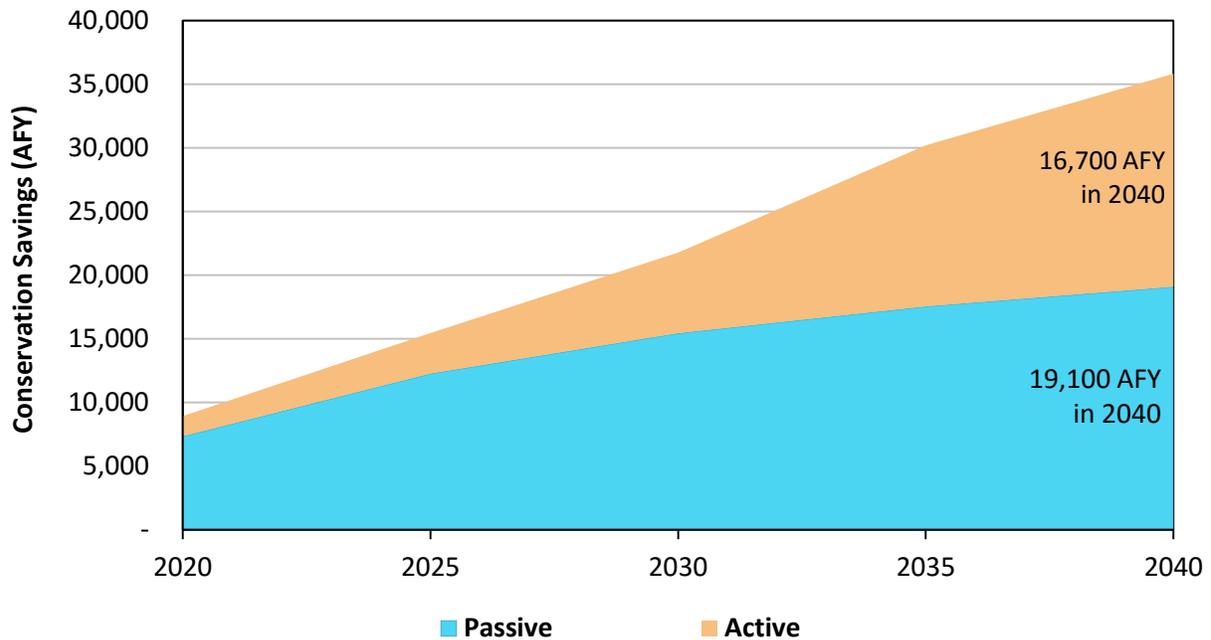


Figure 7. Total Water Conservation in Orange County

1.3 With Conservation Demand Forecast

Subtracting the future water conservation savings shown in Table 7 from the base water demand forecast shown in Table 4 results in the water demand forecast with conservation that is used to model potential water supply gaps for the OC Study. Table 8 presents the demand forecast by area and total Orange County, while Figure 8 presents the historical and forecasted water demands for total Orange County.

Note: Price elasticity of water demand reflects the impact that changes in retail cost of water has on water use. Theory states that if price goes up, customers respond by reducing water use. A price elasticity value of -0.2 implies that if the real price of water increases by 10%, water use would decrease by 2%. Price elasticity is estimated by detailed econometric water demand models, where price can be isolated from all other explanatory variables. Many times price is correlated with other variables making it difficult to estimate a significant statistical value. In addition, there is a potential for double counting reduction in water demand if estimates of future conservation from active programs are included in a demand forecast because customers who respond to price take advantage of utility-provided incentives for conservation. MET's 2015 IRP considers the impact of price elasticity in their future water demand scenarios, but does not include future active conservation in its demand forecast. The OC Study included future estimates of water conservation from active conservation, and thus did not include a price elasticity variable in its statistical modeling of water demand. Including both price elasticity and active conservation would have resulted in "double counting" of the future water savings.

Table 7. Water Demand Forecast with Conservation

Brea / La Habra

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	8,094	2,925	6,368	1,043	18,429
2025	8,546	3,154	6,789	1,109	19,598
2030	8,519	3,200	6,796	1,111	19,626
2035	8,475	3,313	6,762	1,113	19,663
2040	8,454	3,302	6,745	1,110	19,611

OC Basin

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	148,902	89,733	136,077	26,230	400,941
2025	157,528	97,180	147,532	28,157	430,396
2030	157,284	98,240	149,476	28,350	433,350
2035	156,263	99,076	149,552	28,342	433,233
2040	155,399	100,275	149,797	28,383	433,854

South County

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	49,212	23,793	37,326	6,620	116,951
2025	53,186	26,250	40,624	7,204	127,263
2030	53,735	26,135	40,575	7,227	127,672
2035	53,545	25,697	39,769	7,141	126,151
2040	53,496	25,509	39,602	7,116	125,725

Total Orange County

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	206,207	116,451	179,770	33,893	536,321
2025	219,260	126,583	194,945	36,470	577,257
2030	219,537	127,575	196,848	36,688	580,647
2035	218,283	128,086	196,082	36,596	579,047
2040	217,349	129,087	196,144	36,610	579,189

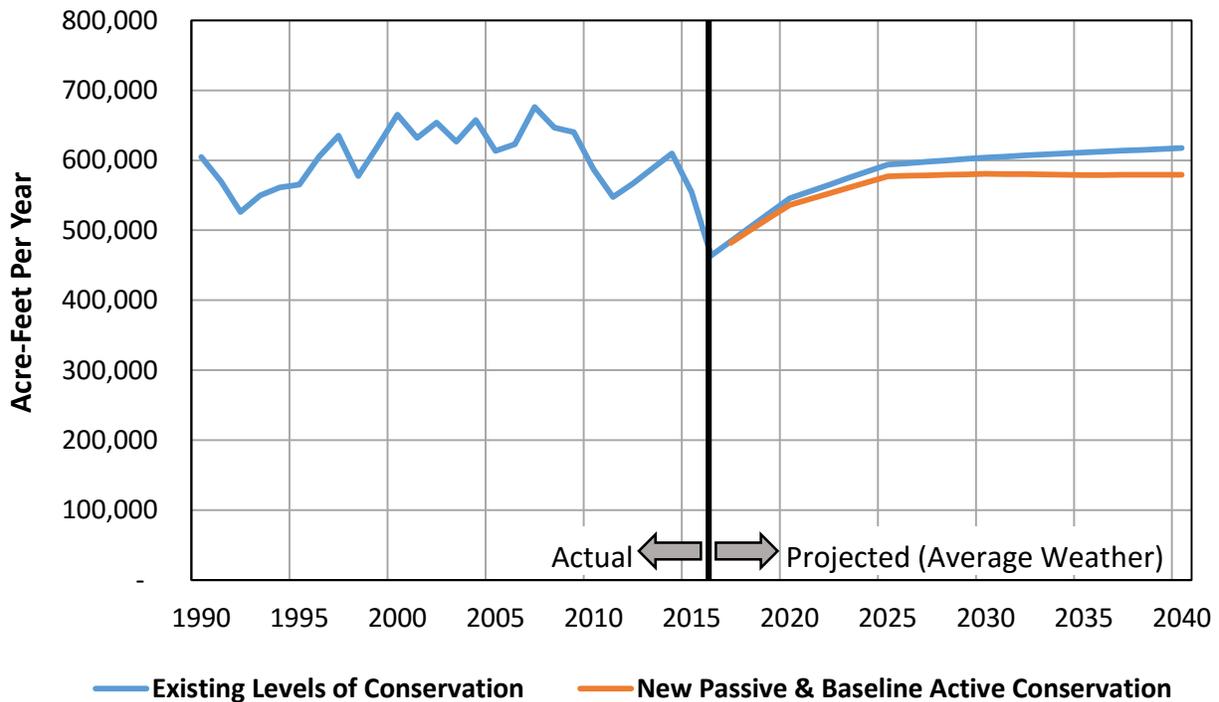


Figure 8. Water Demand Forecast for Total Orange County

3.0 Planning Scenarios

At the start of the Orange County Water Reliability Study, a workgroup was formed made up of representatives from Orange County water agencies. This OC Workgroup met 13 times during the

12-month Phase 1 of the study. During the first four meetings of the OC Workgroup, three basic planning scenarios emerged, each with and without a California WaterFix to the Delta—thus resulting in six scenarios in total. While there was discussion on assigning probabilities or weights to these planning scenarios, consensus was not reached on which scenario was more probable than the others. Assignment of the likelihood that one scenario is more probable than the others will be revisited in Phase 2 of the Orange County Reliability Study. There was, however, general agreement that all of the scenarios represent plausible future outcomes and thus all scenarios should be evaluated in terms of assessing potential water supply gaps (difference between forecasted water demands and existing water supplies). It is important to note that the purpose of estimating the water supply gaps for Orange County is to determine what additional MET and Orange County water supply investments are needed for future reliability planning. Thus, other than the California WaterFix to the Delta, all planning scenarios assume no new additional regional or Orange County water supply investments, with a couple of exceptions. In Orange County, it was assumed that existing and planned non-potable recycling projects would build additional supplies out into the future. It was also assumed that the OCWD GWRS Phase 3 expansion project would be implemented by 2022 to increase the recycled supplies for groundwater replenishment from 100,000 afy to 130,000 afy.

To develop the planning scenarios, the OC Workgroup considered the following parameters:

- California WaterFix to Sacramento-San Joaquin Delta (Cal Fix), which impacts the reliability of the State Water Project.
- Regional MET water demands and supplies, which impacts the availability of water from MET and supply reliability for Orange County.
- Orange County water demands, which impacts the supply reliability for Orange County.
- Santa Ana River baseflows, which impacts the replenishment of the OC Basin and the supply reliability for the water agencies within the OC Basin.
- Climate variability impacts on regional and local water demands and supplies, which impacts the availability of water from MET and the supply reliability for Orange County.

The definition of the six scenarios are:

- **Scenario 1a - Planned Conditions, No Cal Fix:** Essentially represents MET's IRP planning assumptions, with very little climate variability impacts (only impacting Delta supplies and not through 2040), no California Fix to the Delta, and no new regional or OC water supply investments.
- **Scenario 1b - Planned Conditions, with Cal Fix:** Same as Scenario 1a, but with new supply from the California Fix to the Delta beginning in 2030.

- **Scenario 2a - Moderately Stressed Conditions, No Cal Fix:** Moderate levels of climate variability impacts (affecting Delta, Colorado River, and Santa Ana watershed), slightly lower regional local supplies than MET assumes in IRP, 4% higher demand growth reflecting climate impacts and higher demographic growth, no California Fix to the Delta, and no new regional or OC water supply investments. The higher demand growth and fewer local supplies reflects potential future impacts if our existing demographics are low and if local supplies become more challenged, a continuation of the trend in recent times.
- **Scenario 2b - Moderately Stressed Conditions, with Cal Fix:** Same as 2a, but with new supply from California Fix to the Delta beginning in 2030.
- **Scenario 3a - Significantly Stressed Conditions, No Cal Fix:** Significant levels of climate variability impacts (affecting Delta, Colorado River, and Santa Ana watershed), 8% higher demand growth reflecting climate impacts and higher demographic growth, no California Fix to the Delta, and no new regional or OC water supply investments.
- **Scenario 3b - Significantly Stressed Conditions, with Cal Fix:** Same as 3a, but with new supply from California Fix to the Delta beginning in 2030.

All of these scenarios were deemed plausible and likely carry about the same likelihood of occurring. While no attempt was made to specifically assign the probability of any one of the six scenarios occurring over the others, some might postulate that Scenario 2 would be the most likely to occur given that most climate experts believe we are already seeing evidence of climate variability impacts today. But even with this postulation, assigning a probability to the success of the Cal Fix would be difficult at this time.

4.0 Water Supply Gap

To plan for future water supply reliability, a gap between forecasted water demands and existing supplies (plus planned projects that are a certainty) should be estimated. In past planning efforts, this gap is often done for average conditions or at best, using one reference drought condition. However, due to recent droughts and environmental restrictions in the Delta, a more sophisticated approach to estimating the potential water supply gap is needed. The OC Model, described in detail in TM #2: Development of OC Supply Simulation Model, uses “indexed-sequential” simulation to evaluate regional water demands and supplies, and Orange County water demands and supplies. All model demands and supply sources are referenced to the same hydrologic index—meaning that if a repeat of the year 1991 occurred, the OC Model would represent the availability of Delta water supplies in 1991 to MET, the availability of Colorado River water supplies in 1991 to MET, and the local Santa Ana watershed conditions in 1991. The OC Model also preserves the historical sequence of the hydrologic years. This is necessary because the source of availability of Delta and Colorado River water supplies are hydrologic models run by California Department of Water Resources (DWR) and the Bureau of Reclamation (BOR). These hydrologic models incorporate water rights (or contract rights) and storage conditions that are run using a specific sequence of hydrologic conditions. Both MET IRP and OC modeling of water supply maintain these sequences in order to

preserve the accuracy of the DWR and BOR model inputs. The hydrologic period used by the OC Model is 1922 to 2014 (which differs from MET’s IRP which is 1922 to 2012). The forecast period is 2015 to 2040. Thus, in the OC Model there are 93 25-year sequences that are mapped to the forecast period. When the year 2014 is reached in any of the sequences, the next year wraps back around starting in 1922. Table 8 illustrates how the indexed-sequential method works.

Table 8. Illustration of Indexed-Sequential Supply Simulation

Forecast Year	Hydrologic Simulation Year – Sequence 1	Hydrologic Simulation Year – Sequence 2	...	Hydrologic Simulation Year – Sequence 93
2015	1922	1923		2014
2016	1923	1924		1922
⋮	⋮	⋮		⋮
2040	1947	1948		1946

Using the SWP system as an index, approximately 12 of the 93 historical hydrologic years (13 percent) are considered critically dry; 20 years (22 percent) are considered very wet; and the remaining 61 years (65 percent) are along the below-normal, normal, and above-normal spectrum.

4.1 Assumptions for Supply Gap Analysis

Figure 9 presents the overall assumptions for the water supply gap analysis. Figure 10 presents more specific assumptions regarding groundwater in the OC Basin. In addition to these assumptions, the following summarizes some of the differences between the MET IRP and the supply gap analysis for the OC Study:

- **Simulation Period:** MET IRP uses a historical hydrology from 1922 to 2012; while the OC Study uses a historical hydrology from 1922 to 2014—capturing the recent drought.
- **Cal Fix:** When the Cal Fix is included, MET IRP assumes that new supply from Cal Fix begins in 2020, based on the assumption that a “commitment” to move forward with the Cal Fix project will result in regulatory relief, beginning in 2020; while the OC Study assumes that supplies from Cal Fix begins when project is fully operational in 2030.
- **Water Conservation:** MET IRP only includes new passive conservation in their demand forecast (with new active conservation being reserved as a new supply option); while the OC Study assumes new passive and baseline new active conservation for water demands in Orange County (additional new active conservation will be evaluated in Phase 2 of the OC Study).

- **Climate Variability:** MET IRP only includes minimal impacts of climate variability for Delta water supplies through 2030; while the OC Study includes a range of climate scenario impacts on water supplies from Delta, Colorado River and Santa Ana Watershed through 2040.

Water Demands (AFY)	FY 2014 Actual	FY 2015 Actual	2025 Projected	2040 Projected
MET Demands*	2,300,000	1,850,000	1,920,000	2,028,000
OCWD Basin Demands**	453,000	410,000	425,000	434,000
OC Total Demands**	630,000	554,000	565,000	579,000

* With future passive conservation only

** With future passive and baseline new active conservation

OC Groundwater (AFY)	Brea/La Habra	Net OC Basin	South County	Total
Groundwater Supply	15,000*	188,500**	10,000	213,500

* Based on firm yield from La Habra Basin and groundwater purchases from Main San Gabriel Basin.

** Includes GWRS, SAR baseflows, SAR stormflows, incidental recharge, MET replenishment, and miscellaneous pumping.

OC Non-Potable Recycled Water (AFY)	2015	2040
OC Basin Recycled Water	22,000	27,700
South County Recycled Water	23,900	41,800
Total	45,900	69,500

Note: Irvine Ranch Water District (IRWD) is split between the Basin and South County

Figure 9. Overall Assumptions for Water Supply Gap Analysis

OC Basin Groundwater (AFY)	Near-Term	Long-Term	Range Within Model
Groundwater Replenishment System (GWRS)	100,000	130,000	100,000 to 130,000
SAR Baseflow (mid level assumption)	53,000	53,000	34,000 to 53,000
SAR Stormflow (average of all hydrologies)	53,000	53,000	6,000 to 150,000
SAR Incidental Recharge (average of all hydrologies)	59,000	59,000	20,000 to 140,000
MET Replenishment (average of all hydrologies)*	54,000	34,000	0 to 65,000
BEA Outflows	-22,000	-9,000	-22,000 to -9,000
Misc. Pumping (golf courses, etc.)	-8,500	-8,500	-8,500
Net Groundwater for OC Basin Agencies	288,500	311,500	168,000 to 455,000

* While OCWD replenishment target is 65,000 AFY, replenishment water is not assumed to be taken during very wet years when SAR stormflows are high, and only a portion of replenishment water is available during years in which MET is in allocation of imported water.

Figure 10. Assumptions for Groundwater in OC Basin

4.2 Availability of Water from MET

Key to the assessment of water reliability for Orange County is estimating the availability of imported water from MET under a wide range of scenarios. Availability of MET water to Orange County is a function of the water demands on MET and the reliability of imported water from the Colorado River and Delta to MET, supplemented by withdrawals from various MET storage accounts.

4.2.1 Demands on MET

MET water demands represent that difference between regional retail water demands (inclusive of groundwater replenishment) and regional local supplies (which includes groundwater, Los Angeles Aqueducts, surface reservoirs, groundwater recovery, recycled water, and seawater desalination). Table 9 presents the MET demand forecast under normal/average weather conditions.

A significant challenge for MET in terms of reliability planning is it represents the “swing” water supply for the region. This compounds the variability on demands on MET due to weather and hydrology. For retail water demands, variations in weather can cause water use to change ± 5 to 9 percent in any given year due to varying demands for irrigation and cooling. In addition to retail water demand variability, local supplies can vary ± 80 percent for the Los Angeles Aqueducts and ± 55 percent for surface reservoirs. Thus, the variability for demands on MET in any given year can be ± 15 to 25 percent. This fact alone makes storage so key in assuring supply reliability for MET and the region.

Table 9. Demands on MET

Total Demand (AFY)	2020	2030	2040
Retail M&I	3,707,546	3,865,200	3,954,814
Retail Agricultural	169,822	163,121	159,537
Seawater Barrier	66,500	66,500	66,500
Replenishment	292,777	272,829	272,847
Total Demand	4,236,645	4,367,650	4,453,698

Local Supplies (AFY)			
Groundwater Production	1,308,101	1,321,220	1,322,197
Surface Production	113,705	113,705	113,705
Los Angeles Aqueduct	261,100	264,296	267,637
Seawater Desalination	50,637	50,637	50,637
Groundwater Recovery	142,286	158,816	162,688
Recycled Water	425,131	468,862	495,698
Other Non-Metropolitan Imports	13,100	13,100	13,100
Total Local Supplies	2,314,061	2,390,637	2,425,663

Demand On MET (AFY)			
Consumptive Use	1,743,866	1,826,245	1,880,131
Seawater Barrier	11,635	8,708	5,877
Replenishment	167,083	142,060	142,027
Total Net Demand on Metropolitan	1,922,584	1,977,013	2,028,035

4.2.2 Supplies from Colorado River and Delta

MET's water supply from the Colorado River, via the Colorado River Aqueduct (CRA), has historically been the backbone to MET's supply reliability. Before the settlement agreement between lower Colorado River Basin states and water agencies that use Colorado River water within California, MET kept the CRA full at 1.2 million acre-feet (maf) per year or nearly at that level in many years. The settlement agreement requires California to live within its 4.4 maf apportionment, and dictates how Colorado River water within California is prioritized. This eliminated most of the surplus water that MET was using to keep the CRA full. To deal with this challenge, MET has developed a number of water transfers and land fallowing programs to mitigate the impacts of the settlement agreement. The 2015 MET IRP is assuming that it will maintain minimum CRA supply of 0.90 maf, with a goal of a full CRA during dry years, when needed (although it is not specified exactly how that will occur).

For the OC Study, we have assumed similar baseline assumptions as the MET IRP, but have added some uncertainties with regard to climate scenarios under Scenario 2 and more significant impacts under Scenario 3. Under significant climate scenario impacts (Scenario 3), where the BOR simulates that Lake Mead elevation would fall below 1,000 feet about 80 percent of the time, the OC Study assumed MET would get a proportionate share of shortages that are allocated by BOR. Exactly how BOR would manage water shortages when Lake Mead elevation falls below 1,000 is uncharted territory, but assuming some proportional allocation of Colorado River water among the Lower Basin states and within California is a plausible scenario. Figure 11 presents the assumed CRA water supplies to MET for the OC Study with (Scenario 3) and without (Scenarios 1 & 2) significant climate scenario impacts. Under the significant climate scenario (Scenario 3), there is a 50 percent probability that CRA deliveries would be below 815,000 afy and a 20 percent probability that CRA deliveries would be below 620,000 afy.

The other main source of imported water available to MET is from the Delta and is delivered to Southern California via the State Water Project (SWP). Although MET's contract for SWP water is 2.0 maf, it has never received that amount. Prior to the QSA (in 2003) when MET relied more heavily on CRA supplies, the maximum water taken by MET from the SWP exceeded 1.1 maf in only three years (1989, 1990 and 2000). Beginning in 2001, MET has tried to maximize their delivery of SWP water. In very wet years, MET typically receives about 1.7 maf of supply from the SWP (about 80 to 85% of their total contract). More typically, MET receives closer to 1.2 maf of supply from the SWP (about 60% of their maximum contract). Droughts and environmental regulatory restrictions in the Delta have greatly impacted the reliability of SWP supply. Biological opinions regarding endangered species not only limit Delta exports during dry years, but have greatly impacted exports during more normal years when water agencies such as MET are counting on such water for storage replenishment.

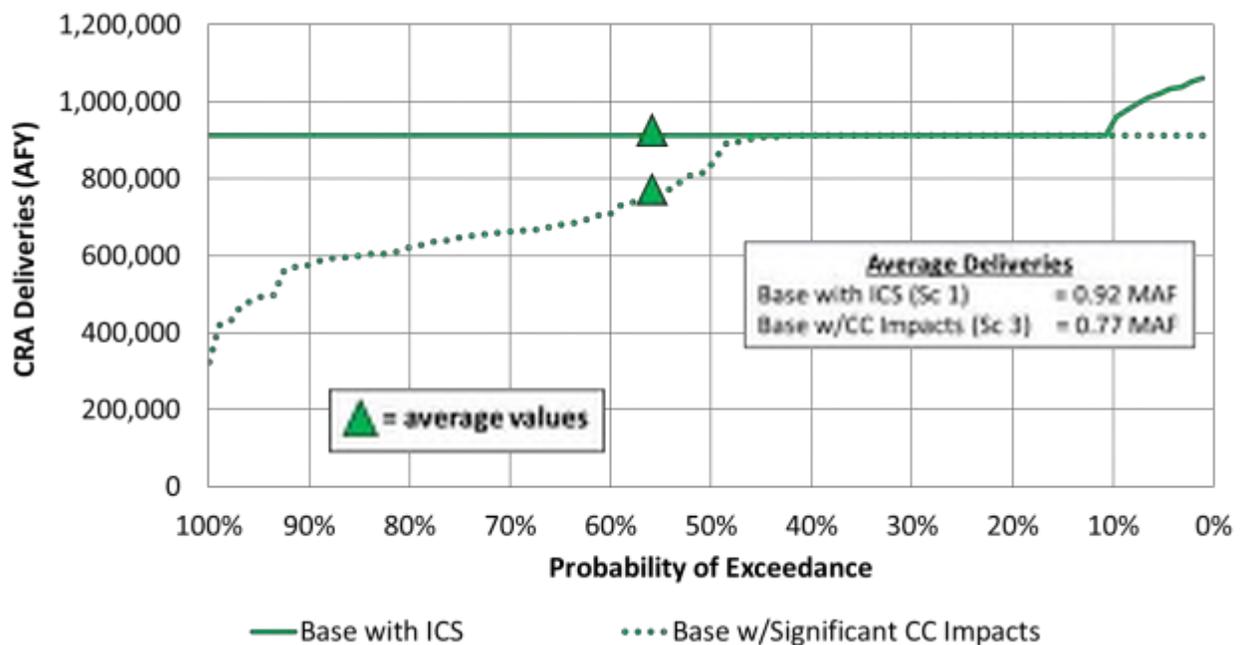


Figure 11. Colorado River Aqueduct Deliveries to MET

To stabilize the decline in SWP deliveries, California has committed to the California WaterFix (Cal Fix) and California EcoRestore. In the long-term, the preferred alternative identified in Cal Fix is expected to increase SWP deliveries (above what they otherwise would have been) by providing more flexible water diversions through improved conveyance and operations. It is important to note that the Cal Fix does not generate **NEW** water supplies per se, but allows supplies lost due to regulatory restrictions to be regained. This project would also provide much needed resiliency during seismic events in the Delta. The new conveyance and diversion facilities will allow for increased water supply reliability and a more permanent solution for flow-based environmental standards. The anticipated implementation of the Cal Fix is expected to be around 2030. Assuming a more flexible, adaptive management strategy, MET is assuming that if Cal Fix moves forward that regulatory relief from further biological opinions in the Delta would occur and SWP deliveries would return to pre-biological opinion deliveries as soon as 2020. However, some might argue this is an optimistic assumption, and there is no certainty that such relief would occur until the project is operational. Therefore for the GAP analysis, the OC Study assumed that improved SWP deliveries from Cal Fix would begin in 2030.

Climate variability can further reduce the reliability of SWP deliveries. The source of water that is pumped from the Delta originates in the Sierra Nevada Mountains as snowpack. It is widely accepted by climate and hydrology experts that climate scenario impacts on snowpack-driven water supplies is even more significant because even a fraction of a degree increase leads to early snowmelt which reduces the ability to capture river flows in surface reservoirs. Using methods described in TM#2, CDM Smith and its climate scenario expert Dr. David Yates estimated the potential impacts to the SWP under significant climate scenario. These estimates are similar to

earlier work that California DWR did on climate scenario impacts on SWP reliability. Figure 12 presents the full range of SWP deliveries to MET with and without Cal Fix and with and without significant climate scenario impacts. As shown, the Cal Fix greatly improves the reliability of SWP supplies to MET—with an average increase in supply (restoration of supplies compared to the no project alternative) of over 400,000 afy. Significant climate scenario reduces SWP deliveries by an average of 200,000 afy, even with the Cal Fix.

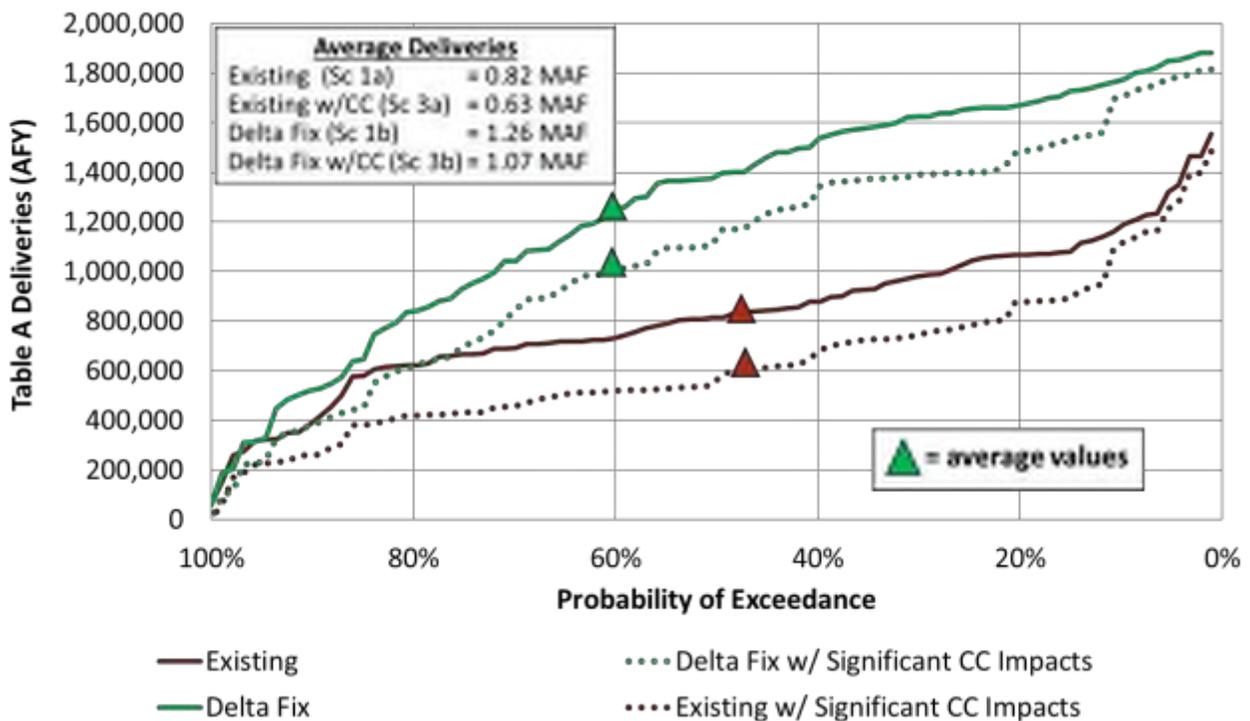


Figure 12. State Water Project Deliveries to MET

4.2.3 Overall MET Reliability

In addition to CRA and SWP water, MET has significant surface storage and groundwater storage programs. MET also has a number of water transfers in the Central Valley. These investments have been critical for the region’s supply reliability during droughts. However, since the first MET IRP in 1996 MET has had to allocate its imported water to its member agencies three in the last seven years.

Using the indexed-sequential simulation method described in TM#2, MET water reliability can be illustrated for several hydrologic sequences. Figures 13, 14 and 15 utilize just 2 of the 93 hydrology sequences to demonstrate how the analysis works. Figure 13 shows the MET demands and supplies without a Cal Fix for the forecast period 2015 to 2040 with the last 25-year hydrologic sequence of 1989 to 2014 imposed. In other words, forecast year 2015 is 1989, 2016 is 1990 ... and 2040 is 2014. Of all the 93 possible 25-year hydrologic sequences, this one is the worst in terms of cumulative supply shortages.

Figure 14 shows Met demands and supplies without a Cal Fix for a more normal hydrology sequence imposed on the forecast period (this sequence begins with 1950 and ends in 1975). Even with a normal hydrology, there are still some water shortages in the later years. Figure 15, shows this same hydrology (1950 to 1975) but with a Cal Fix. Under this scenario, regional storage replenishes greatly and shortages in the later years are eliminated.

When all 93 hydrologic sequences are simulated, and under all six scenarios representing various climate scenarios and Cal Fix assumptions, the probability of MET shortages exceeding 15 percent can be derived. A regional 15 percent shortage is similar to the allocation MET imposed in 2015. Figure 16 presents this probability of MET shortage. The results presented here for Scenario 1 with and without Cal Fix are similar to those presented in MET’s Draft IRP.

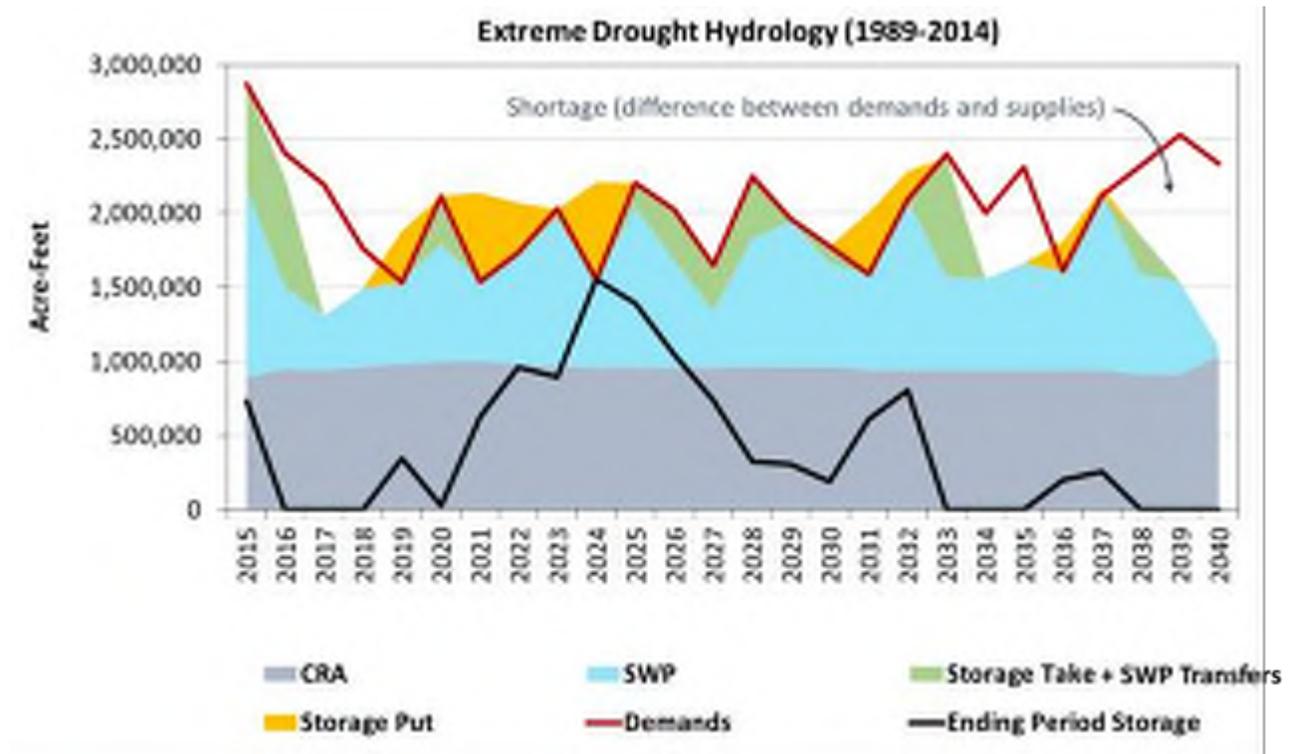


Figure 13. MET Reliability under Drought, for Scenario 1a (no Climate variability, no Cal Fix)

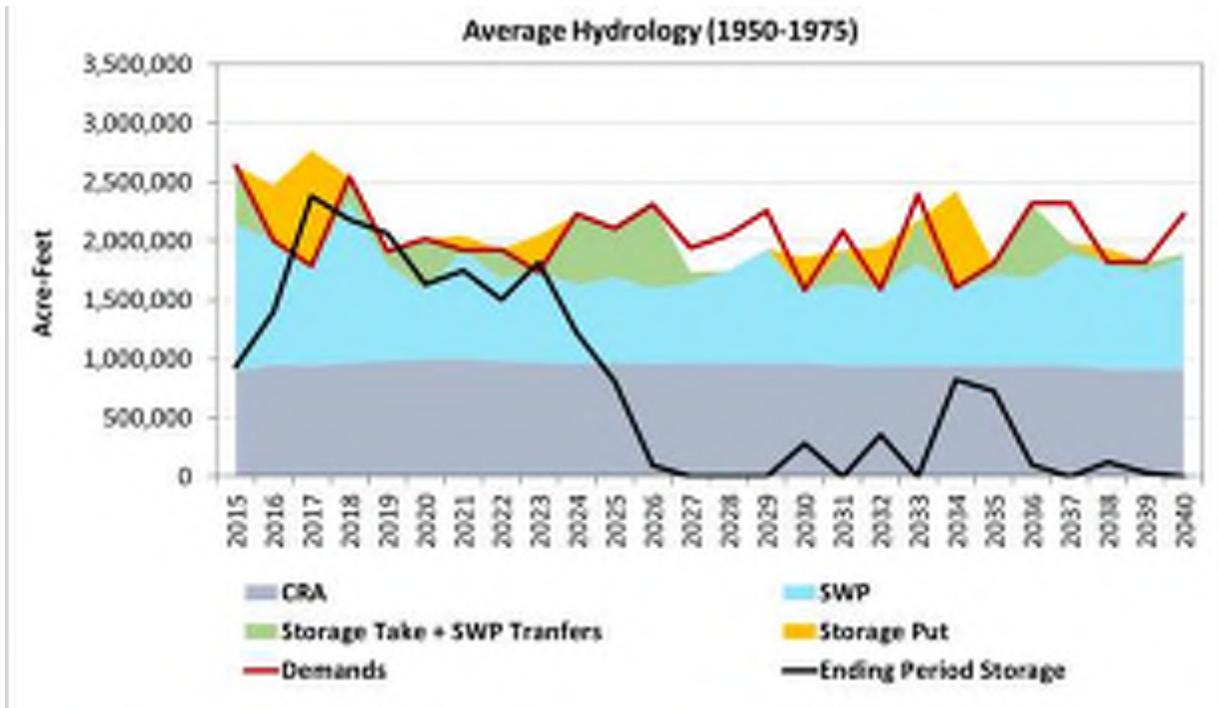


Figure 14. MET Reliability under Average Hydrology, for Scenario 1a (no Climate variability, no Cal Fix)

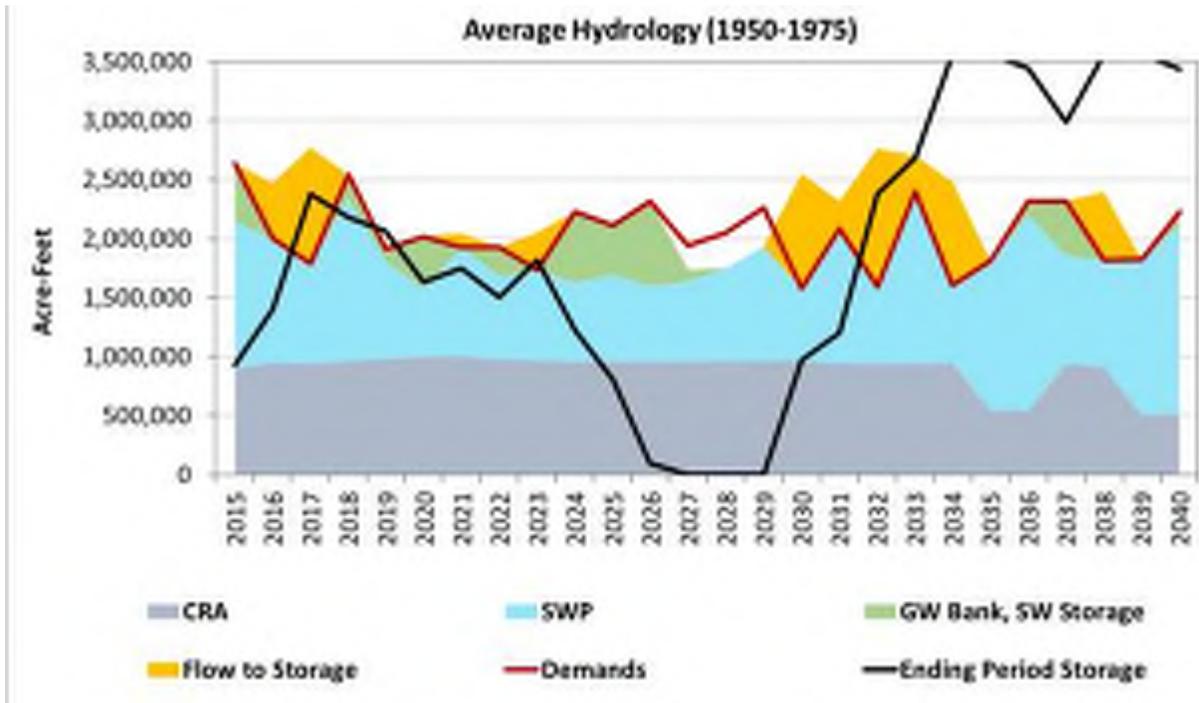


Figure 15. MET Reliability under Average Hydrology, for Scenario 1b (no Climate variability, with Cal Fix)

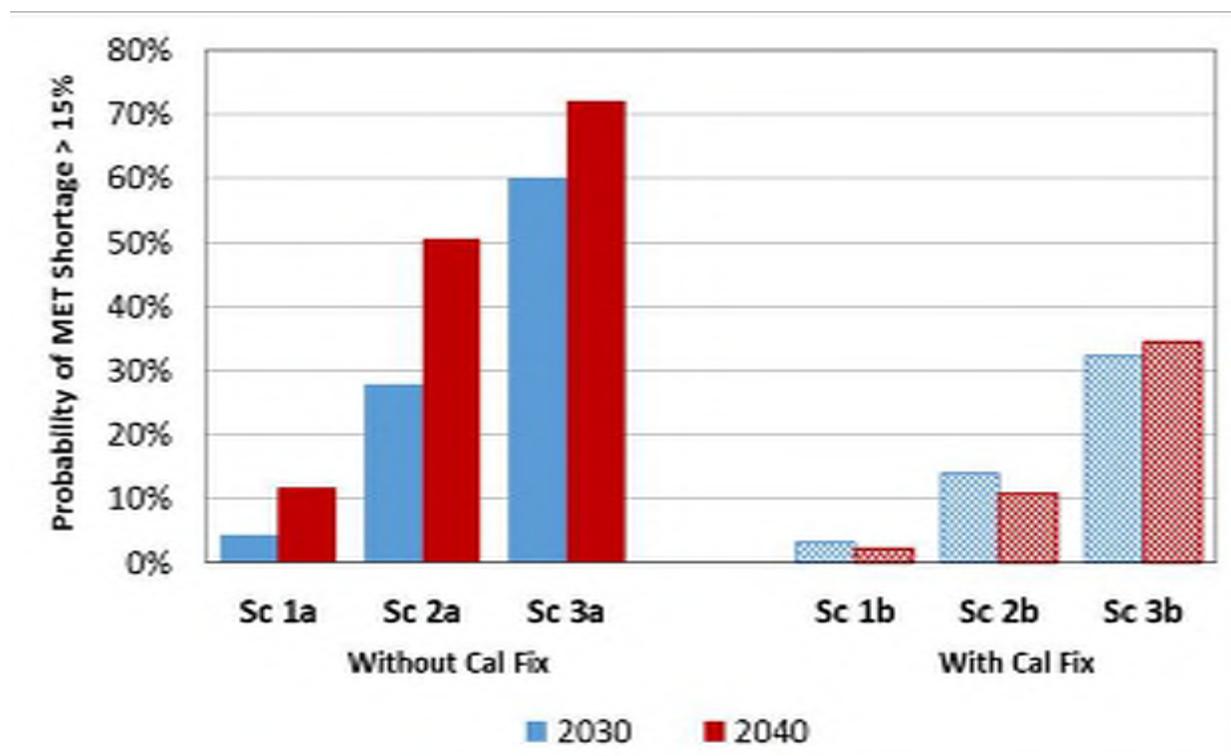


Figure 16. MET Supply Reliability (Percent of Time MET Supply Shortage Greater than 15%)

As shown in Figure 16, the impacts of climate variability (Scenarios 2 and 3) can be significant in increasing the probability and magnitude of MET shortages. In 2040, significant climate scenario (Scenario 3) can increase the probability of shortage by 60 percent without Cal Fix. The analysis also shows the enormous benefit that Cal Fix can have on MET reliability, decreasing the probability of shortage from 50 percent in 2040 to 10 percent under Scenario 2.

4.3 Orange County Water Supply Gap

When MET shortages occur, imported water is allocated to Orange County based on MET’s current drought allocation formula. For the OC Basin, the estimation of the water supply gap required that the OC Model be able to simulate the way OCWD manages the OC Basin. The OC Basin’s Basin Production Percentage (BPP) was set in the model to look forward each year and estimate all inflows to the basin, then set the BPP so that the cumulative overdraft in the basin would not exceed 500,000 af. In addition, the model does not allow the change in overdraft to exceed certain thresholds—essentially trying to keep some managed overdraft in the basin.

Note: Modeling the management of the OCWD basin is complex, especially with respect to future uncertainties. The discussion of this effort herein was an initial attempt to reflect on how the BPP could be set within the context of a modeling effort. Since this initial effort, CDM Smith and OCWD have met a number of times to refine the analysis for the Phase 2 effort. The refined analysis will be documented in the final Project Technical Memorandum.

Figure 17 presents a simulation of the OC Basin for the forecast period of 2015 to 2040, under an extreme drought hydrology of 1989 to 2014. Under Scenario 1, with no climate scenario and no Cal Fix, Figure 17 shows the pumping from the basin (blue line), the sources of inflows to the basin (shaded color areas), the cumulative basin overdraft (red line), and the BPP (dashed black line read on right-hand axis).

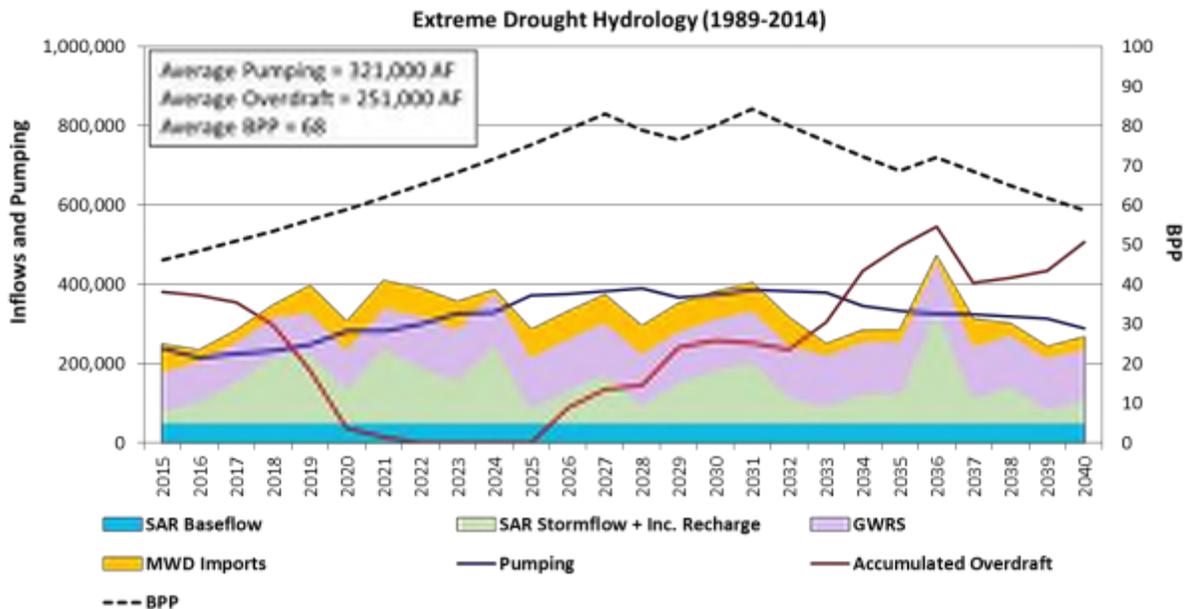


Figure 17. Simulation of OC Basin under Drought, for Scenario 1a (no Climate scenario, no Cal Fix)

When the other local Orange County water supplies from the Brea/La Habra and South County areas are added to the simulation, the OC Model estimates the overall supply reliability for the OC County total. Using all 93 hydrologic sequences, a probability chart can be created. The probability chart shows the percent time that any water shortage occurs and to what magnitude. Figure 18 shows the overall reliability for OC County total for Scenarios 1a, 2a and 3a (no Cal Fix) for the year 2040. As shown on this chart, there is a 50 percent chance that some level of shortage occurs for Scenario 1a. This probability of some shortage occurring increases to 80 percent for Scenario 2a and 98 percent for Scenario 3a. The average shortages are 32,000 afy, 74,000 afy, and 126,000 afy for Scenarios 1a, 2a, and 3a respectively.

Figure 19 compares Scenarios 1, 2, and 3 with and without the Cal Fix. As shown in Figure 19, the Cal Fix dramatically reduces the probability of shortages and thus the average shortages. The average shortages under the Cal Fix are 5,000 afy, 17,000 afy, and 64,000 afy for Scenarios 1b, 2b, and 3b respectively. The one thing to note, however, is that the maximum shortages (which occur about 1 to 3 percent of the time) are not reduced substantially with the Cal Fix. These maximum shortages may require a multipronged strategy to minimize or eliminate, such as new base-loaded supplies, storage, water transfers and mandatory restrictions on some water uses.

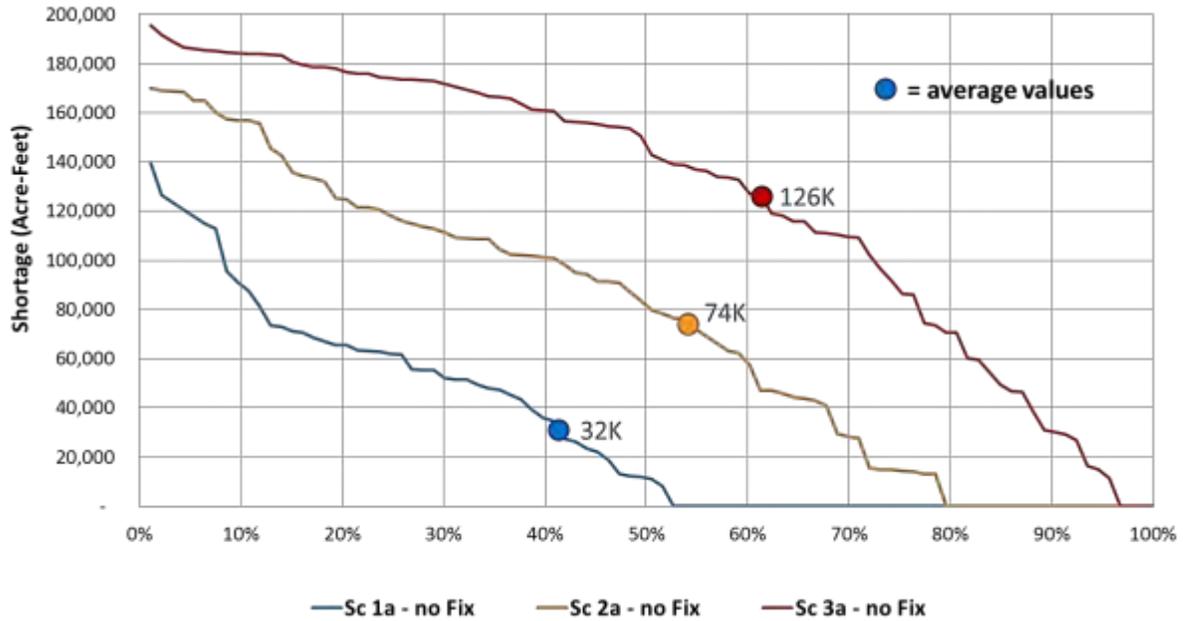


Figure 18. Probability of Water Shortages (Gap) for Orange County Total, No Cal Fix

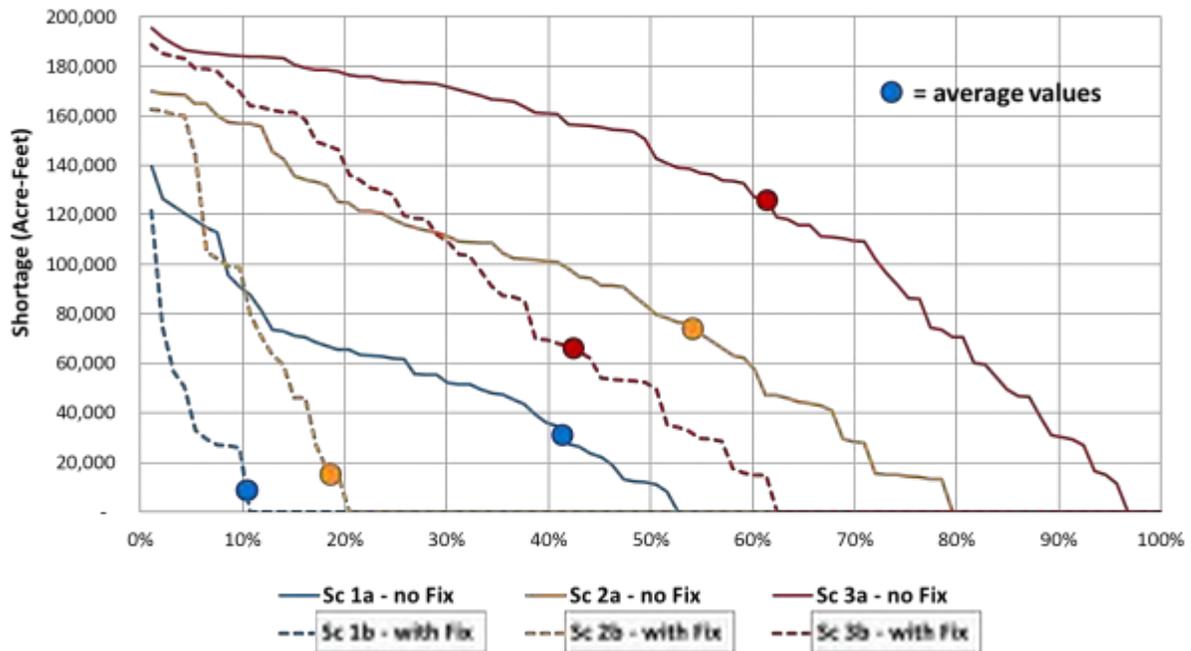


Figure 19. Probability of Water Shortages (Gap) for Orange County Total, with Cal Fix

This supply reliability analysis was done for all three areas of the Orange County, Brea/La Habra, OC Basin, and South County. The average water shortages (averaged for all 93 hydrologic sequences) are shown in Table 10 for all six scenarios.

Table 10. Summary of Average Water Supply Gap for Orange County Areas (acre-feet year)

Area	Scenario 1		Scenario 2		Scenario 3	
	a – no Fix	b – with Fix	a – no Fix	b – with Fix	a – no Fix	b – with Fix
Brea / La Habra						
2020	110 (1%)	110 (1%)	160 (1%)	160 (1%)	250 (1%)	250 (1%)
2040	820 (4%)	130 (1%)	1,800 (9%)	430 (2%)	3,100 (15%)	1,600 (8%)
OC Basin						
2020	3,800 (1%)	3,800 (1%)	5,300 (1%)	5,300 (1%)	9,300 (2%)	9,300 (2%)
2040	19,000 (5%)	2,800 (1%)	49,000 (12%)	11,000 (3%)	85,000 (20%)	42,000 (10%)
South County						
2020	2,100 (2%)	2,100 (2%)	3,000 (3%)	3,000 (3%)	4,800 (4%)	4,800 (4%)
2040	12,000 (3%)	1,900 (2%)	23,000 (58%)	5,600 (4%)	38,000 (28%)	20,000 (15%)
OC Total						
2020	6,000 (1%)	6,000 (1%)	8,500 (2%)	8,500 (2%)	14,000 (3%)	14,000 (3%)
2040	32,000 (8%)	4,800 (1%)	76,000 (19%)	17,000 (4%)	126,000 (21%)	64,000 (13%)

* Numbers in parentheses () represent % of water demand.

5.0 Conclusions

While no attempt was made during Phase 1 of the OC Study to assign the likelihood of any one of the six scenarios occurring over the others, some might postulate that Scenario 2 would be the most likely to occur given that most climate experts believe we are already seeing evidence of climate variability impacts today. This all said, a number of observations can be made from this study, which are:

1. The most sensitive model parameters are:
 - Whether or not the Cal Fix is implemented, and by when
 - The extent that climate variability impacts our supply reliability, which can take many forms:
 - Loss of the snowpack in the Sierras and Rocky’s affecting imported water
 - Higher reservoir evapotranspiration
 - Reduced groundwater recharge statewide and locally
 - Increased water demands for irrigation and cooling from higher temperatures
 - Requires increase storage to capture and utilize available supplies

2. The range in water supply gaps carry different implications, namely:
 - Under Scenario 1a (no climate variability, no Cal Fix), supply shortages are fairly manageable, with average shortages in 2040 being about 6% of demand with an occurrence of about 4 in 10 years.
 - Under Scenario 2a (moderate climate variability, no Cal Fix), supply shortages require moderate levels of new investments, with average shortages in 2040 being about 13% of demands with an occurrence of about 5 in 10 years.
 - Under Scenario 3a (significant climate variability, no Cal Fix), supply shortages require significant levels of new investments, with average shortages in 2040 being about 21% of demands with an occurrence of about 6 in 10 years.
 - Scenarios with Cal Fix significantly reduce average shortages by 85% for Scenario 1, by 77% for Scenario 2, and by 50% for Scenario 3 in 2040.
 - Modest shortages begin in 2020, 8,500 AF per year on average (about 2% of demands) with an occurrence of about 1 in 10 years
3. Decisions made by Orange County water agencies to improve water supply reliability with local water supply investments should consider the following:
 - The large influence of the Cal Fix. MET and Orange County are much more reliable with the Cal Fix; however, the following questions are posed:
 - What is the implication for triggering Orange County supply investments as long as the Cal Fix is an uncertainty?
 - How long should Orange County wait to see where the Cal Fix is headed? 3, 5 or 10 years?
 - What types of Orange County supply investment decisions would be beneficial whether or not the Cal Fix proceeds ahead?
 - MET is potentially undertaking a NEW Indirect Potable Reuse project.
 - What are the implications of this project for decision-making in Orange County?
 - Other MET investments in its recommended 2015 IRP.
 - What success rate does Orange County attribute to these planned MET water supply investments?
 - Will the success rate be influenced by the Cal Fix? (e.g., additional storage without Cal Fix may not provide much benefit if there is no replenishment water during normal hydrologic years)

Phase 2 of the OC Study seeks to address these observations in a collaborative way by providing insights as to the various cost implications of different portfolios made up from MET, the MET member agencies and Orange County water supply options and to discuss policy implications for MET and Orange County. The combined information from Phases 1 and 2 would give local decision

makers both an idea of the risk of water supply shortages under a wide range of plausible scenarios, and the range of cost implications for mitigating the shortages. The intent of the OC Study, however, is to not to make any specific recommendations as to which supply options should be implemented, but rather present common information in an objective manner for local decision making.

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APPENDIX H

AWWA Water Loss Audit Worksheet



AWWA Free Water Audit Software v5.0

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

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

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

Please begin by providing the following information

Name of Contact Person:

Email Address:

Telephone | Ext.:

Name of City / Utility:

City/Town/Municipality:

State / Province:

Country:

Year: Financial Year

Start Date: Enter MM/YYYY numeric format

End Date: Enter MM/YYYY numeric format

Audit Preparation Date:

Volume Reporting Units:

PWSID / Other ID:

The following guidance will help you complete the Audit

All audit data are entered on the [Reporting Worksheet](#)

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

Use of Option (Radio) Buttons: Pcnt: Value:

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

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

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

<p><u>Instructions</u></p> <p>The current sheet. Enter contact information and basic audit details (year, units etc)</p>	<p><u>Reporting Worksheet</u></p> <p>Enter the required data on this worksheet to calculate the water balance and data grading</p>	<p><u>Comments</u></p> <p>Enter comments to explain how values were calculated or to document data sources</p>	<p><u>Performance Indicators</u></p> <p>Review the performance indicators to evaluate the results of the audit</p>	<p><u>Water Balance</u></p> <p>The values entered in the Reporting Worksheet are used to populate the Water Balance</p>	<p><u>Dashboard</u></p> <p>A graphical summary of the water balance and Non-Revenue Water components</p>
<p><u>Grading Matrix</u></p> <p>Presents the possible grading options for each input component of the audit</p>	<p><u>Service Connection Diagram</u></p> <p>Diagrams depicting possible customer service connection line configurations</p>	<p><u>Definitions</u></p> <p>Use this sheet to understand the terms used in the audit process</p>	<p><u>Loss Control Planning</u></p> <p>Use this sheet to interpret the results of the audit validity score and performance indicators</p>	<p><u>Example Audits</u></p> <p>Reporting Worksheet and Performance Indicators examples are shown for two validated audits</p>	<p><u>Acknowledgements</u></p> <p>Acknowledgements for the AWWA Free Water Audit Software v5.0</p>

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



AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0
American Water Works Association.
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? Click to access definition
+ Click to add a comment

Water Audit Report for: Mesa Water District (CA3010004)
Reporting Year: **2014** / 7/2013 - 6/2014

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

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

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

Master Meter and Supply Error Adjustments

WATER SUPPLIED

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

Volume from own sources:	+ ?	9	16,775.000	acre-ft/yr
Water imported:	+ ?	10	2,028.500	acre-ft/yr
Water exported:	+ ?	n/a	0.000	acre-ft/yr

Pcnt:	+ ?	9	-1.25%	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Value:		acre-ft/yr
	+ ?	9	0.00%	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>			acre-ft/yr
	+ ?			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>			acre-ft/yr

WATER SUPPLIED: **19,015.842** acre-ft/yr

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

AUTHORIZED CONSUMPTION

Billed metered:	+ ?	8	17,708.800	acre-ft/yr
Billed unmetered:	+ ?	n/a	0.000	acre-ft/yr
Unbilled metered:	+ ?	8	334.930	acre-ft/yr
Unbilled unmetered:	+ ?	5	151.474	acre-ft/yr

AUTHORIZED CONSUMPTION: **18,195.204** acre-ft/yr

Click here: ?
for help using option buttons below

Pcnt:				<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Value:	151.474	acre-ft/yr
-------	--	--	--	-----------------------	----------------------------------	-----------------------	--------	---------	------------

Use buttons to select percentage of water supplied
OR
value

Pcnt:	0.25%	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Value:		acre-ft/yr
-------	-------	-----------------------	----------------------------------	-----------------------	--------	--	------------

1.25%	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	1.000	acre-ft/yr
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WATER LOSSES (Water Supplied - Authorized Consumption)

820.638 acre-ft/yr

Apparent Losses

Unauthorized consumption: + ? **47.540** acre-ft/yr

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

Customer metering inaccuracies:	+ ?	8	228.402	acre-ft/yr
Systematic data handling errors:	+ ?	5	1.000	acre-ft/yr

Apparent Losses: **276.941** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **543.697** acre-ft/yr

WATER LOSSES: **820.638** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: **1,307.042** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	9	319.0	miles
Number of active AND inactive service connections:	+ ?	10	24,168	
Service connection density:	?		76	conn./mile main

Are customer meters typically located at the curbstop or property line? (length of service line, beyond the property boundary, that is the responsibility of the utility)

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

Average operating pressure: + ? 10 73.5 psi

COST DATA

Total annual cost of operating water system:	+ ?	10	\$30,632,820	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	\$3.15	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	8	\$193.60	\$/acre-ft

Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 84 out of 100 *****

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

PRIORITY AREAS FOR ATTENTION:

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

1: Volume from own sources

2: Unauthorized consumption

3: Systematic data handling errors



AWWA Free Water Audit Software: System Attributes and Performance Indicators

WAS v5.0

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Water Audit Report for:
 Reporting Year:

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 84 out of 100 ***

System Attributes:

	Apparent Losses:	276.941	acre-ft/yr
+	Real Losses:	543.697	acre-ft/yr
=	Water Losses:	820.638	acre-ft/yr

? Unavoidable Annual Real Losses (UARL): acre-ft/yr

Annual cost of Apparent Losses:

Annual cost of Real Losses: Valued at Variable Production Cost
 Return to Reporting Worksheet to change this assumption

Performance Indicators:

Financial:

{	Non-revenue water as percent by volume of Water Supplied:	6.9%	
	Non-revenue water as percent by cost of operating system:	1.9%	Real Losses valued at Variable Production Cost

Operational Efficiency:

{	Apparent Losses per service connection per day:	10.23	gallons/connection/day
	Real Losses per service connection per day:	20.08	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.27	gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL): acre-feet/year

? Infrastructure Leakage Index (ILI) [CARL/UARL]:

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



AWWA Free Water Audit Software: User Comments

WAS v5.0

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Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment:	
Audit Item	Comment
Volume from own sources:	
Vol. from own sources: Master meter error adjustment:	
Water imported:	
Water imported: master meter error adjustment:	
Water exported:	
Water exported: master meter error adjustment:	
Billed metered:	
Billed unmetered:	
Unbilled metered:	

Audit Item	Comment
Unbilled unmetered:	
Unauthorized consumption:	
Customer metering inaccuracies:	
Systematic data handling errors:	
Length of mains:	
Number of active AND inactive service connections:	
Average length of customer service line:	
Average operating pressure:	
Total annual cost of operating water system:	
Customer retail unit cost (applied to Apparent Losses):	
Variable production cost (applied to Real Losses):	



AWWA Free Water Audit Software: Water Balance

WAS v5.0

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Water Audit Report for:	Mesa Water District (CA3010004)	
Reporting Year:	2014	7/2013 - 6/2014
Data Validity Score:	84	

	Water Exported	Billed Water Exported			
	<i>0.000</i>	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption (water exported is removed)	Revenue Water
Own Sources (Adjusted for known errors)	16,987.342	18,195.204	17,708.800	17,708.800	17,708.800
			Unbilled Authorized Consumption	Billed Unmetered Consumption	
Water Supplied	19,015.842	Water Losses	486.404	0.000	Non-Revenue Water (NRW)
			Apparent Losses	Unbilled Metered Consumption	
			276.941	334.930	
			Unauthorized Consumption	151.474	
Water Imported	2,028.500	820.638	Real Losses	47.540	1,307.042
			543.697	Customer Metering Inaccuracies	
			Leakage on Transmission and/or Distribution Mains	228.402	
			Not broken down	Systematic Data Handling Errors	
				1.000	
				Leakage and Overflows at Utility's Storage Tanks	
				Not broken down	
				Leakage on Service Connections	
				Not broken down	



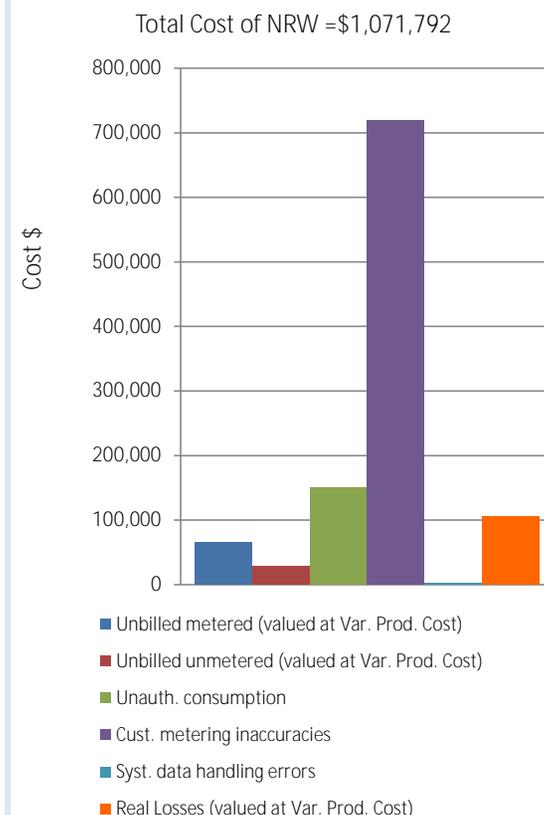
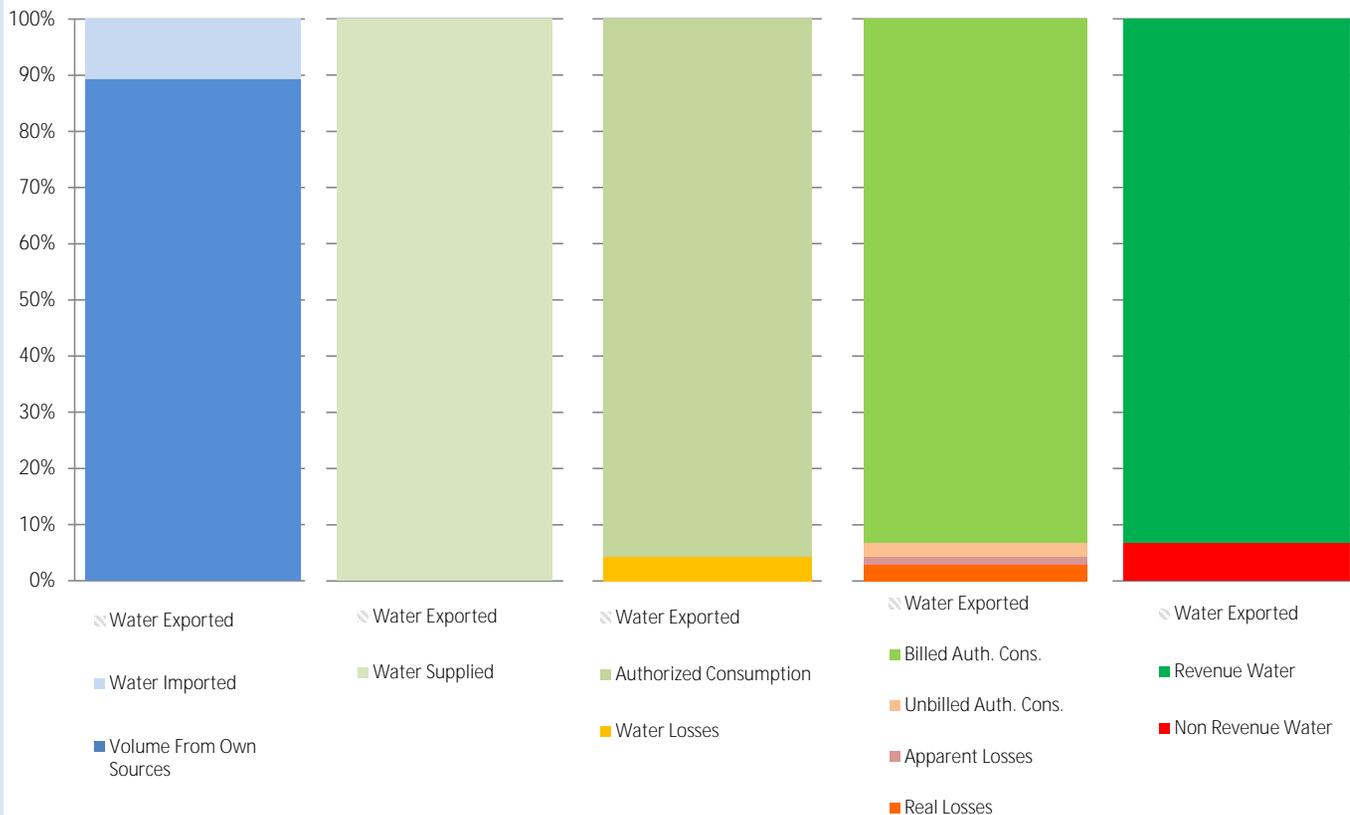
AWWA Free Water Audit Software: Dashboard

WAS v5.0
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The graphic below is a visual representation of the Water Balance with bar heights proportional to the volume of the audit components

Water Audit Report for: **Mesa Water District (CA3010004)**
Reporting Year: **2014** **7/2013 - 6/2014**
Data Validity Score: **84**

- Show me the VOLUME of Non-Revenue Water
- Show me the COST of Non-Revenue Water



APPENDIX I

Water Use Efficiency Implementation Report



Orange County

Water Use Efficiency Programs Savings and Implementation Report

Retrofits and Acre-Feet Water Savings for Program Activity

Program	Program Start Date	Retrofits Installed in	Month Indicated		Current Fiscal Year		Overall Program		
			Interventions	Water Savings	Interventions	Water Savings	Interventions	Annual Water Savings[4]	Cumulative Water Savings[4]
High Efficiency Clothes Washer Program	2001	October-15	532	1.53	2,244	16.15	105,611	3,644	20,708
Smart Timer Program - Irrigation Timers	2004	October-15	1	0.00	371	15.65	13,438	4,655	28,933
Rotating Nozzles Rebate Program	2007	October-15	3,709	14.83	18,064	135.73	478,934	2,422	9,721
SoCal WaterSmart Commercial Plumbing Fixture Rebate Program	2002	September-15	2,767	7.65	3,622	18.06	51,788	3,518	34,157
Water Smart Landscape Program [1]	1997	September-15	12,690	905.55	12,690	2,710.58	12,690	10,632	71,574
Industrial Process Water Use Reduction Program	2006	September-15	0	11.26	1	11.26	14	357	1,357
Turf Removal Program ^[3]	2010	November-15	947,615	11.05	2,868,923	68	10,386,596	1,454	2,982
High Efficiency Toilet (HET) Program	2005	October-15	2,337	8.28	8,102	114.87	54,376	2,010	11,439
Home Water Certification Program	2013	October-15	11	0.022	42	0.147	301	7.080	15.007
Synthetic Turf Rebate Program	2007						685,438	96	469
Ultra-Low-Flush-Toilet Programs ^[2]	1992						363,926	13,452	162,561
Home Water Surveys ^[2]	1995						11,867	160	1,708
Showerhead Replacements ^[2]	1991						270,604	1,667	19,083
Total Water Savings All Programs				960	2,914,059	3,090	12,435,583	44,073	364,706

⁽¹⁾ Water Smart Landscape Program participation is based on the number of water meters receiving monthly Irrigation Performance Reports.

⁽²⁾ Cumulative Water Savings Program To Date totals are from a previous Water Use Efficiency Program Effort.

⁽³⁾ Turf Removal Interventions are listed as square feet.

⁽⁴⁾ Cumulative & annual water savings represents both active program savings and passive savings that continues to be realized due to plumbing code changes over time.

HIGH EFFICIENCY CLOTHES WASHERS INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY13/14	FY14/15	FY15/16	Total	Current FY Water Savings Ac/Ft (Cumulative)	Cumulative Water Savings across all Fiscal Years	15 yr. Lifecycle Savings Ac/Ft
Brea	132	175	156	42	186	144	93	115	114	43	1,777	0.30	346.91	919
Buena Park	85	114	146	59	230	145	105	106	91	24	1,412	0.19	263.13	731
East Orange CWD RZ	18	22	17	3	23	10	10	8	8	4	185	0.03	38.21	96
El Toro WD	91	113	130	32	162	112	134	121	111	29	1,438	0.23	267.47	744
Fountain Valley	205	219	243	72	289	158	115	102	110	37	2,296	0.24	467.55	1,188
Garden Grove	238	304	332	101	481	236	190	162	165	42	3,227	0.36	641.93	1,670
Golden State WC	339	401	447	168	583	485	265	283	359	106	4,723	0.80	909.33	2,444
Huntington Beach	761	750	751	211	963	582	334	295	319	89	7,930	0.64	1,649.30	4,103
Irvine Ranch WD	1,972	2,052	1,844	1,394	2,621	2,170	1,763	1,664	1,882	676	22,448	4.63	4,161.08	11,615
La Habra	96	136	83	22	179	128	82	114	87	25	1,233	0.16	230.28	638
La Palma	33	35	51	25	76	46	34	25	34	10	429	0.07	78.92	222
Laguna Beach CWD	57	77	77	27	96	57	38	37	39	23	904	0.16	181.03	468
Mesa Water	239	249	246	73	232	176	114	86	89	27	2,352	0.21	498.68	1,217
Moulton Niguel WD	652	716	742	250	1,127	679	442	421	790	337	8,995	2.42	1,691.75	4,654
Newport Beach	245	270	259	57	197	142	116	92	95	36	2,533	0.28	540.91	1,311
Orange	366	365	403	111	349	262	218	163	160	54	3,748	0.44	781.73	1,939
Orange Park Acres	4	8	-	-	-	-	-	-	-	-	12	0.00	3.09	6
San Juan Capistrano	109	103	127	43	190	110	76	73	92	34	1,397	0.30	271.08	723
San Clemente	204	261	278	63	333	206	140	94	141	41	2,516	0.29	494.64	1,302
Santa Margarita WD	654	683	740	257	1,105	679	553	662	792	224	8,907	1.68	1,660.81	4,609
Seal Beach	47	46	57	7	81	51	31	29	38	12	582	0.10	113.15	301
Serrano WD	30	31	23	7	21	20	13	10	26	5	343	0.03	71.90	177
South Coast WD	107	130	148	43	183	112	89	79	68	25	1,522	0.18	297.39	788
Trabuco Canyon WD	69	60	62	28	82	62	30	45	47	19	755	0.14	146.53	391
Tustin	152	146	144	45	174	97	78	59	80	32	1,534	0.23	314.38	794
Westminster	213	171	233	74	329	208	121	82	109	30	2,383	0.20	480.73	1,233
Yorba Linda	288	350	367	117	394	273	181	167	156	64	3,637	0.47	750.09	1,882
MWDOC Totals	7,406	7,987	8,106	3,331	10,686	7,350	5,365	5,094	6,002	2,048	89,218	14.78	17,352.00	17,237
Anaheim	854	847	781	860	910	477	331	285	295	98	10,301	0.68	2,141.25	5,330
Fullerton	269	334	330	69	397	270	200	186	211	63	3,486	0.45	644.49	1,804
Santa Ana	236	235	257	87	355	190	163	131	132	35	2,606	0.25	570.33	1,348
Non-MWDOC Totals	1,359	1,416	1,368	1,016	1,662	937	694	602	638	196	16,393	1.37	3,356.08	3,167
Orange County Totals	8,765	9,403	9,474	4,347	12,348	8,287	6,059	5,696	6,640	2,244	105,611	16.15	20,708.07	20,404

SMART TIMERS INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY 04/05		FY 05/06		FY 06/07		FY 07/08		FY 08/09		FY 09/10		FY 10/11		FY 11/12		FY 12/13		FY 13/14		FY 14/15		FY 15/16		Total Program		Cumulative Water Savings across all Fiscal Years	
	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.		
Brea	2	0	1	3	8	6	0	40	3	9	0	0	2	0	8	0	9	8	4	0	43	6	5	0	85	72	398.22	
Buena Park	0	0	0	0	0	0	0	0	3	1	0	0	0	4	19	3	0	0	0	4	10	0	0	14	30	85.75		
East Orange CWD RZ	1	0	2	0	0	0	0	0	0	0	0	1	0	5	0	2	0	0	0	2	0	0	0	13	0	3.55		
El Toro WD	1	0	8	0	4	95	1	174	0	25	2	18	5	26	2	7	2	11	0	8	9	4	0	77	330	1,976.03		
Fountain Valley	3	3	2	2	11	0	4	0	1	0	0	6	2	2	8	2	3	2	4	0	7	10	2	0	47	27	114.99	
Garden Grove	2	2	11	1	2	0	1	3	2	1	6	0	5	4	7	0	5	2	9	0	10	14	3	3	63	30	106.46	
Golden State WC	0	0	15	2	24	12	8	8	1	2	9	22	7	4	13	3	9	49	9	25	39	12	1	0	135	139	520.07	
Huntington Beach	5	2	21	9	12	12	7	1	13	1	6	27	6	36	15	4	18	33	20	35	19	2	11	0	153	162	665.38	
Irvine Ranch WD	2	2	68	111	160	434	66	183	29	56	14	145	28	153	267	71	414	135	71	59	67	310	9	0	1,195	1,659	7,923.73	
La Habra	0	0	0	0	7	1	1	0	0	0	0	21	0	0	3	0	4	7	2	0	4	7	57	43	78	79	171.24	
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	0	1	1	7	1	1.60	
Laguna Beach CWD	3	0	5	0	21	0	5	0	2	0	2	14	4	1	109	2	76	2	71	0	86	0	0	0	384	19	157.52	
Mesa Water	5	0	13	27	14	6	12	0	6	7	13	7	7	22	21	0	10	2	15	2	17	28	5	0	138	101	486.67	
Moulton Niguel WD	2	0	25	10	39	52	59	20	21	23	17	162	36	60	179	31	51	74	40	45	46	95	2	0	517	572	2,337.11	
Newport Beach	3	17	35	4	125	86	98	40	10	27	7	58	6	0	275	12	242	26	168	75	11	9	53	25	1,033	379	1,957.82	
Orange	8	4	37	13	28	38	4	0	5	2	2	13	5	8	25	0	20	24	13	9	18	31	4	0	169	142	667.97	
San Juan Capistrano	0	0	5	4	5	4	11	1	10	0	7	49	13	1	103	2	14	18	6	11	6	19	4	2	184	111	448.73	
San Clemente	4	0	483	1	46	7	21	60	81	20	13	209	46	11	212	17	26	7	28	2	28	24	16	6	1,004	364	2,056.38	
Santa Margarita WD	3	0	15	8	40	96	53	70	25	44	10	152	61	53	262	7	53	171	64	93	53	321	8	0	647	1,015	3,563.97	
Santiago CWD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	1	1	31	1	2.10
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	0	1	36	1	12	0	0	0	3	52	104.07	
Serrano WD	0	0	0	0	0	0	0	0	0	0	11	0	4	0	3	0	1	0	0	0	4	0	1	0	0	24	0	5.95
South Coast WD	2	0	6	1	17	29	7	49	11	6	3	10	13	3	78	10	13	16	8	4	104	73	4	0	266	201	828.89	
Trabuco Canyon WD	0	0	29	0	10	93	4	0	1	0	2	0	2	10	12	0	6	0	2	0	6	1	6	0	80	104	695.27	
Tustin	1	0	1	4	0	0	2	3	7	9	10	14	10	0	11	0	8	4	9	1	18	14	8	0	85	49	211.62	
Westminster	1	0	8	12	6	0	1	0	3	0	3	0	1	1	2	0	1	1	2	0	13	17	4	0	45	31	130.93	
Yorba Linda	0	0	30	6	31	5	20	41	8	5	5	21	25	0	22	0	20	0	12	5	32	2	15	1	220	86	529.19	
MWDOC Totals	48	30	820	218	610	976	385	693	242	238	142	949	289	374	1,671	185	1,017	583	571	402	648	1,026	254	82	6,697	5,756	26,151.20	
Anaheim	6	1	8	13	17	78	12	57	9	59	5	46	12	11	23	60	19	10	9	26	7	52	6	7	133	420	1,949.05	
Fullerton	0	0	2	0	10	0	10	0	2	2	2	39	9	33	22	51	9	29	8	0	40	26	5	6	119	186	641.99	
Santa Ana	0	0	0	0	1	0	3	0	2	4	1	8	8	0	6	5	8	19	7	8	9	27	10	1	55	72	190.50	
Non-MWDOC Totals	6	1	10	13	28	78	25	57	13	65	8	93	29	44	51	116	36	58	24	34	56	105	21	14	307	678	2,781.54	
Orange County Totals	54	31	830	231	638	1,054	410	750	255	303	150	1,042	318	418	1,722	301	1,053	641	595	436	704	1,131	275	96	7,004	6,434	28,933	

ROTATING NOZZLES INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY 06/07			FY 07/08			FY 08/09			FY 10/11			FY 11/12			FY 12/13			FY 13/14			FY 14/15			FY 15/16			Total Program			Cumulative Water Savings across all Fiscal Years
	Small	Large		Small	Large		Small	Large		Small	Large		Small	Large		Small	Large		Small	Large		Small	Large		Small	Large		Small	Large		
	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	
Brea	0	0	0	0	0	0	22	0	0	32	0	0	130	0	0	65	120	0	84	0	0	157	45	0	0	842	0	498	1,107	0	13.71
Buena Park	0	0	0	0	0	0	37	75	0	29	0	0	32	0	0	65	0	0	53	0	0	248	0	0	0	0	0	464	75	2,535	450.81
East Orange	0	0	0	0	0	0	105	0	0	0	0	0	340	0	0	55	0	0	30	0	0	221	0	0	0	0	0	751	0	0	9.60
El Toro	0	0	0	0	0	0	88	290	0	174	0	0	357	76	0	23	6,281	0	56	3,288	0	1,741	28,714	0	90	4,457	0	2,674	45,980	890	635.80
Fountain Valley	0	0	0	51	0	0	83	0	0	83	0	0	108	0	0	35	0	0	0	0	0	107	0	0	18	0	0	506	0	0	7.95
Garden Grove	0	0	0	44	0	0	153	106	0	38	0	0	119	0	0	95	0	0	80	0	0	88	50	0	44	0	0	812	201	0	17.16
Golden State	0	0	0	161	0	0	83	0	0	303	943	0	294	0	0	257	2,595	0	192	0	0	583	1,741	0	65	0	0	2,218	5,308	0	102.89
Huntington Beach	0	0	0	93	845	1,202	322	19	1,174	203	625	0	458	0	0	270	0	0	120	0	0	798	1,419	0	198	1,432	0	2,501	7,760	2,681	746.72
Irvine Ranch	0	0	0	610	7,435	440	1,594	5,108	85	2,411	2,861	0	1,715	4,255	0	25,018	1,014	0	11,010	4,257	0	1,421	632	0	171	1,110	0	44,984	81,113	2,004	2,656.37
La Habra	0	535	0	9	0	0	15	0	900	0	0	0	33	90	0	0	0	0	15	0	0	109	338	0	21	0	0	202	1,236	900	217.49
La Palma	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0.24
Laguna Beach	0	0	0	115	0	0	101	47	0	156	0	0	763	0	0	3,596	0	0	2,948	878	0	2,879	1,971	0	46	0	0	10,795	2,896	0	164.61
Mesa Water	83	0	0	0	25	343	198	0	0	118	0	0	297	277	0	270	0	0	361	0	0	229	0	0	77	0	0	1,828	385	343	117.26
Moulton Niguel	0	0	0	297	120	0	426	6,883	1,986	1,578	0	0	1,225	0	0	512	1,385	0	361	227	0	1,596	4,587	0	473	233	0	6,702	13,435	2,945	906.15
Newport Beach	0	0	0	22	569	0	65	170	0	337	1,208	0	640	3,273	0	25,365	50	0	19,349	6,835	0	460	3,857	0	250	0	0	46,580	20,743	0	947.31
Orange	0	0	0	158	0	0	961	163	0	135	30	0	343	0	0	264	0	0	245	120	0	304	668	0	271	0	0	2,810	981	0	58.18
San Clemente	0	0	0	118	0	0	466	25	0	2,612	851	0	4,266	117	1,343	631	172	0	415	5,074	0	326	0	0	279	0	0	9,842	7,538	1,343	387.00
San Juan Capistrano	0	0	0	70	0	0	434	1,660	0	1,452	0	0	949	0	0	684	30	0	370	0	0	495	737	0	15	0	0	5,125	8,136	0	239.81
Santa Margarita	0	0	0	165	0	0	1,079	68	0	3,959	3,566	0	4,817	0	0	983	0	0	389	0	0	1,207	1,513	0	711	107	0	15,041	6,191	611	415.93
Seal Beach	0	0	0	0	0	0	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	5,261	0	0	0	0	155	5,552	0	50.97
Serrano	0	0	0	94	0	0	24	0	0	364	0	0	58	0	0	190	0	0	105	0	0	377	0	0	291	0	0	3,001	0	0	48.15
South Coast	0	0	0	74	133	0	115	0	0	318	1,772	0	688	359	0	435	0	0	70	0	0	4,993	13,717	0	116	179	0	6,809	16,160	0	213.13
Trabuco Canyon	0	0	0	130	0	0	0	0	0	0	0	0	379	0	0	34	0	0	0	0	0	56	0	0	77	0	0	2,033	791	0	52.43
Tustin	0	0	0	23	0	0	549	0	0	512	0	0	476	1,013	0	378	0	0	329	0	0	408	0	0	120	45	0	3,109	1,058	0	60.05
Westminster	0	0	0	0	0	0	111	0	0	0	0	0	26	0	0	15	0	0	0	0	0	54	0	0	57	0	0	343	0	0	5.47
Yorba Linda	0	0	0	563	0	0	440	113	500	529	0	0	559	0	0	730	0	0	40	990	0	921	0	0	636	0	0	4,789	4,359	500	255.63
MWDOC Totals	83	535	0	2,797	9,127	1,985	7,596	14,727	4,645	15,343	11,856	0	19,072	9,460	1,343	59,970	11,647	0	36,622	21,669	0	19,818	65,250	0	4,026	8,405	0	174,582	231,005	14,752	8,780.80
Anaheim	0	0	0	68	0	0	329	0	0	372	382	0	742	38,554	0	459	813	0	338	0	0	498	712	0	152	5,221	0	3,231	45,846	105	575.88
Fullerton	0	0	0	95	0	0	446	64	0	416	0	0	409	0	0	119	0	0	107	0	0	684	1,196	0	260	0	0	2,584	1,260	1,484	306.37
Santa Ana	0	0	0	145	0	0	96	56	0	53	0	0	22	65	0	99	0	0	86	2,533	0	310	0	0	0	0	0	859	3,226	0	57.47
Non-MWDOC Totals	0	0	0	308	0	0	871	120	0	841	382	0	1,173	38,619	0	677	813	0	531	2,533	0	1,492	1,908	0	412	5,221	0	6,674	50,332	1,589	939.71
Orange County Totals	83	535	0	3,105	9,127	1,985	8,467	14,847	4,645	16,184	12,238	0	20,245	48,079	1,343	60,647	12,460	0	37,153	24,202	0	21,310	67,158	0	4,438	13,626	0	181,256	281,337	16,341	9,720.51

SOCAL WATER\$MART COMMERCIAL PLUMBING FIXTURES REBATE PROGRAM^[1]
INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	Totals	Cumulative Water Savings across all Fiscal Years
Brea	27	113	24	4	1	234	0	10	53	593	346
Buena Park	153	432	122	379	290	5	23	56	94	1,859	908
East Orange CWD RZ	0	0	0	0	0	0	0	0	0	0	0
El Toro WD	0	92	143	1	137	0	212	6	1	760	512
Fountain Valley	17	35	0	2	314	0	0	1	0	623	517
Garden Grove	5	298	130	22	0	4	1	167	160	1,525	1,304
Golden State WC	46	414	55	68	135	0	1	0	182	1,986	1,685
Huntington Beach	48	104	126	96	156	104	144	7	451	1,981	1,368
Irvine Ranch WD	121	789	2,708	1,002	646	1,090	451	725	894	11,702	5,898
La Habra	191	75	53	4	0	0	0	0	109	652	478
La Palma	0	140	21	0	0	0	0	0	0	166	74
Laguna Beach CWD	20	137	189	0	0	0	27	0	0	446	281
Mesa Water	141	543	219	669	41	6	0	79	269	3,080	1,817
Moulton Niguel WD	9	69	151	6	0	0	0	3	0	583	722
Newport Beach	98	27	245	425	35	0	0	566	0	1,834	1,144
Orange	18	374	67	1	73	1	271	81	62	1,966	1,560
San Juan Capistrano	2	1	1	0	0	0	14	0	0	260	367
San Clemente	2	18	43	0	19	0	0	1	0	432	350
Santa Margarita WD	6	23	11	0	0	0	0	2	0	117	182
Santiago CWD	0	0	0	0	0	0	0	0	0	0	0
Seal Beach	1	2	124	0	0	0	0	0	0	354	383
Serrano WD	0	0	0	0	0	0	0	0	0	0	0
South Coast WD	9	114	56	422	84	148	0	382	0	1,320	441
Trabuco Canyon WD	0	4	0	0	0	0	0	0	0	11	14
Tustin	115	145	25	230	0	0	0	75	0	832	720
Westminster	40	161	16	63	35	1	28	0	20	835	899
Yorba Linda	10	24	8	30	0	1	0	0	135	420	498
MWDOC Totals	1,079	4,134	4,537	3,424	1,966	1,594	1,172	2,161	2,430	34,337	22,466
Anaheim	766	3,298	582	64	48	165	342	463	959	11,331	6,099
Fullerton	133	579	29	4	0	94	0	178	55	1,736	1,427
Santa Ana	493	815	728	39	12	16	17	5	178	4,384	4,166
Non-MWDOC Totals	1,392	4,692	1,339	107	60	275	359	646	1,192	17,451	11,691
Orange County Totals	2,471	8,826	5,876	3,531	2,026	1,869	1,531	2,807	3,622	51,788	34,157

[1] Retrofit devices include ULF Toilets and Urinals, High Efficiency Toilets and Urinals, Multi-Family and Multi-Family 4-Liter HETs, Zero Water Urinals, High Efficiency Clothes Washers, Cooling Tower Conductivity Controllers, Ph Cooling Tower Conductivity Controllers, Flush Valve Retrofit Kits, Pre-rinse Spray heads, Hospital X-Ray Processor Recirculating Systems, Steam Sterilizers, Food Steamers, Water Pressurized Brooms, Laminar Flow Restrictors, and Ice Making Machines.

Water Smart Landscape Program
Total Number of Meters
in Program by Agency

Agency	FY 04-05	FY 05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	Overall Water Savings To Date (AF)
Brea	0	0	0	0	0	0	0	22	22	22	22	22	62.80
Buena Park	0	0	0	0	0	17	103	101	101	101	101	101	455.49
East Orange CWD RZ	0	0	0	0	0	0	0	0	0	0	0	0	0.00
El Toro WD	88	109	227	352	384	371	820	810	812	812	812	812	4,798.99
Fountain Valley	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Garden Grove	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Golden State WC	0	0	0	14	34	32	34	32	32	32	32	32	198.31
Huntington Beach	0	0	0	0	0	31	33	31	31	31	31	31	146.22
Irvine Ranch WD	277	638	646	708	1,008	6,297	6,347	6,368	6,795	6,797	6,769	6,780	37,821.08
Laguna Beach CWD	0	0	0	0	57	141	143	141	124	124	124	124	724.23
La Habra	0	0	0	0	23	22	24	22	22	22	22	22	135.15
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Mesa Water	191	170	138	165	286	285	288	450	504	511	514	515	2,906.82
Moulton Niguel WD	80	57	113	180	473	571	595	643	640	675	673	695	4,073.55
Newport Beach	32	27	23	58	142	171	191	226	262	300	300	300	1,479.78
Orange	0	0	0	0	0	0	0	0	0	0	0	0	0.00
San Clemente	191	165	204	227	233	247	271	269	269	299	407	438	2,336.02
San Juan Capistrano	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Santa Margarita WD	547	619	618	945	1,571	1,666	1,746	1,962	1,956	2,274	2,386	2,386	14,007.83
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Serrano WD	0	0	0	0	0	0	0	0	0	0	0	0	0.00
South Coast WD	0	0	0	62	117	108	110	118	118	118	164	164	818.21
Trabuco Canyon WD	0	0	0	12	49	48	62	60	60	60	60	60	346.24
Tustin	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Westminster	0	0	0	10	18	18	20	18	18	18	18	18	115.17
Yorba Linda WD	0	0	0	0	0	0	0	0	0	0	0	0	0.00
MWDOC Totals	1,406	1,785	1,969	2,733	4,395	10,025	10,787	11,273	11,766	12,196	12,435	12,500	70,425.9
Anaheim	0	0	0	0	0	142	146	144	190	190	190	190	1,147.97
Fullerton	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Santa Ana	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Non-MWDOC Totals	0	0	0	0	0	142	146	144	190	190	190	190	1,147.97
Orange Co. Totals	1,406	1,785	1,969	2,733	4,395	10,167	10,933	11,417	11,956	12,386	12,625	12,690	71,573.83

INDUSTRIAL PROCESS WATER USE REDUCTION PROGRAM

Number of Process Changes by Agency

Agency	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	Overall Program Interventions	Annual Water Savings[1]	Cumulative Water Savings across all Fiscal Years[1]
Brea	0	0	0	0	0	0	0	0	0	0	0	0
Buena Park	0	1	0	0	0	0	0	0	0	1	54	365
East Orange	0	0	0	0	0	0	0	0	0	0	0	0
El Toro	0	0	0	0	0	0	0	0	0	0	0	0
Fountain Valley	0	0	0	0	0	0	0	0	0	0	0	0
Garden Grove	0	0	0	0	0	0	0	0	0	0	0	0
Golden State	1	0	0	0	0	0	0	0	0	1	3	22
Huntington Beach	0	0	0	0	0	2	0	1	0	3	127	234
Irvine Ranch	0	0	2	1	1	1	1	0	0	6	98	366
La Habra	0	0	0	0	0	0	0	0	0	0	0	0
La Palma	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	0	0	0	0	0	0	0	0	0	0	0	0
Mesa Water	0	0	0	0	0	0	0	0	0	0	0	0
Moulton Niguel	0	0	0	0	0	0	0	0	0	0	0	0
Newport Beach	0	0	0	0	0	0	0	1	0	1	21	18
Orange	1	0	0	0	0	0	0	0	0	1	43	330
San Juan Capistrano	0	0	0	0	0	0	0	0	0	0	0	0
San Clemente	0	0	0	0	0	0	0	0	0	0	0	0
Santa Margarita	0	0	0	0	0	0	0	0	0	0	0	0
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	0
Serrano	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	0	0	0	0	0	0	0	0	0	0	0	0
Trabuco Canyon	0	0	0	0	0	0	0	0	0	0	0	0
Tustin	0	0	0	0	0	0	0	0	0	0	0	0
Westminster	0	0	0	0	0	0	0	0	0	0	0	0
Yorba Linda	0	0	0	0	0	0	0	0	0	0	0	0
MWDOC Totals	2	1	2	1	1	3	1	2	0	13	346	1335
Anaheim	0	0	0	0	0	0	0	0	0	0	0	0
Fullerton	0	0	0	0	0	0	0	0	0	0	0	0
Santa Ana	0	0	0	0	0	0	0	0	1	1	11	23
OC Totals	2	1	2	1	1	3	1	2	1	14	357	1357

[1] Acre feet of savings determined during a one year monitoring period.

If monitoring data is not available, the savings estimated in agreement is used.

HIGH EFFICIENCY TOILETS (HETs) INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	Total	Cumulative Water Savings across all Fiscal Years
Brea	0	2	7	43	48	8	0	0	38	146	115	407	56.69
Buena Park	0	1	2	124	176	7	0	0	96	153	75	634	126.10
East Orange CWD RZ	0	0	10	12	1	0	0	0	13	26	16	78	12.77
El Toro WD	0	392	18	75	38	18	0	133	218	869	159	1,920	346.39
Fountain Valley	0	69	21	262	54	17	0	0	41	132	144	740	169.64
Garden Grove	0	14	39	443	181	24	0	0	63	350	276	1,390	281.36
Golden State WC	2	16	36	444	716	37	80	2	142	794	385	2,654	514.92
Huntington Beach	2	13	59	607	159	76	0	0	163	1,190	455	2,724	443.98
Irvine Ranch WD	29	1,055	826	5,088	2,114	325	0	1,449	810	1,777	1,398	14,871	3,784.91
Laguna Beach CWD	0	2	17	91	28	11	0	0	45	112	42	348	66.56
La Habra	0	3	18	296	34	20	0	0	37	94	52	554	139.13
La Palma	0	1	10	36	26	13	0	0	21	59	34	200	36.73
Mesa Water	0	247	19	736	131	7	0	0	147	162	116	1,565	441.29
Moulton Niguel WD	0	20	104	447	188	46	0	0	400	2,497	1,455	5,157	593.83
Newport Beach	0	5	19	163	54	13	0	0	49	168	141	612	110.87
Orange	1	20	62	423	79	40	0	1	142	978	329	2,075	326.05
San Juan Capistrano	0	10	7	76	39	11	0	0	35	140	143	461	69.71
San Clemente	0	7	22	202	66	21	0	0	72	225	178	793	141.13
Santa Margarita WD	0	5	14	304	151	44	0	0	528	997	721	2,764	350.18
Seal Beach	0	678	8	21	12	1	0	2	17	50	45	834	311.28
Serrano WD	2	0	1	13	5	0	0	0	2	40	37	100	12.47
South Coast WD	2	2	29	102	41	12	23	64	102	398	175	950	133.04
Trabuco Canyon WD	0	0	4	23	23	0	0	0	10	108	107	275	31.24
Tustin	0	186	28	387	479	17	0	0	64	132	137	1,430	393.93
Westminster	0	17	25	541	167	23	0	0	35	161	287	1,256	287.02
Yorba Linda WD	0	14	89	323	96	18	0	0	40	280	278	1,138	223.99
MWDOC Totals	38	2,779	1,494	11,282	5,106	809	103	1,651	3,330	12,038	7,300	45,930	9,405.17
 	 	 	 	 	 	 	 	 	 	 	 	 	
Anaheim	0	255	78	2,771	619	114	0	0	156	1,188	400	5,581	1,433.43
Fullerton	0	4	28	286	60	23	0	0	61	293	193	948	174.49
Santa Ana	0	11	25	925	89	23	0	0	33	602	209	1,917	425.93
Non-MWDOC Totals	0	270	131	3,982	768	160	0	0	250	2,083	802	8,446	2,033.86
 	 	 	 	 	 	 	 	 	 	 	 	 	
Orange County Totals	38	3,049	1,625	15,264	5,874	969	103	1,651	3,580	14,121	8,102	54,376	11,439.03

TURF REMOVAL BY AGENCY^[1]
through MWDOC and Local Agency Conservation Programs

Agency	FY 10/11		FY 11/12		FY 12/13		FY 13/14		FY 14/15		FY 15/16		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	
Brea	0	0	3,397	9,466	7,605	0	5,697	0	71,981	30,617	12,421	0	101,101	40,083	46.12
Buena Park	0	0	0	0	0	0	0	0	11,670	1,626	5,827	0	17,497	1,626	4.54
East Orange	0	0	0	0	0	0	1,964	0	18,312	0	6,921	0	27,197	0	6.92
El Toro	0	0	4,723	0	4,680	72,718	4,582	0	27,046	221,612	15,277	86,846	56,308	381,176	132.49
Fountain Valley	0	0	1,300	0	682	7,524	4,252	0	45,583	5,279	5,869	0	57,686	12,803	22.35
Garden Grove	0	46,177	14,013	0	4,534	0	8,274	0	67,701	22,000	13,443	0	107,965	68,177	81.61
Golden State	0	0	42,593	30,973	31,813	3,200	32,725	8,424	164,507	190,738	29,919	0	301,557	233,335	192.04
Huntington Beach	801	3,651	27,630	48,838	9,219	12,437	20,642	0	165,600	58,942	54,016	7,426	277,908	131,294	149.53
Irvine Ranch	5,423	12,794	6,450	1,666	32,884	32,384	36,584	76,400	234,905	317,999	70,450	1,174,609	386,696	1,615,852	434.10
La Habra	0	7,775	0	8,262	0	0	0	0	14,014	1,818	6,127	2,936	20,141	20,791	18.02
La Palma	0	0	0	0	0	0	0	0	4,884	0	500	57,400	5,384	57,400	9.47
Laguna Beach	978	0	2,533	0	2,664	1,712	4,586	226	13,647	46,850	2,693	0	27,101	48,788	24.38
Mesa Water	0	0	6,777	0	10,667	0	22,246	0	131,675	33,620	18,947	0	190,312	33,620	68.99
Moulton Niguel	956	16,139	4,483	26,927	11,538	84,123	14,739	40,741	314,250	1,612,845	80,041	127,043	426,007	1,907,818	681.78
Newport Beach	0	0	3,454	0	3,548	2,346	894	0	33,995	65,277	1,064	55,287	42,955	122,910	41.78
Orange	0	0	12,971	0	15,951	8,723	11,244	0	120,093	281,402	19,781	0	180,040	290,125	142.80
San Clemente	0	0	21,502	0	16,062	13,165	18,471	13,908	90,349	1,137	18,718	392,742	165,102	420,952	128.24
San Juan Capistrano	0	0	22,656	103,692	29,544	27,156	12,106	0	101,195	32,366	13,778	19,598	179,279	182,812	167.35
Santa Margarita	4,483	5,561	1,964	11,400	10,151	11,600	17,778	48,180	211,198	514,198	104,454	178,666	350,028	769,605	300.42
Seal Beach	0	0	0	0	3,611	0	0	0	15,178	504	2,159	0	20,948	504	6.72
Serrano	0	0	0	0	0	0	2,971	0	41,247	0	32,545	0	76,763	0	17.35
South Coast	0	16,324	6,806	0	9,429	4,395	15,162	116,719	84,282	191,853	46,342	0	162,021	329,291	165.41
Trabuco Canyon	0	0	272	0	1,542	22,440	2,651	0	14,771	0	5,436	66,964	24,672	89,404	29.00
Tustin	0	0	0	0	9,980	0	1,410	0	71,285	14,137	13,567	1,700	96,242	15,837	32.24
Westminster	0	0	0	0	0	0	0	0	14,040	34,631	11,354	0	25,394	34,631	15.22
Yorba Linda	11,349	0	0	0	0	0	0	0	112,136	12,702	51,470	54,587	174,955	67,289	59.33
MWDOC Totals	23,990	108,421	183,524	241,224	216,104	303,923	238,978	304,598	2,195,544	3,692,153	643,119	2,225,804	3,501,259	6,876,123	2,978.20

Anaheim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Fullerton	0	0	0	0	0	0	0	9,214	0	0	0	0	0	9,214	3.87
Santa Ana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Non-MWDOC Totals	0	9,214	0	0	0	0	0	9,214	3.87						

Orange County Totals	23,990	108,421	183,524	241,224	216,104	303,923	238,978	313,812	2,195,544	3,692,153	643,119	2,225,804	3,501,259	6,885,337	2,982
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[1] Installed device numbers are listed as square feet

HOME WATER SURVEYS PERFORMED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 13/14		FY 14/15		FY 15/16		Total		Cumulative Water Savings
	Surveys	Cert Homes	Surveys	Cert Homes	Surveys	Cert Homes	Surveys	Cert Homes	
Brea	1	0	2	0	0	0	3	0	0.16
Buena Park	0	0	1	0	0	0	1	0	0.05
East Orange	19	0	1	0	0	0	20	0	1.39
El Toro	0	0	3	0	0	0	3	0	0.14
Fountain Valley	3	0	4	0	0	0	7	0	0.40
Garden Grove	0	0	6	0	1	0	7	0	0.31
Golden State	0	0	0	0	0	0	0	0	0.00
Huntington Beach	2	0	5	0	2	0	9	0	0.42
Irvine Ranch	1	0	3	0	5	0	9	0	0.33
La Habra	0	0	1	0	0	0	1	0	0.05
La Palma	0	0	0	0	0	0	0	0	0.00
Laguna Beach	4	0	8	0	1	0	13	0	0.68
Mesa Water	0	0	0	0	0	0	0	0	0.00
Moulton Niguel	4	0	4	0	0	0	8	0	0.47
Newport Beach	2	0	8	0	3	0	13	0	0.59
Orange	2	0	18	0	1	0	21	0	1.01
San Clemente	15	0	13	0	0	0	28	0	1.67
San Juan Capistrano	4	0	13	0	2	0	19	0	0.94
Santa Margarita	15	0	40	1	12	0	67	1	3.22
Seal Beach	0	0	1	0	1	0	2	0	0.07
Serrano	0	0	2	0	0	0	2	0	0.09
South Coast	6	0	4	0	1	0	11	0	0.64
Trabuco Canyon	0	0	4	0	0	0	4	0	0.19
Tustin	0	0	10	0	4	0	14	0	0.56
Westminster	0	0	0	0	0	0	0	0	0.00
Yorba Linda	0	0	13	0	8	0	21	0	0.80
MWDOC Totals	78	0	164	1	41	0	283	1	14.18

Anaheim	0	0	0	0	0	0	0	0	0.00
Fullerton	0	0	17	0	1	0	18	0	0.82
Santa Ana	0	0	0	0	0	0	0	0	0.00
Non-MWDOC Totals	0	0	17	0	1	0	18	0	0.82

Orange County Totals	78	0	181	1	42	0	301	1	15.007
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SYNTHETIC TURF INSTALLED BY AGENCY^[1]
through MWDOC and Local Agency Conservation Programs

Agency	FY 07/08		FY 08/09		FY 09/10		FY 10/11		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	
Brea	0	0	2,153	2,160	500	0	0	0	2,653	2,160	3.30
Buena Park	0	0	1,566	5,850	0	0	0	0	1,566	5,850	5.19
East Orange	0	0	0	0	983	0	0	0	983	0	0.55
El Toro	3,183	0	2,974	0	3,308	0	895	0	10,360	0	6.98
Fountain Valley	11,674	0	1,163	0	2,767	0	684	0	16,288	0	12.46
Garden Grove	1,860	0	0	0	3,197	0	274	0	5,331	0	3.47
Golden State	6,786	0	13,990	0	15,215	0	2,056	0	38,047	0	24.88
Huntington Beach	15,192	591	12,512	0	4,343	1,504	0	0	32,047	2,095	25.29
Irvine Ranch	11,009	876	13,669	0	2,585	0	0	0	27,263	876	21.00
La Habra	0	0	0	0	0	0	0	0	0	0	-
La Palma	429	0	0	0	0	0	0	0	429	0	0.36
Laguna Beach	3,950	0	3,026	0	725	0	0	0	7,701	0	5.84
Mesa Water	4,114	0	3,005	78,118	4,106	0	2,198	0	13,423	78,118	63.46
Moulton Niguel	14,151	0	25,635	2,420	7,432	0	0	0	47,218	2,420	35.69
Newport Beach	2,530	0	6,628	0	270	0	0	0	9,428	0	6.92
Orange	4,169	0	7,191	0	635	0	0	0	11,995	0	8.89
San Clemente	9,328	0	11,250	455	2,514	1,285	500	0	23,592	1,740	18.37
San Juan Capistrano	0	0	7,297	639	2,730	0	4,607	0	14,634	639	9.02
Santa Margarita	12,922	0	26,069	0	21,875	0	7,926	0	68,792	0	44.68
Seal Beach	0	0	817	0	0	0	0	0	817	0	0.57
Serrano	7,347	0	1,145	0	0	0	0	0	8,492	0	6.97
South Coast	2,311	0	6,316	0	17,200	0	1,044	0	26,871	0	16.43
Trabuco Canyon	1,202	0	9,827	0	0	0	0	0	11,029	0	7.89
Tustin	6,123	0	4,717	0	2,190	0	0	0	13,030	0	9.67
Westminster	2,748	16,566	8,215	0	890	0	0	0	11,853	16,566	22.47
Yorba Linda	11,792	0	12,683	0	4,341	5,835	0	0	28,816	5,835	24.48
MWDOC Totals	132,820	18,033	181,848	89,642	97,806	8,624	20,184	0	432,658	116,299	384.83

Anaheim	4,535	0	7,735	20,093	13,555	65,300	4,122	0	29,947	85,393	69.18
Fullerton	4,865	876	5,727	0	6,223	0	105	0	16,920	876	12.36
Santa Ana	0	0	2,820	0	525	0	0	0	3,345	0	2.27
Non-MWDOC Totals	9,400	876	16,282	20,093	20,303	65,300	4,227	0	50,212	86,269	83.81

Orange County Totals	142,220	18,909	198,130	109,735	118,109	73,924	24,411	0	482,870	202,568	468.63
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[1] Installed device numbers are calculated in square feet

ULF TOILETS INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	Previous Years	FY 95-96	FY 96-97	FY 97-98	FY 98-99	FY 99-00	FY 00-01	FY 01-02	FY 02-03	FY 03-04	FY 04-05	FY 05-06	FY 06-07	FY 07-08	FY 08-09	Total	Cumulative Water Savings across all Fiscal Years
Brea	378	189	299	299	122	144	867	585	341	401	26	48	17	4	0	3,720	1,692.64
Buena Park	361	147	331	802	520	469	524	1,229	2,325	1,522	50	40	18	9	0	8,347	3,498.37
East Orange CWD RZ	2	0	33	63	15	17	15	50	41	44	19	18	13	2	0	332	138.23
El Toro WD	1,169	511	678	889	711	171	310	564	472	324	176	205	61	40	0	6,281	3,091.16
Fountain Valley	638	454	635	858	1,289	2,355	1,697	1,406	1,400	802	176	111	58	32	0	11,911	5,383.10
Garden Grove	1,563	1,871	1,956	2,620	2,801	3,556	2,423	3,855	3,148	2,117	176	106	67	39	0	26,298	12,155.41
Golden State WC	3,535	1,396	3,141	1,113	3,024	2,957	1,379	2,143	3,222	1,870	167	116	501	43	0	24,607	11,731.47
Huntington Beach	3,963	1,779	2,600	2,522	2,319	3,492	3,281	2,698	3,752	1,901	367	308	143	121	0	29,246	13,854.70
Irvine Ranch WD	4,016	841	1,674	1,726	1,089	3,256	1,534	1,902	2,263	6,741	593	626	310	129	0	26,700	11,849.23
Laguna Beach CWD	283	93	118	74	149	306	220	85	271	118	32	26	29	6	0	1,810	845.69
La Habra	594	146	254	775	703	105	582	645	1,697	1,225	12	31	6	7	0	6,782	2,957.73
La Palma	65	180	222	125	44	132	518	173	343	193	31	27	20	17	0	2,090	927.52
Mesa Water	1,610	851	1,052	2,046	2,114	1,956	1,393	1,505	2,387	988	192	124	56	14	0	16,288	7,654.27
Moulton Niguel WD	744	309	761	698	523	475	716	891	728	684	410	381	187	100	0	7,607	3,371.14
Newport Beach	369	293	390	571	912	1,223	438	463	396	1,883	153	76	36	16	0	7,219	3,166.77
Orange	683	1,252	1,155	1,355	533	2,263	1,778	2,444	2,682	1,899	193	218	88	53	4	16,600	7,347.93
San Juan Capistrano	1,234	284	193	168	323	1,319	347	152	201	151	85	125	42	39	0	4,663	2,324.42
San Clemente	225	113	191	65	158	198	667	483	201	547	91	66	37	34	0	3,076	1,314.64
Santa Margarita WD	577	324	553	843	345	456	1,258	790	664	260	179	143	101	29	0	6,522	3,001.01
Seal Beach	74	66	312	609	47	155	132	81	134	729	29	10	6	12	0	2,396	1,073.80
Serrano WD	81	56	68	41	19	52	95	73	123	98	20	15	14	2	0	757	338.66
South Coast WD	110	176	177	114	182	181	133	358	191	469	88	72	32	22	0	2,305	990.05
Trabuco Canyon WD	10	78	42	42	25	21	40	181	102	30	17	20	12	14	0	634	273.02
Tustin	968	668	557	824	429	1,292	1,508	1,206	1,096	827	69	89	26	12	0	9,571	4,423.88
Westminster	747	493	969	1,066	2,336	2,291	2,304	1,523	2,492	1,118	145	105	70	24	0	15,683	7,064.28
Yorba Linda WD	257	309	417	457	404	1,400	759	1,690	1,155	627	158	136	81	41	0	7,891	3,409.49
MWDOC Totals	24,256	12,879	18,778	20,765	21,136	30,242	24,918	27,175	31,827	27,568	3,654	3,242	2,031	861	4	249,336	113,878.61

Anaheim	447	1,054	1,788	3,661	1,755	7,551	4,593	6,346	9,707	5,075	473	371	462	341	1	43,625	18,359.52
Fullerton	1,453	1,143	694	1,193	1,364	2,138	1,926	2,130	2,213	1,749	172	77	44	23	2	16,321	7,435.23
Santa Ana	1,111	1,964	1,205	2,729	2,088	8,788	5,614	10,822	10,716	9,164	279	134	25	5	0	54,644	22,887.95
Non-MWDOC Totals	3,011	4,161	3,687	7,583	5,207	18,477	12,133	19,298	22,636	15,988	924	582	531	369	3	114,590	48,682.70

Orange County Totals	27,267	17,040	22,465	28,348	26,343	48,719	37,051	46,473	54,463	43,556	4,578	3,824	2,562	1,230	7	363,926	162,561.30
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APPENDIX J

CUWCC BMP Report





CUWCC BMP Retail Coverage Report 2014

Foundational Best Management Practices for Urban Water Efficiency

BMP 1.1 Operation Practices 160

ON TRACK

Mesa Water District

1. Conservation Coordinator provided with necessary resources to implement BMPs?

Name:

Title:

Email:

2. Water Waste Prevention Documents

WW Document Name	WWP File Name	WW Prevention URL	WW Prevention Ordinance Terms Description
Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP.	ORDINANCE NO. 21 Water Conservation.pdf		Water Conservation Ordinance, prohibiting the waste of water.
Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area.			
Option C Describe any documentation of support for legislation or regulations that prohibit water waste.			
Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP.			
Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP.			
Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development.			

At Least As effective As

Exemption

Comments:



CUWCC BMP Retail Coverage Report 2014
Foundational Best Management Practices for Urban Water Efficiency

BMP 1.1 Operation Practices

ON TRACK



CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.2 Water Loss Control

ON TRACK

160 Mesa Water District

Completed Standard Water Audit Using AWWA Software? Yes

AWWA File provided to CUWCC? Yes

Mesa_AWWA-2014.xls

AWWA Water Audit Validity Score? 84

Complete Training in AWWA Audit Method Yes

Complete Training in Component Analysis Process? Yes

Component Analysis? Yes

Repaired all leaks and breaks to the extent cost effective? Yes

Locate and Repair unreported leaks to the extent cost effective? Yes

Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair. Yes

Provided 7 Types of Water Loss Control Info

Leaks Repairs	Value Real Losses	Value Apparent Losses	Miles Surveyed	Press Reduction	Cost Of Interventions	Water Saved (AF)
319	105260	380002	0	False	172161	

At Least As effective As

No

Exemption

No

Comments:



CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.3 Metering With Commodity

ON TRACK

160 Mesa Water District

Numbered Unmetered Accounts	No
Metered Accounts billed by volume of use	Yes
Number of CII Accounts with Mixed Use Meters	1207
Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	Yes
Feasibility Study provided to CUWCC?	Yes
Date:	2/24/2014
Uploaded file name:	BMP 1.3 Feasibility Analysis.pdf
Completed a written plan, policy or program to test, repair and replace meters	Yes
At Least As effective As	<input type="text" value="No"/>
Exemption	<input type="text" value="No"/>
Comments:	



CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.4 Retail Conservation Pricing

On Track

160 Mesa Water District

Implementation (Water Rate Structure)

Customer Class	Water Rate Type	Conserving Rate?	(V) Total Revenue Comodity Charges	(M) Total Revenue Fixed Carges
Single-Family	Uniform	Yes	7684957.31	1766128.76
Multi-Family	Uniform	Yes	7203573.16	1549385.36
Commercial	Uniform	Yes	4500119.2	947833.67
Industrial	Uniform	Yes	449348.55	115657.2
Institutional	Uniform	Yes	1686861.01	266605.37
Dedicated Irrigation	Uniform	Yes	2646814.38	485630.5
Other	Uniform	Yes	30377.1	361842.31
			24202050.71	5493083.17

Calculate: V / (V + M) 82 %

Implementation Option: Use Annual Revenue As Reported

Use 3 years average instead of most recent year

Canadian Water and Wastewater Association

Upload file:

Agency Provide Sewer Service: No

At Least As effective As

Exemption

Comments:



CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.1 Public Outreach

ON TRACK

160 Mesa Water District

Retail

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Municipal Water District of Orange County

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quarter of the reporting year? Yes

Public Outreach Program List	Number
Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	6
General water conservation information	3
Total	9

Did at least one contact take place during each quarter of the reporting year? Yes

Number Media Contacts	Number
News releases	11
Total	11

Did at least one website update take place during each quarter of the reporting year? Yes

Public Information Program Annual Budget

Annual Budget Category	Annual Budget Amount
Classes	1600
Brochures	1000
Bill Inserts	3000
Promos	2500
Total Amount:	8100

Public Outreach Additional Programs

Water Issues Study Group: This adult education program is for those in the community that are serious about getting involved with important issues concerning our water.

Description of all other Public Outreach programs

Comments:

At Least As effective As

No

0



CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.1 Public Outreach

ON TRACK

Exemption

No



CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.2 School Education Programs

ON TRACK

160 Mesa Water District

Retail

Does your agency implement School Education programs? Yes

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Municipal Water District of Orange County

Materials meet state education framework requirements? Yes

All lessons are aligned with the California Science Content Standards to achieve the state education framework requirements.

Materials distributed to K-6? Yes

Grade-specific education booklets featuring mascot Ricki the Rambunctious Raindrop. Booklets contain lessons and hands-on activities that are designed to reinforce and augment the concepts taught in the large group assemblies.

Materials distributed to 7-12 students? No (Info Only)

Annual budget for school education program: 6724.00

Description of all other water supplier education programs

Mesa Water hosts the Water Issues Study Group, geared towards adult education. Additionally, Mesa Water participates and sponsors a booth at the Children's Water Education Festival, hosted by Orange County Water District.

Comments:

At Least As effective As No

Exemption No 0



CUWCC BMP Coverage Report 2014

160 Mesa Water District

Baseline GPCD: 187.68

GPCD in 2014 153.19

GPCD Target for 2018: 153.90

Biennial GPCD Compliance Table

ON TRACK

Year	Report	Target		Highest Acceptable Bound	
		% Base	GPCD	% Base	GPCD
2010	1	96.4%	180.90	100%	187.70
2012	2	92.8%	174.20	96.4%	180.90
2014	3	89.2%	167.40	92.8%	174.20
2016	4	85.6%	160.70	89.2%	167.40
2018	5	82.0%	153.90	82.0%	153.90

Arcadis U.S., Inc.

445 South Figueroa Street

Suite 3650

Los Angeles, California 90071

Tel 213 486 9884

Fax 213 486 9894

www.arcadis.com

A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the width of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, intersecting the horizontal line.

APPENDIX B – ORANGE COUNTY WATER DISTRICT 2017-2018 ENGINEER’S REPORT



**2017 - 2018 Engineer's Report
on the Groundwater Conditions,
Water Supply and Basin Utilization
in the Orange County Water District**

2017-2018

ENGINEER'S REPORT ON

GROUNDWATER CONDITIONS,

WATER SUPPLY AND BASIN UTILIZATION

IN THE

ORANGE COUNTY WATER DISTRICT

FEBRUARY 2019

ORANGE COUNTY WATER DISTRICT
BOARD OF DIRECTORS

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ORANGE COUNTY WATER DISTRICT
ORANGE COUNTY'S GROUNDWATER AUTHORITY

OFFICERS

President
VICENTE SARMIENTO, ESQ.
First Vice President
CATHY GREEN
Second Vice President
STEPHEN R. SHELDON
General Manager
MICHAEL R. MARKUS, P.E., D.WRE

February 20, 2019

Michael R. Markus
General Manager
Orange County Water District
Post Office Box 8300
Fountain Valley, CA 92728-8300

Dear Mr. Markus:

In accordance with Section 26 of the District Act, the 2017-2018 Engineer's Report on the Groundwater Conditions, Water Supply and Basin Utilization in the District is hereby submitted.

Precipitation for the water year July 1, 2017 through June 30, 2018 within the District's boundaries averaged 3.88 inches, which was twenty nine percent of the long-term average rainfall. The average discharge of Santa Ana River flow past Prado Dam for the water year was measured to be 84,806 acre-feet which represented thirty eight percent of the 30-year average flow. Flow past the District's spreading grounds (including any flow from the Santiago Creek) that was lost to the Pacific Ocean totaled 605 acre-feet.

Total water demands within the District for the 2017-2018 water year were 419,477 acre-feet (excluding water used for groundwater replenishment and barrier maintenance). Supplemental water used for groundwater replenishment and barrier maintenance during the water year totaled 140,152 acre-feet. Groundwater production within the basin for the water year totaled 310,025 acre-feet (includes In-Lieu Program water) which was a three percent increase from the prior water year.

The accumulated basin overdraft decreased from 328,000 acre-feet on June 30, 2017 to 277,000 acre-feet on June 30, 2018 using the three-layer approach and the new benchmark for full-basin conditions. Under the provisions of Section 27 of the District Act, a portion of the Replenishment Assessment for the 2019-2020 water year could be equal to an amount necessary to purchase up to 187,000 acre-feet of replenishment water.

Truly yours,

Chris S. Olsen
Director of Engineering

Lo Tan
Principal Engineer

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EXECUTIVE SUMMARY

Total water demands within Orange County Water District (OCWD) were 419,477 acre-feet (AF) for the 2017-18 water year (beginning on July 1, 2017 and ending on June 30, 2018). Groundwater production for the water year totaled 310,025 AF including any available In-Lieu Program water. The use of supplemental water in OCWD's service area during the 2017-18 water year totaled 227,413 AF of which 87,261 AF resulted from the direct use by water agencies and districts and 140,152 AF were used for the purpose of groundwater replenishment and maintenance of seawater intrusion control barriers.

For the water year which ended on June 30, 2018, the "annual overdraft" (annual basin storage decrease without supplemental replenishment water) was 195,000 AF. The accumulated overdraft decreased from 328,000 AF on June 30, 2017 to 277,000 AF on June 30, 2018. Precipitation within the basin was 29 percent of the long-term average during the water year, totaling 3.88 inches.

Based on the groundwater basin conditions for the water year ending on June 30, 2018, OCWD may purchase up to 187,000 AF of water for groundwater replenishment during the ensuing water year, beginning on July 1, 2019, pursuant to the District Act.

ACKNOWLEDGMENTS

A number of public and private entities contributed data used in this report including:

- City of Anaheim
- City of Buena Park
- East Orange County Water District
- City of Fountain Valley
- City of Fullerton
- City of Garden Grove
- Golden State Water Company
- City of Huntington Beach
- Irvine Ranch Water District
- City of La Palma
- Mesa Water District
- Metropolitan Water District of Southern California
- Municipal Water District of Orange County
- City of Newport Beach
- City of Orange
- County of Orange, Public Works Department
- Orange County Sanitation District
- City of Santa Ana
- Santa Ana Watershed Project Authority
- City of Seal Beach
- Serrano Water District
- City of Tustin
- United States Geological Survey
- City of Westminster
- Yorba Linda Water District

The cooperation received from all agencies is gratefully acknowledged.

This report is based on the 2017-18 Basic Data Report which is placed on file at the office of OCWD in Fountain Valley.

GLOSSARY OF ACRONYMS

AF	Acre-feet
ARTIC	Anaheim Regional Transportation Intermodal Center
AWPF	Advanced Water Purification Facility
BEA	Basin Equity Assessment
BPP	Basin Production Percentage
CPTP	Coastal Pumping Transfer Program
CUP	Conjunctive Use Program
DRWF	Dyer Road Well Field
GAP	Green Acres Project
GWRS	Groundwater Replenishment System
IDP	Irvine Desalter Project
IRWD	Irvine Ranch Water District
MF	Microfiltration
mg/L	Milligrams per Liter
MBI	Mid-Basin Injection
MGD	Million Gallons per Day
MSL	Mean Sea Level
MWD	Metropolitan Water District of Southern California
MWDOC	Municipal Water District of Orange County
NO ₃	Nitrate
O&M	Operation and Maintenance
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
RA	Replenishment Assessment
RO	Reverse Osmosis
RTS	Readiness-to-Serve
SAR	Santa Ana River
SWP	State Water Project
TDS	Total Dissolved Solids
UV	Ultraviolet
WRD	Water Replenishment District of Southern California
WSM	Basin Water Supply Management Program

PART I: GROUNDWATER CONDITIONS

Section 25 of the OCWD Act requires that OCWD order an annual investigation to report on the groundwater conditions within the District's boundaries. A summary of the groundwater conditions for the water year covering July 1, 2017 to June 30, 2018 is as follows.

GROUNDWATER CONDITIONS 2017-18 SUMMARY OF FINDINGS

1. Groundwater production (including the In-Lieu Program) totaled 310,025 acre-feet (AF) for the 2017-18 water year.
2. Groundwater stored in the basin increased by 51,000 AF for the 2017-18 water year.
3. Accumulated Overdraft¹ on June 30, 2018 was 277,000 AF.²
4. Annual Overdraft was 195,000 AF for the 2017-18 water year.
5. Average Annual Overdraft³ for the immediate past five water years (2013-14 through 2017-18) was 159,600 AF.
6. Projected Annual Overdraft³ for the current 2018-19 water year is 108,000 AF.
7. Projected Annual Overdraft³ for the ensuing 2019-20 water year is 146,000 AF.
8. Projected Accumulated Overdraft² on June 30, 2019 is 235,000 AF.
9. Under the provisions of Section 27 of the District Act, a portion of the 2019-20 Replenishment Assessment (RA) could be equal to an amount necessary to purchase up to 187,000 AF of replenishment water.⁴

¹ Accumulated overdraft was calculated using OCWD's three-layer storage change methodology adopted on March 21, 2007 and the associated new benchmark for full-basin conditions. Water year 2005-06 was the first year this methodology was used. Additional explanation can be found in the report on "Evaluation of Orange County Groundwater Basin Storage and Operational Strategy" by OCWD in 2007.

² Water from the Metropolitan Water District of Southern California Long-Term Groundwater Storage Program was included as part of the total stored water in determining the basin's accumulated overdraft.

³ Annual overdraft is defined in the District Act as "the quantity, determined by the Board of Directors, by which the production of groundwater supplies within said District during the water year exceeds the natural replenishment of such groundwater supplies in such water year."

⁴ Determined by adding the five-year average annual overdraft (159,600 AF) to one-tenth of the accumulated overdraft (277,000 AF) which results in the following:
 $159,600 \text{ AF} + [(277,000 \text{ AF}) \times 0.10] = 187,300 \text{ AF}$ (or 187,000 AF when rounded).

BASIN HYDROLOGY

Groundwater conditions in the Orange County groundwater basin are influenced by the natural hydrologic conditions of rainfall, capture and recharge of Santa Ana River (SAR) and Santiago Creek stream flows, natural infiltration of surface water, and the transmissive capacity of the basin. The basin is also influenced by groundwater extraction and injection through wells, use of imported water for groundwater replenishment, wastewater reclamation and water conservation efforts and activities throughout OCWD's service area.

The water year beginning on July 1, 2017, yielded an average of 3.88 inches of rainfall within OCWD's boundaries, which is approximately 29 percent of the long-term annual average of 13.40 inches. Rainfall data within OCWD's boundaries was provided by the Orange County Public Works Department for precipitation stations number 5, 61, 88, 96, 121, 163, 165, 169, 173, 219 and 229. The previous water year (2016-17) had rainfall equaling 18.00 inches. The average annual rainfall in the OCWD service area for the five-year period (from July 1, 2013 through June 30, 2018) was 8.60 inches, and below-average rainfall in the watershed tends to lead to lower flows in the SAR reaching Orange County. Stream flow in the SAR measured downstream of Prado Dam for the water year 2017-18 totaled 84,806 AF which was approximately 38 percent of the 30-year flow average of 225,098 AF.

GROUNDWATER PRODUCTION

Groundwater production from wells within OCWD for the 2017-18 water year totaled 236,916 AF (excluding In-Lieu Program water, MWD Groundwater Storage Program extractions, and any groundwater used for the Talbert Barrier): 235,145 AF for non-irrigation and 1,771 AF for irrigation uses. The term "irrigation" used in the District Act and herein refers to irrigation for agricultural, horticultural or floricultural crops and for pasture grown for commercial purposes.

OCWD's In-Lieu Program replaces groundwater supplies with imported water to reduce groundwater pumping. During the 2017-18 water year, the In-Lieu Program was in effect and 73,108 AF were purchased from MWD. Historical data on the annual groundwater production and In-Lieu quantities within OCWD are shown in Figure 1. Table 1 summarizes the annual groundwater production and In-Lieu Program water for the period of 1968-69 through 2017-18. For the 2017-18 water year, total groundwater production would have reached 310,025 AF without the In-Lieu Program. Groundwater producers that participated in the In-Lieu Program during 2017-18 water year are listed in Appendix 1.

FIGURE 1. Groundwater Production

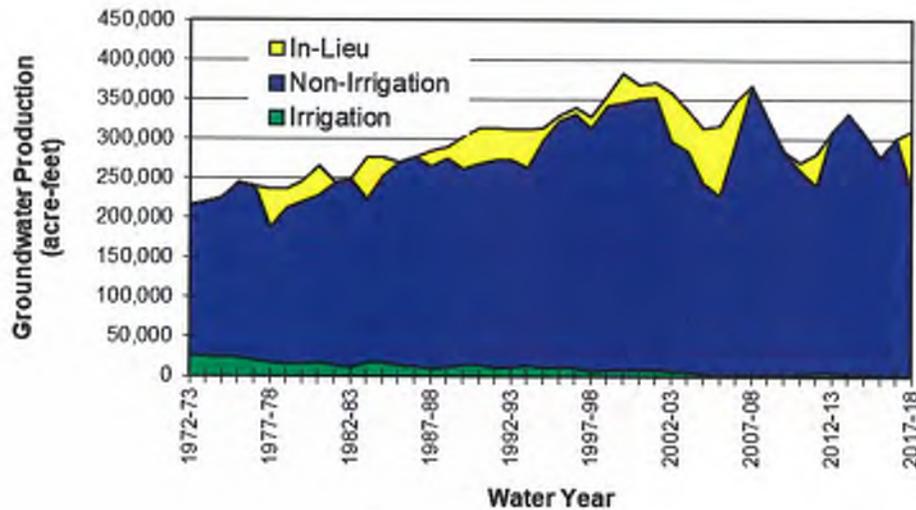


TABLE 1. Historical Groundwater Production Within OCWD

Water Year Jul 1-Jun 30	Groundwater Production (AF)	In-Lieu Program (AF)	Water Year Jul 1-Jun 30	Groundwater Production (AF)	In-Lieu Program (AF)
1968-69	178,798	-	1993-94	264,159	48,134
1969-70	194,379	-	1994-95	298,217	15,622
1970-71	203,923	-	1995-96	324,111	5,542
1971-72	229,048	-	1996-97	331,406	7,883
1972-73	214,983	-	1997-98	313,805	15,096
1973-74	218,863	-	1998-99	342,823	13,352
1974-75	225,597	-	1999-00	345,362	38,007
1975-76	245,456	-	2000-01	350,385	18,640
1976-77	243,511	-	2001-02	352,113	19,473
1977-78	188,407	48,290	2002-03	297,191	61,463
1978-79	213,290	23,792	2003-04	284,621	52,168
1979-80	221,453	24,861	2004-05	244,370	69,617
1980-81	228,943	36,373	2005-06	228,159	89,216
1981-82	244,184	-	2006-07	299,118	50,740
1982-83	249,548	-	2007-08	366,185	-
1983-84	223,207	52,822	2008-09	324,147	-
1984-85	252,070	25,198	2009-10	285,575	-
1985-86	270,932	-	2010-11	259,861	10,435
1986-87	276,354	-	2011-12	241,082	40,564
1987-88	265,226	18,856	2012-13	309,295	-
1988-89	275,077	15,022	2013-14	330,782	-
1989-90	261,190	38,961	2014-15	305,259	-
1990-91	266,745	44,588	2015-16	277,090	-
1991-92	271,224	39,789	2016-17	301,637	-
1992-93	273,587	38,900	2017-18	236,916	73,108

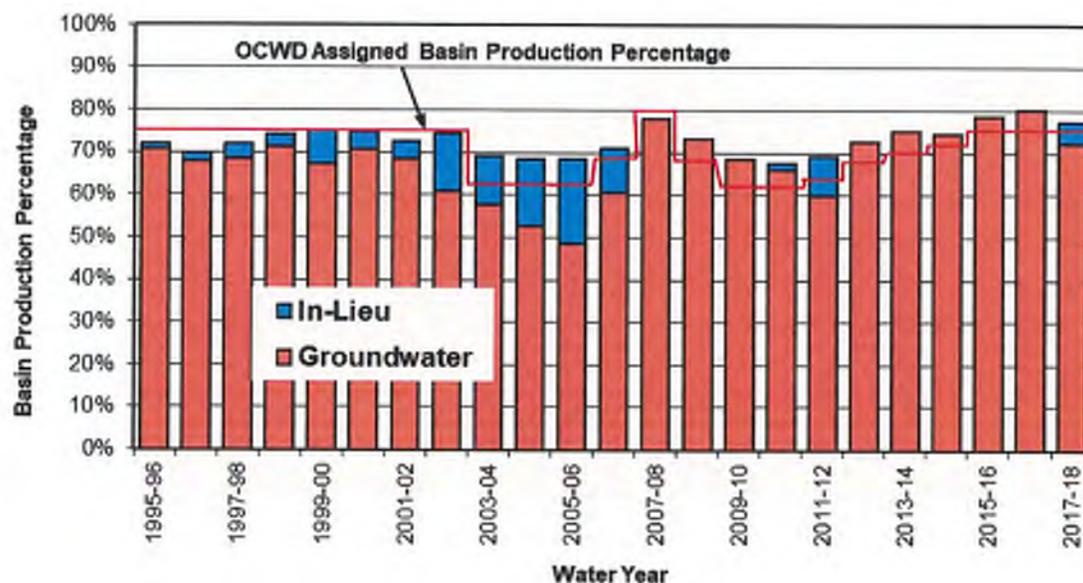
Groundwater production and In-Lieu Program quantities for 2017-18 for the major groundwater producers are summarized in Appendix 1. The groundwater production for all producers exceeding 25 AF per year for non-irrigation and irrigation purposes are presented in Appendices 2 and 3, respectively.

BASIN PRODUCTION PERCENTAGE

The Basin Production Percentage (BPP) is defined in the District Act as “...the ratio that all water to be produced from groundwater supplies within the district bears to all water to be produced by persons and operators within the district from supplemental sources as well as from groundwater within the district.” The BPP applies only to water producers that utilize more than 25 AF of groundwater per water year. Water producers that use 25 AF or less from the groundwater basin are excluded from the production percentage limitation.

The BPP for the 2017-18 water year was established at 75.0 percent by the OCWD Board of Directors. The overall BPP achieved within OCWD for non-irrigation use in the 2017-18 water year was 77.1 percent. The achieved pumping is greater than 75.0 percent primarily due to additional extraction from several water quality projects that are given a Basin Equity Assessment (BEA) exemption to pump groundwater above the BPP. The production percentage achieved by each major producer for non-irrigation use is presented in Appendix 1. Historical assigned and achieved BPPs are illustrated below in Figure 2.

FIGURE 2. Groundwater BPP



GROUNDWATER LEVELS

Groundwater levels in the Orange County groundwater basin are shown on Plate 1. Groundwater level data used to prepare this plate were collected during late June and early July 2018 from over 500 production and monitoring wells screened within the principal aquifer system (approximately 300 to 1,200 feet deep), from which over 90% of basin pumping occurs. The groundwater elevation contours range from 10 to 60 feet below mean sea level in the coastal area of the basin due to pumping. A general indicator of changing basin levels is the location of the zero (0) mean sea level (MSL) elevation contour each year (MSL elevations are referenced to Vertical Datum NGVD 29). The zero MSL contour moved slightly seaward (ranging from 0.01 to 0.83 mile) when compared to its alignment the prior year, indicating an increase in groundwater levels in the Principal aquifer system from June 2017 to June 2018.

Plate 2 shows the change in groundwater levels from June 2017 to June 2018 for the Principal aquifer system. In the Principal aquifer, groundwater levels rose moderately throughout the entire groundwater basin except for a localized decline of 5 to 25 feet in the Orange Forebay area surrounding Santiago Creek and Santiago Basin.

Key well groundwater elevation trends throughout the groundwater basin are illustrated in Plate 3.

Below is a general overview of the change in groundwater levels from June 2017 to June 2018 for the three primary aquifer systems of the basin.

Shallow Aquifer Groundwater Levels:

In the shallow aquifer, groundwater levels rose by approximately 5 to 15 feet throughout most of the basin from June 2017 to June 2018 except for a continued mild decline of 2 to 4 feet in the Irvine Sub-basin and a localized decline of 5 to 15 feet immediately surrounding Santiago Basin in the Orange Forebay area. Due to the lack of rainfall and SAR storm flow, combined recharge from Santiago Basin and Santiago Creek during water year 2017-18 was less than 50% of prior water year, resulting in the water level decrease in this vicinity.

In the Irvine Sub-basin, the mild decline of approximately 3 feet in shallow aquifer groundwater levels was slightly more than the prior wet year due to the low rainfall during water year 2017-18. The continued downward trend indicated that incidental recharge from the Santa Ana Mountains into the shallow aquifer has been insufficient to offset pumping from the Irvine Desalter Project Shallow Groundwater Unit.

Shallow aquifer groundwater levels rose approximately 5 to 10 feet in the Anaheim

Forebay near the OCWD recharge facilities and 10 to 15 feet farther west throughout the Fullerton area.

The rise of shallow aquifer groundwater level was approximately 5 feet or less throughout most of the Pressure area, i.e., in the central portion of the basin, the coastal area, and in the west Orange County area near the boundary with Los Angeles County.

In the Talbert Barrier area, shallow aquifer groundwater levels remained approximately the same or rose slightly by 1 to 2 feet from June 2017 to June 2018. Barrier injection operations were able to maintain protective groundwater elevations sufficiently above mean sea level seaward of the barrier throughout water year 2017-18 to prevent seawater intrusion.

Principal Aquifer Groundwater Levels:

In the Principal aquifer, groundwater levels rose moderately throughout the entire basin except for a localized decline of 5 to 25 feet in the Orange Forebay area surrounding Santiago Creek and Santiago Basin, similar to the shallow aquifer groundwater levels in that area.

Like the shallow aquifer, principal aquifer groundwater levels rose 5 to 10 feet in the Anaheim Forebay near the OCWD recharge facilities and 10 to 15 feet farther west throughout the Fullerton area.

Throughout most of the pressure area of the basin, i.e., the central portion of the basin, as well as in the Irvine Sub-basin, Principal aquifer groundwater levels rose 5 to 15 feet. Near the Irvine Ranch Water District (IRWD) Dyer Road Well Field (DRWF) and Mesa Water production wells, the rise was much larger, ranging from approximately 25 to 35 feet from June 2017 to June 2018.

In the coastal area, principal aquifer groundwater levels rose 5 to 10 feet, except for a slightly larger rise of approximately 15 feet in the immediate vicinity of the west end of the Talbert Barrier in Huntington Beach resulting from increased barrier injection into the deeper portion of the principal aquifer for basin replenishment.

The moderate to large rise in principal aquifer groundwater levels throughout the basin from June 2017 to June 2018 was primarily due to reduced basin pumping stemming from the MWD In-Lieu Program in which 73,108 AF of imported deliveries were made to the producers in lieu of pumping groundwater. As a result, groundwater pumping during water year 2017-18 was 21% less than the prior water year. The groundwater level rise in the principal aquifer was most pronounced in the IRWD DRWF and Mesa Water area because of the higher density of production wells along with confined conditions and finer-grained sediments as compared to the Forebay area of the basin.

Principal aquifer groundwater levels rose approximately 5 feet throughout the western portion of the basin (i.e., Buena Park, Los Alamitos, western Huntington Beach, and Seal Beach) and rose approximately the same amount farther west across the Los Angeles county line in the Cerritos and Long Beach areas. The approximately equivalent rise in principal aquifer groundwater levels in the Cerritos/Long Beach area relative to western Orange County indicated that the gradient across the county line was approximately the same in June 2017 and June 2018. Therefore, the groundwater outflow to Los Angeles county during water year 2017-18 likely did not change appreciably from the prior water year.

Deep Aquifer Groundwater Levels:

In the deep aquifer, groundwater levels experienced a moderate to large rise of 10 to 40 feet throughout the entire basin from June 2017 to June 2018 and were very similar to or slightly larger than those in the principal aquifer. Like with the principal aquifer, the basin-wide rise in Deep aquifer groundwater levels was attributed to the reduction in pumping stemming from the MWD In-Lieu Program, despite the lack of rainfall during the water year 2017-18.

Deep aquifer groundwater levels rose 10 to 15 feet throughout the Forebay areas of Anaheim, Fullerton, and Orange, as well as in the central Pressure area of the basin. Near the IRWD DRWF and Mesa Water production wells, the rise was as much as 30 to 40 feet from June 2017 to June 2018, which was 5 feet more than the rise in the principal aquifer.

In the Irvine Sub-basin, deep aquifer groundwater levels rose 20 to 30 feet in the western portion due to the closer proximity to the effects of the In-Lieu Program and rose a lesser amount of 5 to 10 feet in the northeast portion closer to the Santa Ana Mountains.

COASTAL GROUNDWATER CONDITIONS

The coastal portion of the groundwater basin, essentially that area within five miles of the coast, is sensitive to seawater intrusion potential and seasonal effects on production well capacity due to lower groundwater levels. Coastal groundwater levels are affected by groundwater production, overall groundwater storage in the basin, and, to a lesser extent, injection at the Talbert and Alamitos barriers.

Coastal groundwater production for water year 2017-18 totaled 67,399 AF (includes Fountain Valley, Huntington Beach, IRWD DRWF and Deep Aquifer Treatment System wells, Mesa Water, Newport Beach, OCWD deep wells in Fountain Valley, Seal Beach, and Westminster). Despite a basin-wide increase in total demand of 5.9%, coastal production for water year 2017-18 was 29% less than the prior water year because of the In-Lieu Program.

Talbert Barrier injection totaled 20,765 AF for water year 2017-18, representing a significant decrease of 38% from the prior water year. The decrease was due to higher groundwater conditions caused by the In-Lieu pumping reduction described above, reducing the required amount of injection necessary to maintain protective elevations seaward of the barrier.

A key OCWD monitoring well M26 is located near Adams Avenue seaward of the barrier. Shallow aquifer groundwater levels were maintained at or slightly above protective elevations of approximately 3 feet above MSL throughout the water year 2017-18. In fact, groundwater elevations at M26 reached an operational maximum threshold of 5 to 6 feet above mean sea level in the fall of 2017 due to reduced pumping from the In-Lieu Program and were then maintained at or near this maximum threshold through January 2018 (while pumping remained low) by reducing barrier injection.

It is important to point out that the coastal pumping from July 2017 through January 2018 was reduced along with the contemporaneous reduction in Talbert Barrier injection. This is a strong indication of the connection between coastal pumping and the amount of barrier injection required to stably maintain groundwater levels at or slightly above protective elevations but without exceeding maximum operational thresholds.

At the Alamitos Barrier, the Orange County portion of injection totaled 912 AF for water year 2017-18, representing 22% less than the prior water year. Alamitos Barrier injection was less during water year 2017-18 primarily because of construction activities for the Alamitos Barrier Improvement Project. The injection total for water year 2017-18 included all sources of water (93% imported and 7% recycled) but only represents OCWD's share, which is less than half of the total injection based on the barrier wells that are located within Orange County versus Los Angeles County. A supply goal of Alamitos Barrier injection has been an approximately 50/50 blend of imported and recycled water. However, the recycled water portion was lower the last five years (five-year average of 15%) because of Leo J. Van der Lans (LVL) treatment plant shutdowns related to plant operational issues and, more recently (the last two years), to wastewater supply interruptions from the Los Angeles County Sanitation District's Long Beach treatment plant.

In the Sunset Gap area, OCWD has been investigating seawater intrusion, which has been found primarily in the Beta aquifer (upper portion of the principal aquifer). Groundwater levels in the Beta aquifer at key OCWD monitoring wells BS10 and BS11 on the Naval Weapons Station Seal Beach are typically below mean sea level and ended the water year 2017-18 at approximately the same level as at the beginning of the water year. OCWD is currently expanding its existing Alamitos Gap groundwater flow model, which will be used to develop a recommended seawater intrusion control plan for the Sunset Gap.

ANNUAL OVERDRAFT

Annual groundwater basin overdraft, as defined in the District Act, is the quantity, determined by the Board of Directors, by which the production of groundwater supplies within the District during the water year exceeds the natural replenishment of such groundwater supplies in such water year. This difference between extraction and replenishment can be estimated by determining the change in volume of groundwater in storage that would have occurred had supplemental and recycled water not been used for any groundwater recharge purpose, including seawater intrusion protection, advanced water reclamation and the In-Lieu Program.

For the 2017-18 water year, it is estimated that the volume of groundwater in storage increased by 51,000 AF. Approximately 246,000 AF of water was supplied to the basin as follows: 1) directly from the percolation or injection of purchased imported water from the Colorado River and State Water Project (SWP), 2) use of recycled water to supplement purchased imported water in the Alamitos seawater intrusion barrier, and 3) use of GWRS recycled water for basin replenishment. Therefore, the annual overdraft was 195,000 AF for the 2017-18 water year. For the five-year period from July 1, 2013 to June 30, 2018, an annual average of approximately 152,000 AF of supplemental water and recycled water as percolated or injected into the underground basin for replenishment or used directly in place of pumping groundwater (i.e., In-Lieu Program). The average annual overdraft during the same five-year period was approximately 159,600 AF.

GROUNDWATER BASIN ACCUMULATED OVERDRAFT

The accumulated overdraft, as defined in the District Act, is the quantity of water needed to be replaced at OCWD's intake area to prevent landward movement of ocean water into the fresh groundwater body. Landward movement of ocean water can be prevented if groundwater levels near the coast are several feet above sea level. Groundwater levels along the coast are related to the volume of water stored in the intake area, water pumped from the entire basin and the pattern or location of pumping. However, the Talbert and Alamitos seawater intrusion control projects have been implemented to prevent landward movement of ocean water into the fresh groundwater body. Due to the operation of seawater intrusion barrier facilities, there is no longer a direct correlation between accumulated overdraft and controlling seawater intrusion. These facilities allow greater utilization of the storage capacity of the groundwater basin. OCWD is also dedicated to maximizing its replenishment capabilities by actively negotiating with the U.S. Army Corps of Engineers to increase its water conservation program behind Prado Dam and implementing a Long-Term Facilities Plan to evaluate cost-effective improvements to its groundwater recharge capabilities.

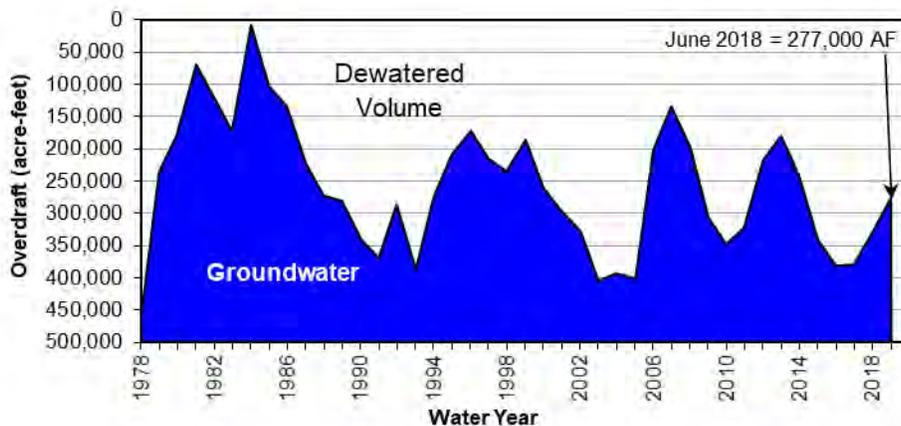
In February 2007, OCWD staff completed a report entitled "Evaluation of Orange County Groundwater Basin Storage and Operational Strategy." This report presented a new

methodology that had been developed, tested, and documented for calculating accumulated overdraft and storage change based on a three-aquifer layer approach. Furthermore, the report provided the basis for calculating accumulated overdraft using a new full-basin benchmark that was developed for each of the three aquifer layers, which in effect replaces the traditional single-layer full benchmark of 1969.

The annual analysis of basin storage change and accumulated overdraft for water year 2017-18 has been completed. Based on the three-layer methodology, an accumulated overdraft of 277,000 AF was calculated for the water year ending June 30, 2018. The accumulated overdraft for the prior water year ending June 30, 2017 was 328,000 AF (also calculated using the three-layer storage method). Therefore, an annual increase of 51,000 AF (reported earlier herein this report) in stored groundwater was calculated as the difference between the June 2017 and June 2018 accumulated overdrafts.

Figure 3 shows the accumulated basin overdraft quantities for the period 1978 through 2018.

FIGURE 3. Accumulated Basin Overdraft



The accumulated overdraft for the current water year ending on June 30, 2019 is projected to be 235,000 AF. The annual overdraft is estimated to be 108,000 AF. This quantity is based on assumed annual groundwater production of approximately 313,000 AF for the current water year (including groundwater pumping within the BPP, In-Lieu Program water, groundwater pumped above the BPP from water quality improvement projects and MWD Groundwater Storage Program extractions) and that natural replenishment (including captured SAR flows and incidental recharge) is estimated to be approximately 205,000 AF for the basin under average rainfall conditions. In addition, GWRS production is projected to reach 98,000 AF.

Projected annual overdraft for the ensuing water year 2019-20 is estimated to be 146,000 AF. This estimate is based on the assumption that total annual groundwater production for the ensuing water year will be 328,000 AF, a figure that is based upon an assumed BPP of 77 percent and includes 24,000 AF of production above the BPP from water quality improvement projects (discussed further in the subsequent section entitled Recommended Basin Production Percentage). The natural replenishment is estimated to be 182,000 AF (average of last five years) under average rainfall conditions, and the GWRS production is projected to be 103,000 AF.

OCWD, MWD, the Municipal Water District of Orange County (MWDOC) and participating producers approved the funding agreement for the MWD Long-Term Groundwater Storage Program on June 25, 2003. This conjunctive use program (also informally referred to as MWD CUP) provides for MWD to store up to 66,000 AF in the OCWD groundwater basin to be pumped (less basin losses) by participating producers in place of receiving imported supplies during water shortage events. A compensation package from MWD was included in the agreement to build eight new groundwater production wells, improvements to the seawater intrusion barrier, construction of the Diemer Bypass Pipeline and an annual administrative fee. The preferred means to store water in the MWD storage account has been through the In-Lieu deliveries to participating groundwater producers. Water into the MWD storage account has also been conducted through direct replenishment utilizing OCWD Forebay recharge basins. In any event, the water stored or extracted by MWD is considered as MWD supply and not groundwater production. There was no MWD CUP water stored or extracted in water year 2017-18. However, the remaining 1,730 AF of MWD CUP water stored in the basin was purchased by OCWD leaving a balance of zero AF in the MWD CUP account at the end of the water year. The annual quantities and cumulative totals of MWD water stored since the inception of the program are shown in Appendix 4. It is important to note that the reported quantities do not include pumping extractions from the account or basin losses.

REPLENISHMENT RECOMMENDATION

Section 27(b) of the District Act states the following:

“The total of the replenishment assessment levied in any year shall not exceed an amount of money found to be necessary to purchase sufficient water to replenish the average annual overdraft for the immediate past five water years plus an additional amount of water sufficient to eliminate over a period of not less than 10 years nor more than 20 years, the accumulated overdraft, plus an amount of money to pay the costs of initiating, carrying on, and completing any of the powers, projects and purposes for which this district is organized.”

Based upon Section 27(b), that portion of the RA that is used for water purchases for the ensuing water year 2019-20 is limited to the amount needed to purchase 187,000 AF as calculated below:

Five-year (7/1/2013 through 6/30/2018) Average Annual Overdraft* = 159,600 AF
 Accumulated Overdraft (End of Water Year 2017-18) = 277,000 AF
 Assumed Time Period to Eliminate Accumulated Overdraft = 10 years
 Potential Water Purchase Amount: 159,600 AF + (277,000 AF/10 years) = 187,300 AF (use 187,000 AF)

**Referred to as the Average Annual Overdraft in Section 27(b) of the District Act.*

Table 2 presents the proposed 2019-20 water budget expenses, which shows the proposed quantity of purchased water (68,000 AF) being significantly less than the prescribed limit of 187,000 AF as allowed for under the provisions of Section 27(b) of the District Act.

TABLE 2. 2019-20 Water Budget Expenses

Water Source	Amount (AF)	Unit Cost (\$/AF)	Total Cost (\$)
Alamitos Barrier	3,000	\$1,179.00	\$ 3,537,000
MWD Untreated Full Service Water	<u>65,000</u>	\$743.00	<u>\$48,295,000</u>
Water Purchases Sub-total	68,000	—	\$51,832,000
Applicable Charges			Total Cost (\$)
Water Reserve Fund	—	—	\$ 3,715,000
MWD Readiness to Serve Charge	—	—	\$ 2,500,000
MWDOC Groundwater Charge	—	—	\$ 615,000
MWD Capacity Charge	—	—	\$ 967,570
Total Expenses			\$59,629,570

RECOMMENDED BASIN PRODUCTION PERCENTAGE

In December 2002, OCWD approved a basin management approach for determining the BPP for future water years. The management approach is based upon the development of a base amount of groundwater production the basin can annually sustain utilizing dependable water supplies OCWD expects to receive. It is a policy for OCWD to provide an estimate of the BPP each January for the following fiscal year to assist the groundwater producers in the preparation of their annual budgets.

A BPP of 77 percent is currently being proposed for the ensuing water year 2019-20. Analysis of the groundwater basin's projected accumulated overdraft, the available supplies to the basin (assuming below-average hydrology) and the projected pumping demands indicate that this level of pumping could potentially be sustained for 2019-20 without detriment to the basin.

The BPP does not restrict the amount of groundwater that a groundwater producer may pump; but a groundwater producer must pay the BEA on any groundwater production (other than BEA-exempt groundwater) above the BPP. In most cases, the BEA amount set

by the OCWD Board of Directors serves to disincentivize non-exempt groundwater production above the BPP. If groundwater producers produced groundwater significantly above the BPP, this additional groundwater production could increase the annual overdraft (and, over time, increase the accumulated overdraft), with potential detriments to the basin, including seawater intrusion. Substantial groundwater production significantly above the BPP could also impair OCWD’s ability to manage the groundwater basin for sustainable groundwater production. The OCWD Act provides regulatory powers, including the setting of basin production limitations and surcharges, and mid-year modifications to the BPP and BEA, to address potential production of significant quantities of groundwater above the BPP.

A BPP of 77 percent corresponds to approximately 328,000 AF of groundwater production which includes 24,000 AF of groundwater production above the BPP to account for several groundwater quality enhancement projects (see description below).

In order to achieve water quality objectives in the groundwater basin, it is estimated for the ensuing water year 2019-20 that additional production of approximately 24,000 AF (above the BPP) will be undertaken by the City of Tustin, City of Garden Grove, City of Huntington Beach, Mesa Water District and IRWD. These agencies need the additional pumping allowance in order to accommodate groundwater quality improvement projects. As in prior years, production above the BPP from these projects would be partially or fully exempt from the BEA as a result of the benefit provided to the basin by removing poor-quality groundwater and treating it for beneficial use.

In March 2019, staff will review with the OCWD Board of Directors the basis and the assumptions made for the proposed BPP and receive any direction on the matter. In April 2019, staff will again apprise the OCWD Board of Directors on the status of the aforementioned conditions. If the estimates of basin supplies in the current or ensuing year are substantially different than those contained in the respective conditions, a revised BPP may then be recommended.

The proposed BPP is calculated as follows:

$$\begin{array}{l}
 \text{Numerator} = \boxed{\begin{array}{c} \text{Groundwater} \\ \text{Projected to} \\ \text{be Produced} \\ 328,000 \text{ AF} \end{array}} - \boxed{\begin{array}{c} \text{Water Quality} \\ \text{BEA Exempt} \\ \text{Pumping Above} \\ \text{BPP} \\ 24,000 \text{ AF} \end{array}} = 304,000 \text{ AF} \\
 \\
 \text{Denominator} = \boxed{\begin{array}{c} \text{Groundwater} \\ \text{Production} \\ 328,000 \text{ AF} \end{array}} + \boxed{\begin{array}{c} \text{Supplemental} \\ \text{(Imported and} \\ \text{Santiago Creek} \\ \text{Native Water)} \\ 66,800 \text{ AF} \end{array}} = 394,800 \text{ AF}
 \end{array}$$

$$\text{BPP} = \frac{\text{Groundwater}}{\text{Groundwater Plus Supplemental}} = \frac{\text{Numerator}}{\text{Denominator}} = \frac{304,000 \text{ AF}}{394,800 \text{ AF}} = 77 \%$$

PART II: WATER SUPPLY AND BASIN UTILIZATION

Section 31.5 of the District Act requires an investigation and annual report setting forth the following information related to water supply and basin utilization within the OCWD service area, together with other information as OCWD may desire:

WATER SUPPLY AND BASIN UTILIZATION 2017-18 SUMMARY OF FINDINGS

1. Water usage from all supplemental sources and non-local water sources (if any) totaled 227,413 AF for the 2017-18 water year including any available In-Lieu Program water.
2. Water usage from recycled water produced from within OCWD including the GWRS totaled 127,812 AF for the 2017-18 water year.
3. Water demands within OCWD totaled 419,477 AF for the 2017-18 water year.
4. Estimated demands for groundwater for the ensuing 2019-20 water year are 328,000 AF.

SUPPLEMENTAL WATER

Supplemental water is used by water agencies within OCWD's boundary to augment groundwater supplies in satisfying their user demands and by OCWD to recharge the groundwater basin. Supplemental water, as defined in Section 31.5 of the District Act, is any water that originates from outside the SAR watershed (comprised of an area of 2,081 square miles) with the exception of that portion of that watershed on and along Santiago Creek upstream of the downstream toe of the slope of the Villa Park Flood Control Dam which is counted as supplemental water. It is important to note that the Santiago Creek watershed lies entirely within the SAR watershed. Sources of supplemental water typically include imported deliveries from MWD and diversions from Irvine Lake/Santiago Reservoir (i.e., Santiago Creek) that are conveyed to users within OCWD boundaries. MWD deliveries originate from either the Colorado River or the SWP. In addition, supplemental water would also include deliveries from within the SAR watershed that involve water exchanges (i.e., releasing a quantity of water that originates from within the SAR watershed while importing an equal quantity of supplemental water to replace it).

Non-local waters are defined, for the purposes of this report, as waters purchased from agencies outside of OCWD's boundary for use within OCWD. Non-local waters include all water deliveries to OCWD where the water source is located within the SAR watershed. Water deliveries to OCWD from the Arlington Desalter in Riverside and the San Bernardino Valley Municipal Water District's High Groundwater Mitigation Project are considered non-local waters. Both projects involve pumping (and treatment in Arlington's case) and release of groundwater from the SAR upstream groundwater basins to OCWD via the SAR for groundwater replenishment at OCWD Forebay recharge facilities. For the purpose of being consistent with previous Engineer's Reports and to present information in a concise manner, non-local water deliveries that are purchased and used by OCWD for groundwater replenishment are included in the supplemental water totals in this report. However, while accounted for in the supplemental water totals in this Engineer's Report for convenience and consistency purposes, these non-local waters are not supplemental sources of water as defined in Section 31.5 of the District Act because the non-local waters originate within the SAR watershed. These non-local water deliveries are not included in the accounting of supplemental sources that address water demands within OCWD as shown in Table 5.

Recycled wastewater produced and used within OCWD is considered, for the purposes of this report, as neither non-local water nor supplemental water (sometimes referred to as neutral water). Therefore, recycled water that originates from within OCWD is reported separately from supplemental water totals. However, recycled water used in the Alamosa Barrier is supplied by Water Replenishment District of Southern California (WRD) and originated from outside the SAR watershed, and, as such, is categorized as supplemental water.

Water agencies utilizing supplemental water are listed in Appendix 1. As summarized in Table 3, the use of supplemental water in OCWD's service area during the 2017-18 water year totaled 227,413 AF of which 87,261 AF resulted from the direct use by water agencies and districts and 140,152 AF (including any available In-Lieu Program water) were used for groundwater replenishment purposes. The supplemental water used by water agencies included 87,019 AF for municipal and industrial use and 242 AF for agricultural purposes. Historical supplemental water usage is illustrated in Figure 4. The GWRS delivered recycled water to OCWD Forebay recharge basins and the Talbert seawater intrusion barrier throughout the 2017-18 water year. A breakdown of non-local water purchases by OCWD from water years 1998-99 through 2017-18 is presented in Appendix 4.

TABLE 3. 2017-18 Supplemental Water Usage

Direct Agency Use	AF
Imported Water ¹	84,454
Santiago Creek Native Water	2,807
Subtotal	87,261
Groundwater Replenishment (Purchased)	AF
In-Lieu Program ²	73,108
Forebay Recharge ³	66,114
Alamitos Barrier ⁴	912
Talbert Barrier	18
Subtotal	140,152
TOTAL	227,413

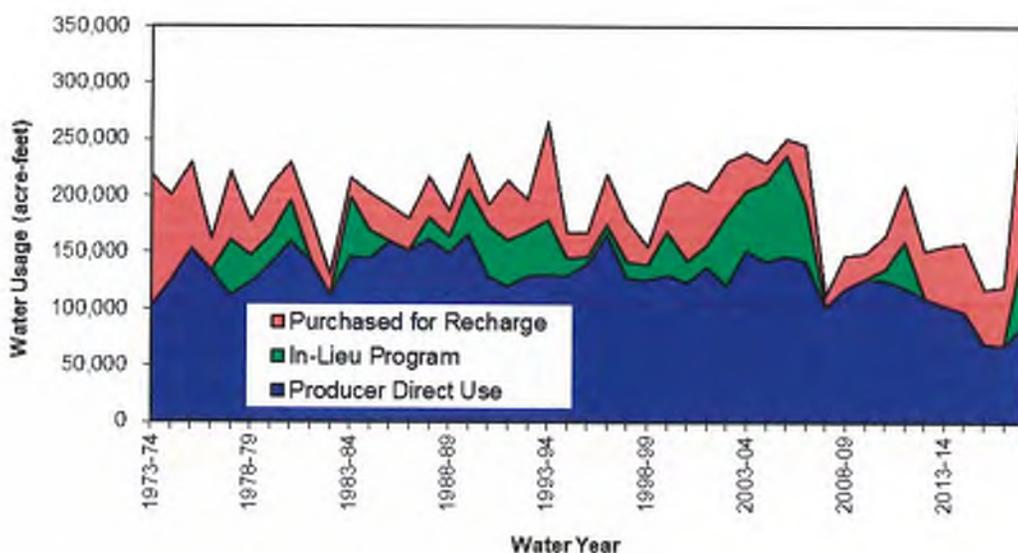
¹Includes extractions from MWD Groundwater Storage Program.

²Any amount reported herein includes water received by OCWD's groundwater producers as In-Lieu water.

³Full service rate untreated water.

⁴Total amount combines imported and recycled water deliveries.

FIGURE 4. Historical Supplemental Water Usage



Recycled water use within OCWD is presented in Table 4 (excluding WRD-supplied recycled water to the Alamitos Barrier because this water is categorized as supplemental water and already included in the total amount reported in Table 3). The major uses of recycled water are groundwater replenishment (including Kraemer, Miller, Miraloma and La Palma recharge basins and Talbert Barrier injection wells) and supply water for irrigation and industrial users.

TABLE 4. 2017-18 Recycled Water Usage

Groundwater Replenishment		Water Usage (AF)
GWRS AWPf (for Talbert Barrier)		20,747
GWRS AWPf (for Recharge Basins) ¹		83,326
GWRS AWPf (for Mid-Basin Injection)		1,548
Subtotal		105,621
Irrigation		Water Usage (AF)
IRWD ²		18,408
OCWD (Green Acres Project) ³		3,783
Subtotal		22,191
TOTAL		127,812

¹Includes 100 AF of GWRS recycled water delivered to City of Anaheim Canyon Power Plant and Anaheim Regional Transportation Intermodal Center (ARTIC).

²Recycled water used within the portion of OCWD that lies within IRWD's boundaries (excludes OCWD/IRWD intertie water deliveries to the Green Acres Project).

³Excludes deliveries to the Orange County Sanitation District and includes IRWD/OCWD Intertie deliveries to the Green Acres Project.

AVAILABILITY OF SUPPLEMENTAL REPLENISHMENT WATER

MWD provided untreated full-service water supplies to its groundwater-basin agencies during the water year 2017-18 as a result of its allocation of State Project Water and normal rainfall condition. The availability of supplemental water from MWD to recharge the groundwater basin in the ensuing water year appears to be good as California is currently receiving average to above average precipitation.

WATER DEMANDS

During the 2017-18 water year, the total water demands within OCWD's service area were 419,477 AF. Water demands were high due to the relatively dry conditions. Total demands include the use of groundwater, MWD In-Lieu Program water, supplemental sources (including imported water and Santiago Creek native water) and recycled water (which is not included within supplemental sources if originating within the SAR watershed). Total demands exclude any groundwater, supplemental water and recycled water (such as the GWRS recycled water) used by OCWD for groundwater recharge and water conservation credits given to groundwater producers for their conservation efforts.

Water demands for 2017-18 and projected water demands for 2018-19 and 2019-20 are summarized in Table 5. The water demands for the current year 2018-19 were determined by assessing the data that is presently available for the first half of the water year and projecting that data to develop the total annual water demands. The water demands for the ensuing year 2019-20 are based on the projections provided by the retail water agencies within OCWD's service area. Long-term projections are presented in Figure 5.

TABLE 5. Water Demands Within OCWD

	Ground-water¹	Imported Water^{2,3}	Santiago Creek Native Water³	Recycled Water⁴	Total⁶
2017-18					
Non-Irrigation	308,254	84,212	2,807	-	395,273
Irrigation	1,771	242	-	22,191	24,204
Total	310,025	84,454	2,807	22,191	419,477
2018-19 (Current Year)⁵					
Non-Irrigation	311,200	75,000	2,500	-	388,700
Irrigation	1,800	-	-	21,000	22,800
Total	313,000	75,000	2,500	21,000	411,500
2019-20 (Ensuing Year)⁵					
Non-Irrigation	326,200	64,800	2,000	-	393,000
Irrigation	1,800	-	-	20,000	21,800
Total	328,000	64,800	2,000	20,000	414,800

¹ Includes In-Lieu Program water, if available. Also includes groundwater pumped under water quality improvement agreements entered into between OCWD and certain producers pursuant to Section 38.1 of the District Act where the produced groundwater is exempted from payment of all or a portion of the BEA. The BEA-exempt groundwater is deducted from the projection of total groundwater used to calculate the BPP.

² Excludes water conservation credits and imported water used for groundwater replenishment.

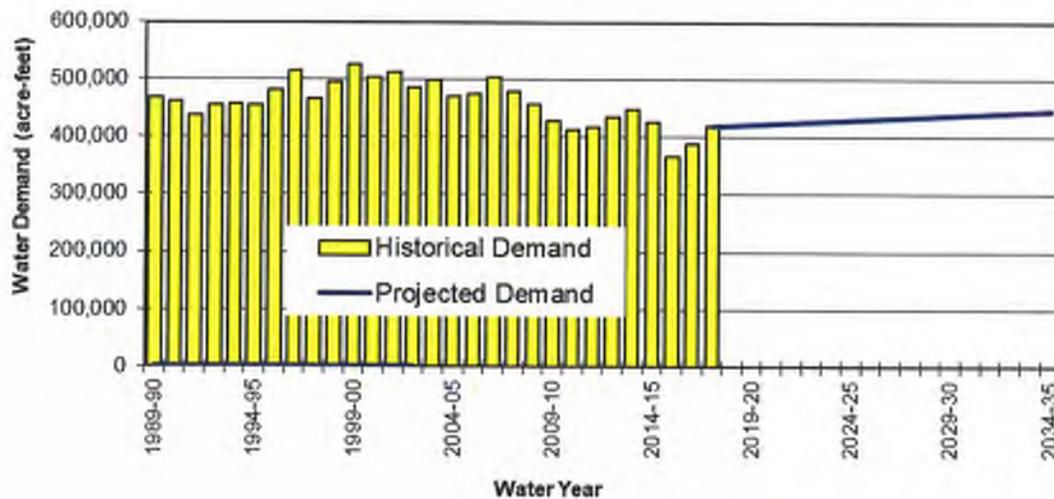
³ "Imported Water" and "Santiago Creek Native Water" are both counted as supplemental water.

⁴ Excludes GWRS recycled water recharged into the groundwater basin. Includes recycled water from IRWD and OCWD's Green Acres Project (excluding OCSD's usage).

⁵ Water demands are estimated by OCWD assuming average hydrology.

⁶ Includes all groundwater and non-groundwater sources, and is greater than the amount of supplemental sources used in the calculation of BPP. For purposes of this table, supplemental water is calculated as the sum of Imported Water and Santiago Creek Native Water, and does not include Recycled Water.

FIGURE 5. Water Demand Projections



WATER DEMAND FORECAST

OCWD participates with MWDOC and retail groundwater producers to predict future demands in OCWD's service area. Each groundwater producer projected its total water demands to the year 2035. These projections include the effect of local water conservation efforts. Figure 5 illustrates the historical and the projected water demands for OCWD's service area to the year 2035.

Population within OCWD's service area is expected to increase from the current 2.28 million people (based on Census 2010 demographic data) to approximately 2.59 million people by the year 2035. This population growth is expected to increase water demands from the current 419,477 AF per year to 447,000 AF per year in 2035 (a water demand projection that takes into consideration future water conservation savings). In an effort to support increasing water demands, OCWD will look to increase basin production by developing new local economical water supply projects.

ADVANCED WASTEWATER RECLAMATION

Groundwater, supplemental water and local surface water have historically been the primary water sources within OCWD. In recent decades, wastewater reclamation has increasingly become a significant source of additional water. Purified recycled water has been produced by OCWD for use as injection water in the Talbert Barrier and as percolation water in Kraemer, Miller, Miraloma and La Palma recharge basins. OCWD and IRWD also recycle wastewater at their respective treatment plants for irrigation and industrial uses.

The GWRS is an advanced wastewater reclamation project jointly-funded by OCWD and the Orange County Sanitation District (OCSD). The project was operational in January 2008. The advanced treatment processes utilized in the GWRS consist of microfiltration (MF) followed by reverse osmosis (RO) membranes and ultraviolet (UV) light disinfection in combination with hydrogen peroxide. For water year 2017-18, the GWRS treated wastewater from the OCSD to drinking water standards and delivered 105,621 AF of purified water for direct injection into the Talbert seawater intrusion barrier and percolation into the OCWD groundwater basin via recharge basins and mid-basin injection (MBI) well.

For water year 2017-18, OCWD and IRWD recycled water deliveries for landscape irrigation and industrial uses in Fountain Valley, Costa Mesa, Huntington Beach, Newport Beach, Santa Ana and IRWD's service area within OCWD totaled 22,191 AF.

WRD operates a 3-MGD Alamitos Barrier Recycled Water Project, known as the Leo J. Vander Lans Water Treatment Facility. This project supplies highly treated recycled water to the Alamitos Barrier. The Leo J. Vander Lans advanced wastewater treatment facility located in Long Beach utilizes the treatment processes of MF, RO and UV light disinfection. Currently undergoing an expansion to 8 MGD, this project is ultimately intended to replace most of the imported water used to supply the Alamitos Barrier with purified recycled water. The project operated for only four months during the water year 2017-18 and supplied 59 AF of purified recycled water to the Alamitos Barrier, which represented 7 percent of the barrier's supply that OCWD is responsible for payment. Recycled water deliveries from the Leo J. Vander Lans plant to the Orange County portion of the Alamitos Barrier are classified as supplemental water because this recycled water originates from outside the SAR watershed. It is noteworthy to mention that the Leo J. Vander Lans Water Treatment Facility is presently under expansion to increase its treatment capacity.

WATER QUALITY

OCWD maintains a comprehensive groundwater protection policy that includes water quality monitoring, removal of contaminants, regulatory agency support, toxic residuals removal and hazardous waste management. In addition, OCWD provides water quality information to regulatory agencies, other water agencies and the general public. In order to meet the current and future water quality testing requirements, OCWD operates the Advanced Water Quality Assurance Laboratory at the Fountain Valley campus. The laboratory houses approximately 31 chemists and laboratory technicians, 12 water quality monitoring personnel and all the analytical instruments that are needed to perform more than 400,000 analyses of approximately 20,000 water samples taken each water year. The laboratory supports the extensive water quality testing requirements for the GWRS.

When blended together by the major agencies within OCWD's service area, the blended groundwater (without treatment) and treated supplemental water for 2017-18 was determined to have a flow-weighted average of 438 milligrams per liter (mg/L) of total dissolved solids (TDS) which is less than the average TDS concentration of 461 mg/L reported for the prior year (2016-17). The average groundwater TDS concentration for the basin for 2017-18 was 462 mg/L (compared to 459 mg/L reported for 2016-17), ranging from a low of 255 mg/L in coastal areas (such as Newport Beach) to a high of approximately 714 mg/L in certain inland areas.

Average concentrations of TDS, nitrate (NO₃) and hardness for groundwater and groundwater combined with supplemental water supplied by agencies within OCWD's service area during the 2017-18 water year are summarized in Table 6. These concentrations were determined from groundwater and supplemental water analyses and from production reports submitted to and filed with OCWD by each water agency. The City of Tustin and IRWD have active groundwater treatment projects that help to reduce certain constituents reported in Table 6 in their groundwater supply prior to service to their customers (see note 6 for detailed explanation).

WATER RESOURCES DATA

A summary of water resources data within OCWD for the 2017-18 water year and the previous water year (2016-17) is included in Appendix 5.

TABLE 6. 2017-18 Water Quality Summary

City/Agency	Groundwater ^{1,7}			Delivered Blend ^{1,2,7}		
	TDS ³	NO ₃ -N ⁴	Hardness ⁵	TDS ³	NO ₃ -N ⁴	Hardness ⁵
Anaheim	602	2.6	333	512	1.6	259
Buena Park	414	1.4	254	411	1.1	232
East Orange County Water District	574	3.6	352	450	1.2	221
Fountain Valley	420	1.4	249	412	1.0	214
Fullerton	471	2.3	244	447	1.6	218
Garden Grove	556	3.7	324	498	2.4	266
Golden State Water Company	398	1.7	222	400	1.0	193
Huntington Beach	391	0.6	234	397	0.5	195
Irvine Ranch Water District ⁶	391*	1.0*	144*	394*	0.8*	152*
La Palma	299	ND ⁸	139	299	ND ⁸	139
Mesa Water District	321	0.4	78	358	0.4	120
Newport Beach	255	1.3	114	320	0.9	138
Orange	457	2.1	268	435	1.4	229
Santa Ana	412	2.4	250	408	1.6	218
Seal Beach	262	ND ⁸	102	332	ND ⁸	135
Serrano Water District	714	1.8	377	695	1.3	380
Tustin ⁶	624*	6.3*	331*	528*	3.7*	260*
Westminster	351	1.4	223	369	1.0	203
Yorba Linda Water District	673	1.7	327	554	1.1	257
Weighted Average⁷	462	2.0	243	438	1.3	213

¹ All groundwater results (alone or blend) are for untreated groundwater (see note 6 below). Units are reported in mg/L.

² Delivered blend includes untreated groundwater and treated imported MWD water (i.e., blend of Colorado River water and State Project water as measured at the MWD Diemer Plant), except Serrano Water District, which blends with treated Santiago Reservoir water. Units are reported in mg/L. Annual average water qualities for MWD and Santiago Reservoir (Irvine Lake) for 2017-18 are as follows:

MWD Water Quality

TDS = 401 mg/L

NO₃-N = 0.34 mg/L

Hardness (as CaCO₃) = 168 mg/L

Santiago Reservoir Water Quality

TDS = 638 mg/L

NO₃-N = 0.04 mg/L

Hardness (as CaCO₃) = 390 mg/L

³ Secondary Drinking Water Standards for TDS are as follows:

500 mg/L = recommended limit

1,000 mg/L = upper limit

⁴ Primary Drinking Water Standard for nitrate NO₃-N (i.e., nitrate expressed as nitrogen) is 10 mg/L.

⁵ Hardness is reported as mg/L of CaCO₃. General classifications of hard and soft water are within the following concentration ranges:

0-75 mg/L = soft

75-150 mg/L = moderately hard

150-300 mg/L = hard

300 and up mg/L = very hard

⁶ Agencies with active groundwater quality improvement projects that treat for one or more of the constituents listed in the table. The results shown herein for "groundwater" and "delivered blend" reflect results from untreated groundwater. Water quality constituents that are marked with an asterisk (*) are reduced prior to delivery to customers.

⁷ All water quality results are flow-weighted averages based on groundwater and imported water delivered to each agency.

⁸ ND = not detected. Nitrate (expressed as NO₃-N) analytical detection limit for OCWD Advanced Water Quality Assurance Laboratory is 0.1 mg/L.

PART III: WATER PRODUCTION COSTS FOR ENSUING WATER YEAR (2019-20)

Section 31.5 of the District Act requires that costs of producing groundwater and obtaining supplemental water be evaluated annually. These costs vary for each groundwater producer and depend on many factors. Although these variations in cost are recognized, it is necessary for the purpose of this report to arrive at figures representing the average cost of producing groundwater and purchasing supplemental water.

ENSUING WATER YEAR (2019-20) WATER PRODUCTION COSTS SUMMARY OF FINDINGS

1. Cost for producing water from the groundwater basin within OCWD including a replenishment assessment for 2019-20 is estimated to be \$754.00 per acre-foot.
2. Cost of treated, non-interruptible supplemental water for 2019-20 is estimated to be \$1,144.00 per acre-foot.

GROUNDWATER PRODUCTION COSTS FOR NON-IRRIGATION USE

Cost for producing an acre-foot of groundwater in the ensuing 2019-20 water year has been estimated for a potable water well for a large groundwater producer (i.e., a city water department, water district) in OCWD’s service area. Operations and maintenance (O&M) and energy costs were determined using the cost information provided by nineteen large groundwater producers from a survey conducted by OCWD in fall 2018. The capital cost component was derived using the current capital cost of a typical production well (including design and construction costs) financed with an annual interest rate of five percent and amortized over a 30-year repayment period. Appendix 6 contains several of the key design characteristics for a typical production well. The OCWD RA used in the determination of groundwater production cost is the proposed RA for 2019-20.

The estimated cost for groundwater production for a large groundwater producing entity such as a city water department or a water district is presented in Table 7. The total cost to produce an acre-foot of groundwater within OCWD in the ensuing 2019-20 water year is estimated to be \$754 per acre-foot. Based on the responses to the aforementioned survey, the flow-weighted average (based upon the quantity of groundwater pumped) for energy cost equaled \$70 per AF. Operation and Maintenance (O&M) costs ranged from \$5 to \$393 per acre-foot with a median cost of approximately \$72 per acre-foot. Elements that influence these costs include load factors and variations in groundwater levels. Recently drilled wells are generally deeper than those drilled decades ago. From the aforementioned survey, the average load factor which indicates the percent-of-use of an extraction facility equaled 44 percent.

TABLE 7. Estimated 2019-20 Groundwater Production Costs

Cost Item	Non-Irrigation Use	
	Annual Cost (\$)	Cost per AF (\$/AF)
Energy	182,000	70 ²
RA	1,266,200	487 ³
Capital	325,000 ^{1,4}	125 ^{1,4}
O&M	187,200	72 ²
Total Cost to Producers	1,960,400	754

¹ Based upon an annual average production of 2,600 AF per production well.

² Based on survey of major agencies within OCWD’s service area, non-irrigation groundwater users.

³ Proposed RA for 2019-20.

⁴ Assuming \$5,000,000 capital cost (including design and construction) with an interest rate of five percent amortized over a 30-year period and excluding cost of land purchase.

COST OF SUPPLEMENTAL WATER

Supplemental water is supplied to OCWD's service area by MWD. MWD delivers both treated and untreated water as either an uninterruptible supply or an interruptible supply. As a result, there are several categories of water available from MWD. The categories most applicable for purposes of this report are 1) uninterruptible (i.e., firm) treated water, which is referred to as "full service water," and 2) uninterruptible untreated water. Treated water is purchased and used directly by various groundwater producers for municipal and industrial purposes, while untreated water is purchased and recharged into the basin by OCWD to support higher groundwater production. Table 8 shows the estimated cost for the MWD uninterruptible treated water (full service water) cost for the ensuing 2019-20 water year. Figure 6 illustrates the historical supplemental water costs along with the historical groundwater production costs. A comparison of estimated costs for groundwater versus supplemental water (non-irrigation use) during the ensuing water year 2019-20 is summarized in Table 9 and also in Figure 6. Values used in Figure 6 are presented in tabular form in Appendix 7.

TABLE 8. Estimated 2019-20 Supplemental Water Cost¹

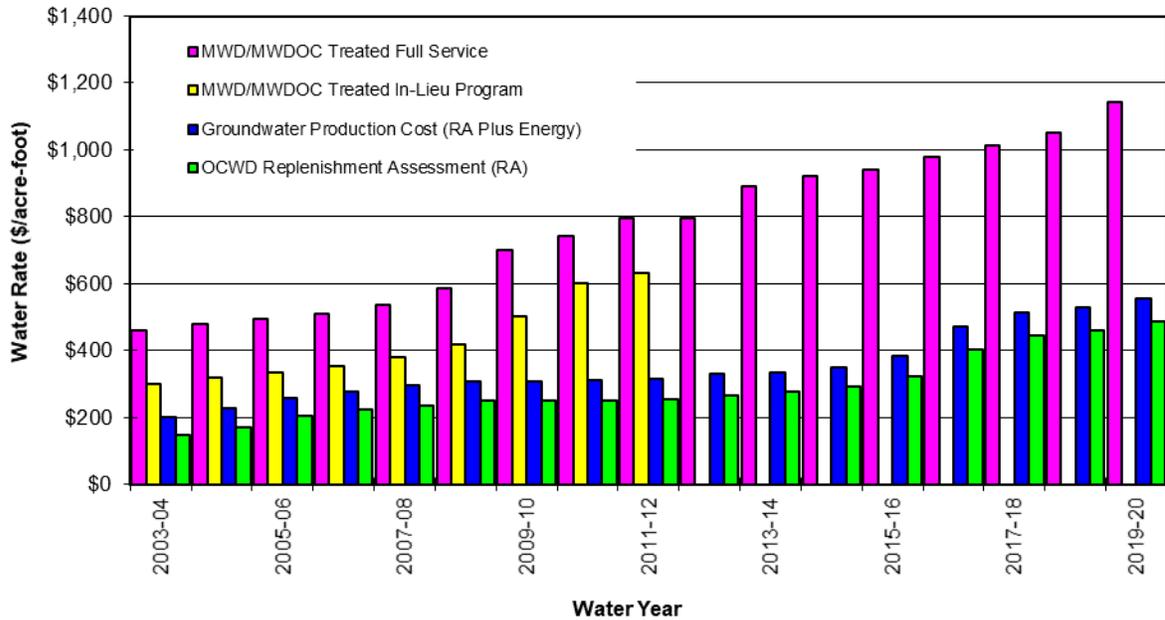
Rate and Charge Components	Treated Water Rate (\$/AF)
Firm Deliveries	Full Service Water
MWD Supply Rate (MWDOC Melded Rate)	208.50
MWD System Access Rate	336.00
MWD System Power Rate	131.50
MWD Water Stewardship Rate	67.00
MWD Treatment Surcharge	321.00
MWD RTS and Capacity Charges ²	<u>80.00</u>
Total	1,144.00

¹ Rates are an average of calendar year 2019 and proposed calendar year 2020. Supplemental water costs for MWD's member agencies (i.e., Anaheim, Fullerton and Santa Ana) are not reported herein due to the variability among these agencies on water supply allocations between MWD's Tier 1 and Tier 2.

² Readiness-to-Serve (RTS) and Capacity Charges have been converted to an approximate cost per acre-foot, but are not normally reported in terms of unit cost.

Cost components for supplemental treated and untreated water are listed in Table 8. Beyond the normally expected water supply, treatment and power charges, there are several other charges. The System Access charge is for costs associated with the conveyance and distribution system, including capital and O&M costs. The Water Stewardship charge is used to support MWD's financial commitment to conservation.

FIGURE 6. Adopted and Projected Water Rates for Non-Irrigation Use¹



¹ Refer to Appendix 7 for actual values used in Figure 6.

TABLE 9. Estimated 2019-20 Water Production Cost Comparison

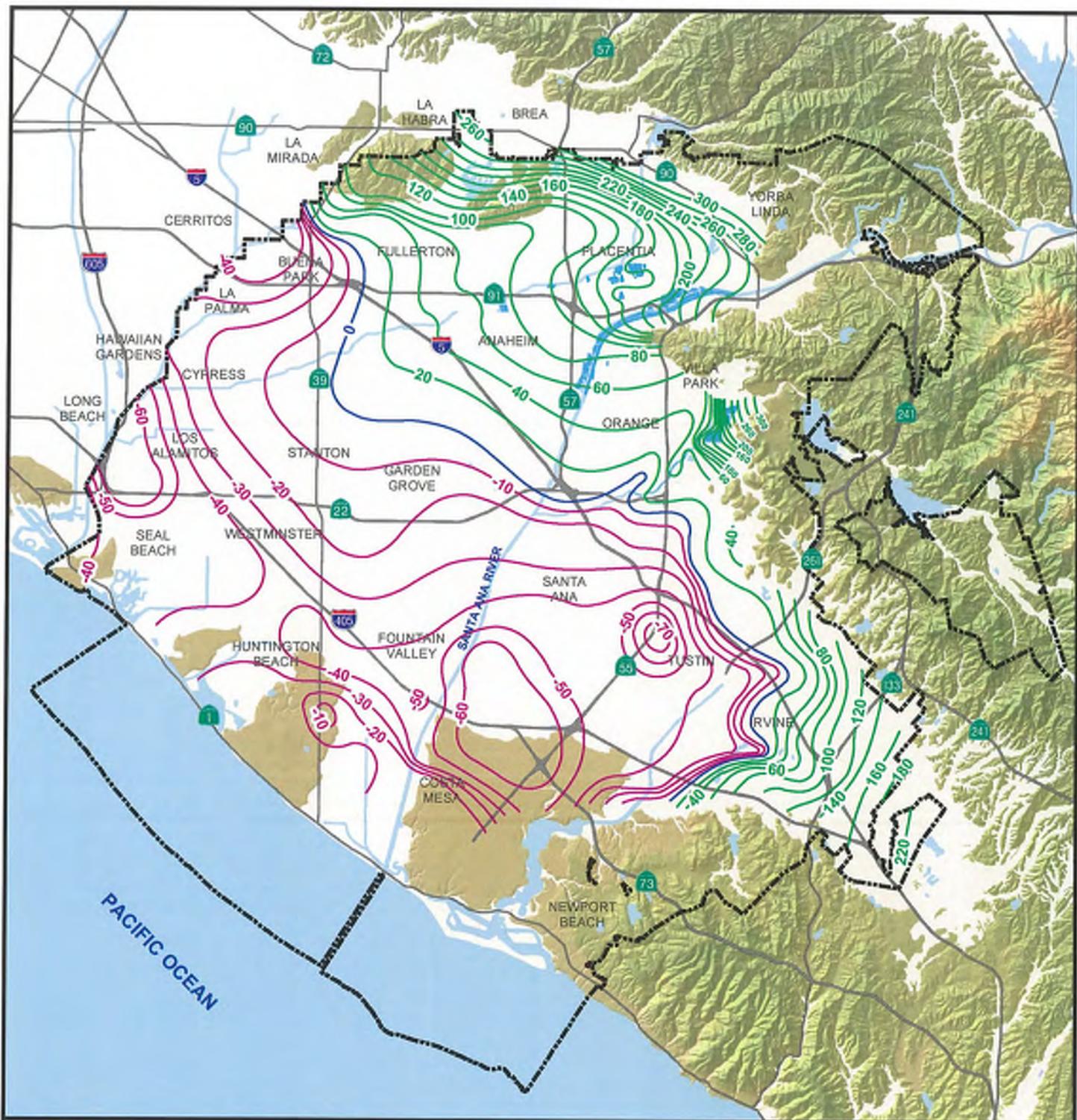
Non-Irrigation Use	Groundwater Cost (\$/AF)	Supplemental Water Cost (\$/AF)
Fixed Cost	125.00 ¹	1,144.00 ³
Variable Cost	629.00 ²	_ ³
Total	754.00	1,144.00

¹ Capital cost.

² Cost for energy, O&M and proposed RA.

³ Delineation of fixed and variable costs is not available.

water recycling, groundwater recovery and other water management programs approved by MWD. MWD uses the Capacity Charge to recover its cost for use of peaking capacity within its distribution system. The RTS charge is to recover MWD's cost associated with providing standby and peak conveyance capacity and system emergency storage capacity.

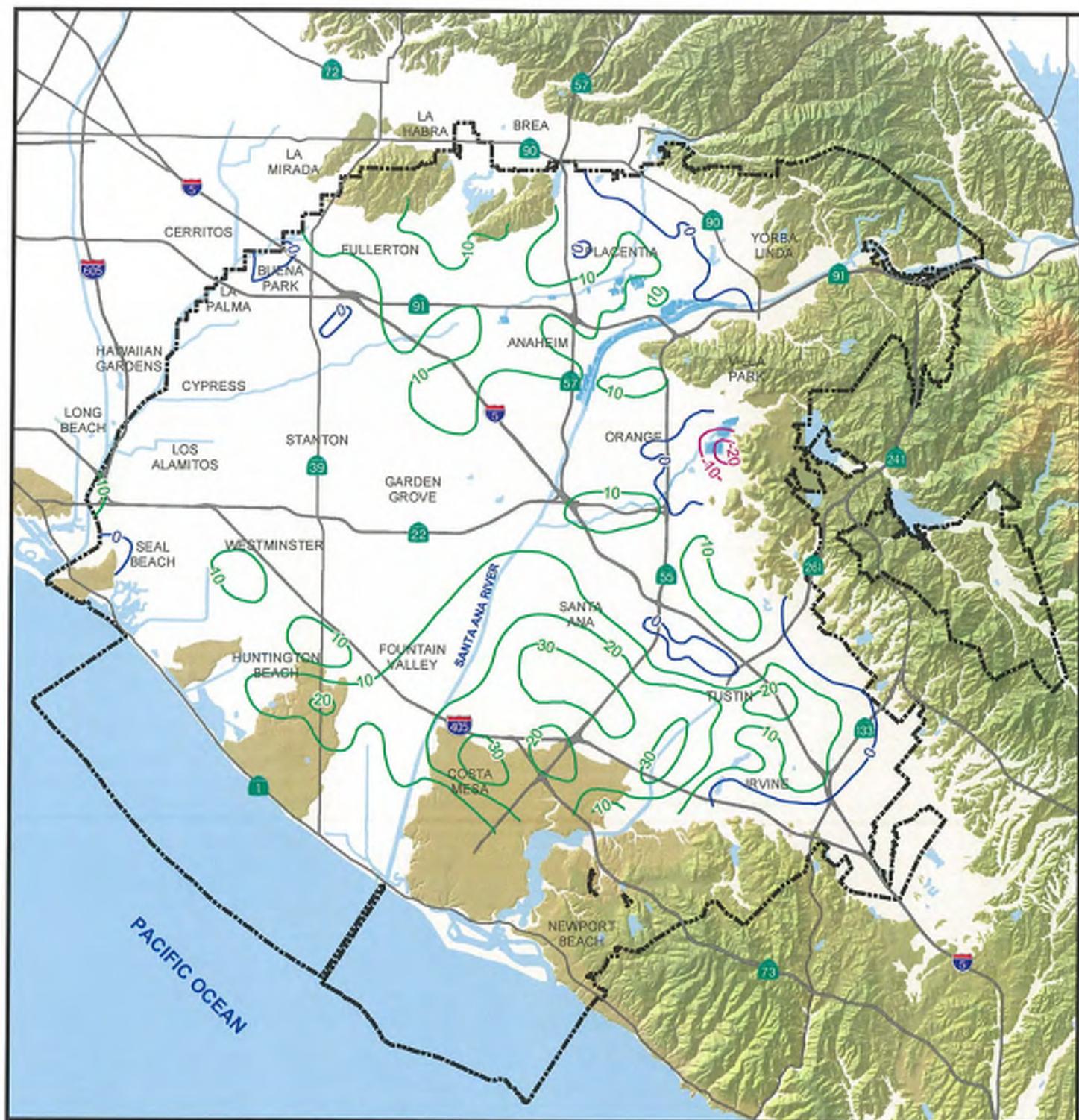


- Estimated Groundwater Elevations Within The Principal Aquifer Feet above Mean Sea Level* (ft MSL)**
- 70 to -10
 - 0
 - 20 to 300
 - Recharge Facility Areas
 - Freeways / Highways
 - Rivers / Streams
 - Orange County Water District
 - Water Bodies

**PLATE 1
GROUNDWATER CONTOUR MAP
JUNE 2018**



*NOTE: MSL elevations are referenced to Vertical Datum NGVD 29



Estimated Groundwater
Elevation Changes Within
The Principal Aquifer (Feet)

- -20 to -10
- 0
- 10 to 30
- Recharge Facility Areas
- Freeways / Highways
- Rivers / Streams
- Orange County Water District
- Water Bodies

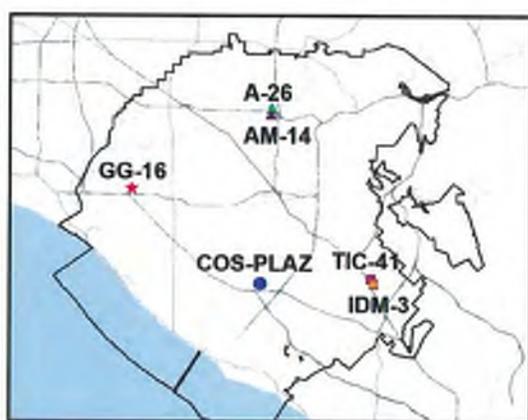
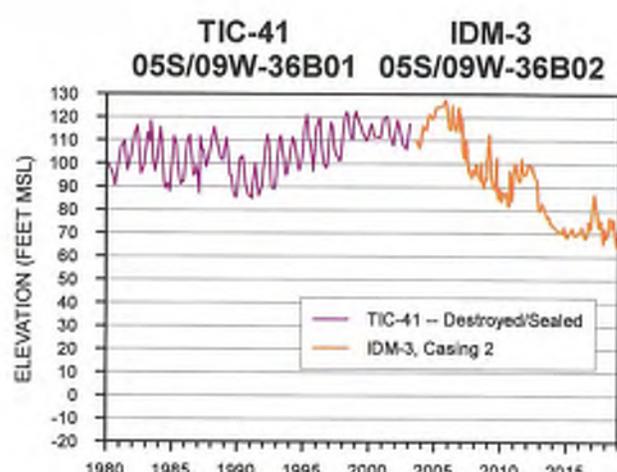
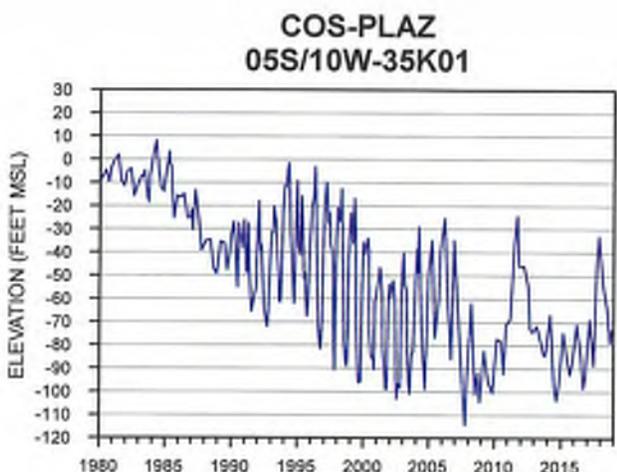
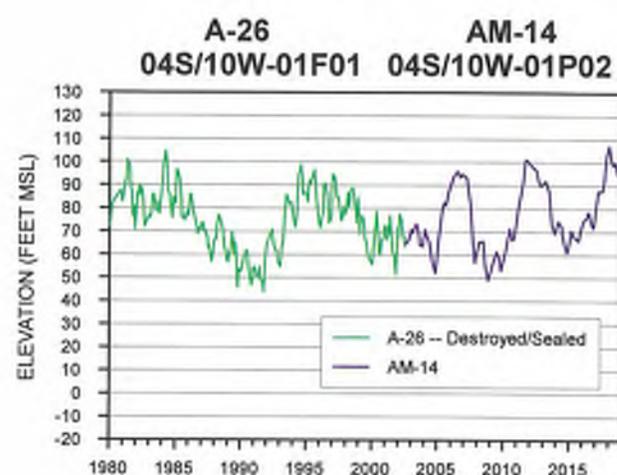
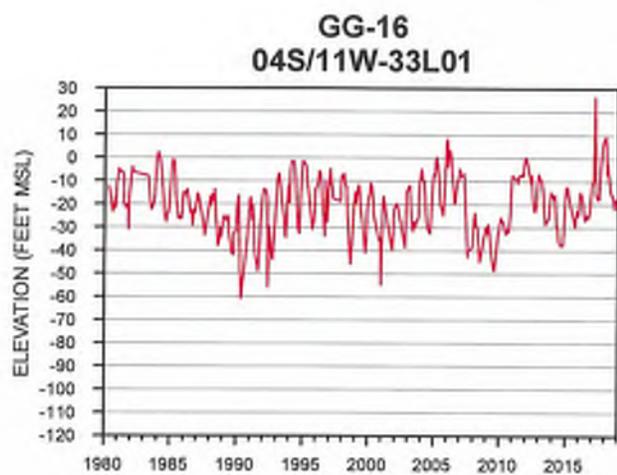
PLATE 2 CHANGE IN GROUNDWATER LEVEL FROM JUNE 2017 TO JUNE 2018



PLATE 3

KEY WELL GROUNDWATER ELEVATION TRENDS

Measured water level elevations in feet relative to mean sea level



APPENDIX 1. 2017-18 Water Production Data

Groundwater Producer	Groundwater (AF) ¹				Supplemental Water (AF)				Grand Total (AF)	Actual BPP Non-Irrigation ¹ Only
	Non-Irrigation ¹		Irrigation Pumping	Total	Non-Irrigation		Irrigation Deliveries	Total		
	Pumping	In-leu ²			Deliveries	Conservation Credit ³				
Anaheim, City of ²	33,414.3	12,010.2	-	45,424.5	14,899.2	242.1	-	15,141.3	60,565.8	75.0%
Buena Park, City of ²	10,046.9	223.6	-	10,270.5	3,250.5	29.2	-	3,279.7	13,550.2	75.8%
East Orange County Water District	240.2	391.2	-	631.4	211.5	3.4	-	214.9	846.3	74.6%
County of Orange	141.6	-	-	141.6	129.2	-	-	129.2	270.8	52.3%
Fountain Valley, City of	4,921.6	1,641.7	-	6,563.3	2,112.4	31.7	-	2,144.1	8,707.4	75.4%
Fullerton, City of	17,098.5	1,550.2	9.4	18,658.1	7,316.8	44.3	-	7,361.1	26,019.2	71.7%
Garden Grove, City of ^{4,7}	14,789.2	2,296.7	-	17,085.9	6,285.8	61.6	-	6,347.4	23,433.3	72.9%
Golden State Water Company ⁷	11,965.6	7,065.2	-	19,030.8	6,149.5	138.5	242.2	6,530.2	25,561.0	75.2%
Huntington Beach, City of	11,682.0	9,124.5	-	20,806.5	6,914.1	120.4	-	7,034.5	27,841.0	74.7%
Irvine Ranch Water District ^{4,5}	35,426.4	11,786.9	721.4	47,934.7	6,176.6	1,345.7	-	7,522.3	55,457.0	86.3%
La Palma, City of	1,874.8	-	-	1,874.8	0.5	9.2	-	9.7	1,884.5	99.5%
Mesa Water District ⁴	9,210.3	5,883.7	73.9	15,167.9	2,034.4	58.9	-	2,093.3	17,261.2	87.8%
Newport Beach, City of	8,199.9	2,893.8	-	11,093.7	3,679.1	30.3	-	3,709.4	14,803.1	74.9%
Orange, City of ⁵	17,057.0	3,921.1	-	20,978.1	7,247.3	89.6	-	7,336.9	28,315.0	74.1%
Orange County Water District ⁶	1,158.1	-	-	1,158.1	-	-	-	0.0	1,158.1	100.0%
Santa Ana, City of ⁷	21,327.4	4,377.9	-	25,705.3	9,265.4	83.4	-	9,348.8	35,054.1	73.3%
Seal Beach, City of	1,722.2	944.0	-	2,666.2	808.9	7.3	-	816.2	3,482.4	76.6%
Serrano Water District ⁵	2,111.4	-	-	2,111.4	698.8	5.0	-	703.8	2,815.2	75.0%
Tustin, City of ⁴	6,182.6	3,793.4	-	9,976.0	919.9	55.5	-	975.4	10,951.4	91.1%
Westminster, City of ⁷	7,166.6	1,185.3	-	8,351.9	2,802.6	55.1	-	2,857.7	11,209.6	74.5%
Yorba Linda Water District ⁷	11,461.2	2,806.8	1.4	14,269.4	6,116.7	49.5	-	6,166.2	20,435.6	69.8%
Total Major Groundwater Producers	227,197.8	71,896.2	806.1	299,900.1	87,019.2	2,460.7	242.2	89,722.1	389,622.2	77.0%
Other Producers	6,147.0	1,212.4	965.1	8,324.5	0.0	0.0	0.0	0.0	8,324.5	
Exempt Well Production	1,800.4	-	-	1,800.4	0.0	0.0	0.0	0.0	1,800.4	
Total Amount	235,145.2	73,108.6	1,771.2	310,025.0	87,019.2	2,460.7	242.2	89,722.1	399,747.1	77.1%
Basin Production Percentage (includes non-irrigation deliveries, but excludes water conservation)										

¹ Water classed as being used for purposes other than commercial agriculture.

² Imported MWD water purchased for domestic use to offset groundwater pumping.

³ Accounts for only those credits allowed for under the program initiated on September 20, 1995.

⁴ Agencies that participate in a groundwater water quality improvement project.

⁵ Agencies that can receive San Diego Creek native water above Villa Park Dam that are conveyed to users within OCWD. Such water, if delivered, is included within the classification of "Supplemental Water".

⁶ Groundwater quantity reported herein is that quantity used by OCWD for purposes other than seawater intrusion barrier maintenance.

⁷ These agencies participated in the MWD Long-Term Groundwater Storage Program for which groundwater was extracted and accounted for as supplemental water.

**APPENDIX 2. 2017-18 Groundwater Production —
Non-Irrigation Use Production Over 25 Acre-feet**

PRODUCER	AF	PRODUCER	AF
Alta Vista Country Club	348.4	Mesa Water District	9,210.3
Anaheim Cemetery	48.6	Midway City Mutual Water Company	160.2
Anaheim, City of	33,414.3	Mile Square Golf Course	93.5
Buena Park, City of	10,046.9	Navy Golf Course	528.8
Canyon RV Park	137.6	Newport Beach Golf Course	53.6
Coca Cola North America	160.7	Newport Beach, City of	8,199.9
County of Orange	141.6	Old Ranch Country Club	569.8
Donovan Golf Course Management	223.7	Orange County Water District	1,158.1
DS Services of America, Inc.	406.2	Orange, City of	17,057.0
East Orange County Water District	240.2	Pacific Scientific Company	25.9
Eastlake Village HOA	82.0	Page Avenue Mutual Water Company	43.0
Eastside Water Association	197.0	Riverview Golf	219.4
Fairhaven Memorial Park	165.9	Santa Ana Cemetery	83.3
Forest Lawn Memorial Park	28.4	Santa Ana Country Club	338.4
Fountain Valley, City of	4,921.6	Santa Ana, City of	21,327.4
Fullerton, City of	17,098.5	Seal Beach, City of	1,722.2
Garden Grove, City of	14,789.2	Serrano Water District	2,111.4
Golden State Water Company	11,965.6	South Coast Shores HOA c/o Optimum PM	62.7
Hargis and Associates, Inc.	59.2	South Midway City Mutual Water Company	81.7
Huntington Beach, City of	11,682.0	The Boeing Company	258.8
Hynes Estates, Inc.	58.9	The Good Shepherd Cemetery	64.4
Irvine Ranch Water District	35,426.4	The Lakes Master Association	60.7
Knott's Berry Farm	278.8	Tustin, City of	6,182.6
La Palma, City of	1,874.8	Westminster, City of	7,166.6
Laguna Beach County Water District	803.0	Westminster Memorial Park	277.2
Lockheed Martin Corporation	29.4	Yorba Linda Country Club	398.5
Los Alamitos Race Course	254.8	Yorba Linda Water District	11,461.2
Melrose Abbey Funeral Center	49.0		
Mesa Verde Country Club	375.0	Total	234,224.3

**APPENDIX 3. 2017-18 Groundwater Production —
Irrigation Use Production Over 25 Acre-feet**

PRODUCER	AF
Berumen Farms, Inc.	29.0
F.S. Nursery c/o Southern CA Edison	44.5
Irvine Ranch Water District	721.4
Mesa Water District	73.9
Neff Ranch, LTD	75.9
Orange County Produce	567.3
Pursche, Roy	196.4
Village Nurseries	29.9
Total	1,738.3

**APPENDIX 4. Non - Local Water Purchased by OCWD for
Water Years 1998-99 through 2017-18**

Water Year	Water Exchange		Alamitos Barrier		Talbert Barrier		Forebay Recharge		In-Lieu Program		Basin		SAR Upstream GW Projects		TOTAL							
	Purch.	AF	Purch.	AF	Purch.	AF	Purch.	AF	Purch.	AF	Purch.	AF	Purch.	AF								
																Mun. WD		CUP ²		WSM Program ³	Arlington Desalter	SBVMWD
																Barrier	OC32A	OC44B	MCWD			
1998-99	996.1	1,493.6	-	-	-	-	10,371.5	-	-	-	13,351.9	2,351.3	-	28,564.4								
1999-00	-	1,873.6	-	-	-	-	28,478.1	-	24,726.0	-	13,280.8	4,994.6	-	73,353.1								
2000-01	-	1,672.5	941.7	-	-	-	59,138.4	-	11,191.0	-	7,449.0	5,177.9	2,787.6	88,358.1								
2001-02	2,990.3	2,282.2	2,673.0	-	-	-	30,092.6	-	19,472.4	-	-	5,819.8	4,296.4	67,626.7								
2002-03	3,471.4	1,448.7	1,540.1	-	-	-	35,755.1	-	25,631.0	-	35,832.0	4,924.7	-	108,603.0								
2003-04	3,605.0	1,938.3	1,703.3	3,380.6	-	-	14,832.0	2,462.7	49,688.8	-	-	4,087.3	-	84,177.6								
2004-05	-	1,914.9	2,451.8	8,368.6	-	-	3,810.8	-	15,021.1	54,596.1	-	567.5	-	86,730.8								
2005-06	-	833.0 ⁴	1,079.9	5,431.1	-	-	7,256.7	-	15,452.9	73,763.1 ⁵	-	-	-	103,816.7								
2006-07	1,745.0	534.1 ⁴	143.9	7,394.7	-	-	42,173.0	-	14,427.3	36,313.0	-	227.6	-	102,958.6								
2007-08	2,882.4	1,505.7 ⁴	-	4,581.4	-	-	-	-	-	-	-	1,266.6	-	10,236.1								
2008-09	3,663.5	2,094.2 ⁴	-	4,140.3	-	-	18,100.0	-	-	-	-	428.2	-	28,426.2								
2009-10	-	1,321.9 ⁴	-	176.9	-	-	20,535.7	-	-	-	-	106.2	-	22,140.7								
2010-11	-	1,689.1 ⁴	-	100.5	-	-	11,038.6	16,500.0	-	10,435.4	-	-	-	39,763.6								
2011-12	-	1,198.7 ⁴	-	1.9	-	-	41,230.8	7,709.6	9,719.9	30,843.6	-	-	-	90,704.5								
2012-13	-	1,721.8 ⁴	-	3.7	-	-	24,356.1	15,570.8	-	-	-	-	-	41,652.4								
2013-14	-	2,370.2 ⁴	-	6.2	-	-	50,700.5	-	-	-	-	-	-	53,076.9								
2014-15	-	2,236.3 ⁴	-	17.7	-	-	48,616.8	-	-	-	-	-	-	60,870.8 ⁶								
2015-16	-	2,398.9 ⁴	-	7.0	-	-	45,118.0	-	-	-	-	-	-	47,523.9								
2016-17	-	1,166.1 ⁴	-	7.8	-	-	48,918.1	-	-	-	-	-	-	50,092.0								
2017-18	-	912.2 ⁴	-	18.4	-	-	66,113.5	-	73,108.6	-	-	-	-	140,152.7								
Total	19,353.7	32,606.0	10,533.7	33,636.8	606,636.3	42,243.1	57,100.8	69,913.7	29,951.7	7,084.0	1,328,828.8 ⁶											

¹ Includes only imported water and excludes groundwater deliveries from Fountain Valley to OCWD.

² CUP is the multi-agency conjunctive use program (known as the MWD Long-Term Groundwater Storage Program or MWD CUP). Basin losses are excluded.

³ Known as Basin Water Supply Management Program (WSM) water. WSM program was terminated on December 31, 2003.

⁴ Includes both MWD imported deliveries and supplemental recycled water deliveries.

⁵ Includes 16,000 AF of 2005-06 MWD Supplemental Storage Program (i.e., "Super In-Lieu") water that was received as In-Lieu by the groundwater producers.

⁶ Includes purchase of 10,000 AF of stored water from MWD CUP storage account at full-service untreated water rate in water year 2014-15.

APPENDIX 5. 2017-18 Water Resources Summary

	2017-2018 Water Year (AF)	2016-2017 Water Year (AF)	Change from last year to this year
SUMMARY OF BASIN CONDITIONS			
BASIN SUPPLIES			
Water Purchases from MWD (excludes In-Lieu)	66,113	48,918	17,195
Water into MWD Storage Account (excludes In-Lieu)	0	1,556	(1,556)
SAR and Santiago Creek Flows ¹	93,633	206,616	(112,983)
GWRS AWPf Water to Forebay Recharge Basins	83,225	61,965	21,260
GWRS AWPf Water to Mid-Basin Injection	1,549	1,563	(14)
GWRS AWPf Water to Talbert Barrier	20,746	33,247	(12,501)
Imported Water to Talbert Barrier (OC-44 & Fountain Valley)	19	8	11
Alamitos Barrier	912	1,166	254
Incidental Recharge	25,687	68,822	(43,135)
Evaporation from Recharge Facilities	(3,363)	(3,292)	(71)
SAR Flow Lost to Pacific Ocean	(605)	(67,933)	67,328
Total Groundwater Recharge	287,916	352,637	(64,721)
WATER PRODUCTION			
Groundwater Production	236,916	301,637	(64,721)
MWD Storage Program Extractions	0	0	0
Total Groundwater Production	236,916	301,637	(64,721)
BASIN STATUS			
Change in Groundwater Storage	51,000	51,000	0
Change in Groundwater Storage excluding MWD Stored Water	51,000	49,444	1,556
Accumulated Overdraft (AOD)	(277,000)	(328,000)	51,000
AOD without MWD Storage Program Water	(277,000)	(329,730)	52,730
IN-LIEU WATER			
OCWD In-Lieu Purchases	73,108	0	(73,108)
MWD In-Lieu Storage	0	0	0
Total In-Lieu	73,108	0	(73,108)
OTHER KEY INFORMATION			
1. Total Dissolved Solids of SAR below Prado Dam (mg/L)	670	724	(54)
2. Total Nitrogen of SAR below Prado Dam (mg/L)	3.7	3.8	(0.1)
3. Total GWRS AWPf Production ²	105,621	96,868	8,753
4. Green Acres Project	3,783	3,566	217
5. Base Flow of Santa Ana River	67,984	67,946	(38)
6. Year-end Storage behind Prado Dam	2	0	2
7. Year-end Storage in Recharge Facilities	12,579	14,597	(2,018)
8. Total Artificial Recharge (percolation plus barriers)	262,230	283,815	(21,585)
9. Rainfall Measured at OCWD Field Headquarters (inches)	3.86	19.68	(15.82)
10. Annual Mean Temperature at Santa Ana Fire Station (°F)	68.3	67.7	(0.6)

¹ Accounts for storage to/from recharge facilities.

² Total includes deliveries to recharge basins, Talbert Barrier, MBI, Anaheim Canyon Power Plant and ARTIC.

APPENDIX 6. Typical Groundwater Extraction Facility Characteristics

PARAMETER	CHARACTERISTICS
Water System Pressure	62 psi
Load (Use) Factor	63%
Design Flow Rate	2,563 gpm
Annual Production	2,600 AF
Bowl Efficiency (minimum)	84%
Motor Horsepower	325 hp
Type Motor	Electric
Well Casing Diameters	16 – 20 inches
Type of Pump	Vertical Turbine
Depth of Well	1,052 feet
Depth of Bowls	278 feet
Total Dynamic Head	325 feet
Estimated Life	30 years
Annual Cost of Facilities ¹	\$325,000

¹ Assuming \$5,000,000 capital cost (including design and construction) with an interest rate of 5 percent amortized over a 30-year period and excluding the cost for land purchase.

APPENDIX 7. Values Used in Figure 6 For Water Rates for Non-Irrigation Use

Water Year	RA (\$/AF)	Estimated Groundwater Production Cost ^{1,2} (\$/AF)	MWD Treated Interruptible Rate (In-Lieu Program) ^{2,3} (\$/AF)	MWD Treated Uninterruptible Rate (Full Service) ^{2,3} (\$/AF)
1985-86	32	85	181	225
1986-87	32	91	187	231
1987-88	32	91	187	231
1988-89	42	105	187	231
1989-90	45	119	136	231
1990-91	48	91	137	232
1991-92	51	100	156	263
1992-93	60	116	206	325
1993-94	67.5	124	257	389
1994-95	88	145	279	416
1995-96	85	140	294	440
1996-97	88	140	303	448
1997-98	91	141	303	455
1998-99	94	143	303	458
1999-00	100	150	303	459
2000-01	107	150	303	459
2001-02	117	162	303	459
2002-03	127	176	299	455
2003-04	149	203	301	460
2004-05	172	229	318	479
2005-06	205	258	337	494
2006-07	223	278	354	510
2007-08	237	296	382	538
2008-09	249	307	420	586
2009-10	249	308	501 ⁴	701
2010-11	249	310	602 ⁴	744
2011-12	254	315	633 ⁴	794
2012-13	266	330	-.5	794
2013-14	276	334	-.5	890
2014-15	294	349	-.5	923
2015-16	322	386	-.5	942
2016-17	402	473	-.5	979
2017-18	445	513	-.5	1,015
2018-19	462	529	-.5	1,050
2019-20	487	557	-.5	1,144 ⁴

¹ Includes RA plus energy cost to produce groundwater.

² Rate is rounded.

³ Rate is proposed.

⁴ Rate is estimated.

⁵ This rate is no longer available because MWD terminated the Replenishment Program.

APPENDIX C – MESA WATER DISTRICT, ORDINANCE NO. 26, MAY

ORDINANCE NO. 26

**ORDINANCE OF THE
MESA WATER DISTRICT BOARD OF DIRECTORS
ADOPTING THE MESA WATER DISTRICT
WATER CONSERVATION AND
WATER SUPPLY EMERGENCY PROGRAM
RESCINDING ORDINANCE NOS. 8, 19, 24**

WHEREAS, the Mesa Water District (Mesa Water® or District) is a county water district organized and operating according to California law; and

WHEREAS, water is a limited natural resource and the District desires to use this natural resource in the most efficient manner possible; and

WHEREAS, Mesa Water District has the authority to adopt water conservation requirements and programs to promote and effectuate wise water use and avoid water wastage; and

WHEREAS, the Board of Directors (Board) of Mesa Water District has previously adopted, and supplemented, Ordinance No. 8 adopting an Emergency Water Conservation Program, which was adopted on March 21, 1991 (Ordinance No.8); and

WHEREAS, Ordinance No. 8 was further supplemented by the adoption of Ordinance No. 19 on December 10, 2007, and Ordinance No. 24 on August 28, 2014 (Ordinance No. 8, as supplemented, Ordinance Nos. 19 and 24 are collectively in certain cases referred to herein as the "Prior Ordinances"); and

WHEREAS, the District desires to repeal its existing Water Conservation Programs and establish an updated and consolidated Water Conservation and Water Supply Emergency Program (Conservation Program) to conform to additional State Water Resources Control Board (SWRCB) Regulations; and

WHEREAS, periodic droughts are a historic fact in the State of California; and

WHEREAS, the District's service area is located in a region with a Mediterranean climate, densely populated demographics, and a mixed economic base of residential, commercial, industrial, and institutional consumers; and

WHEREAS, Mesa Water District derives the water which it delivers to its customers from local groundwater and supplemental waters imported from outside District boundaries; and

WHEREAS, the quality and quantity of supplemental imported water is under the control of other agencies, and may be subject to conditions beyond the control of those other agencies or Mesa Water District; and

WHEREAS, pursuant to California Water Code Section 31026, Mesa Water District may restrict the use of water it provides during any emergency caused by drought, or other threatened or existing water shortage, and to prohibit the wastage of water or the use of water it provides during such periods, for any purpose other than domestic uses or such other restricted uses as may be determined to be necessary by the District and may prohibit use of water it provides during such periods for specific uses which it may from time to time find to be non-essential; and

WHEREAS, pursuant to the applicable provisions of California law, Mesa Water District is required to periodically prepare and update an Urban Water Management Plan in order to address certain water supply and planning requirements; and

WHEREAS, Water Code Section 10632 requires the Urban Water Management Plan to provide an urban water shortage contingency analysis, which includes stages of action to be undertaken by an urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage; and

WHEREAS, pursuant to California Water Code Sections §§31020, and 375-377, inclusive, Mesa Water District may establish additional guidelines, surcharges, cost recovery systems, enforcement procedures, and other rules and regulations to assist in the conservation of water; and

WHEREAS, the Board of Directors of Mesa Water District finds and determines that a water shortage or threat of a water shortage may be found to exist based upon the occurrence of one or more of the following conditions or circumstances:

- A. A general water supply shortage due to increased demand and/or limited supplies.
- B. Distribution or storage facilities of Mesa Water District or any agency supplying water to the District, become inadequate or are restricted.
- C. A major failure of the supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to the District.
- D. Contamination of the water supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to the District.
- E. Acts of nature which in the opinion of Mesa Water District constitute an emergency situation or which require special water conservation actions.

WHEREAS, prior to the adoption of this Ordinance, the Board has conducted a noticed public hearing to receive public comments concerning the subject matter hereof; and

WHEREAS, the purpose of this Ordinance is to adopt and enact the Conservation Program within the District's service area.

NOW, THEREFORE, BE IT ORDAINED BY THE MESA WATER DISTRICT BOARD OF DIRECTORS AS FOLLOWS:

Section 1. Recitals. The foregoing recitals are true and correct and are incorporated herein by this reference.

Section 2. Findings. The Board hereby finds and determines as follows:

- a. A reliable minimum supply of potable water is essential to the public health, safety, and welfare of the people, and economy of the southern California region.
- b. Water management that includes active water use efficiency measures not only in times of drought, but at all times, is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.
- c. California Water Code Section 375 authorizes water suppliers to adopt and enforce a comprehensive water conservation program to reduce water consumption and conserve supplies.
- d. Mesa Water District has the authority, pursuant to California Water Code Sections 31026-31029 to take action(s) relative to the use and conservation of water within its service area.
- e. The adoption and enforcement of a permanent water conservation program is necessary to help to manage the District's potable water supply in the short and long-term and to avoid or minimize the effects of periodic drought and shortage conditions within, or affecting its service area and potable water supplies. Such program is essential to ensure a reliable and sustainable minimum supply of water for the public health, safety and welfare.
- f. The Board does hereby find that the following circumstances may constitute an emergency condition or a threatened or existing water shortage condition within or affecting Mesa Water District:
 - i. A general water supply shortage due to increased demand and/or limited supplies.

- ii. Distribution or storage facilities of Mesa Water District or any agency supplying water to the District, become inadequate.
- iii. A major failure of the supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to its service area.
- iv. Contamination of the water supply, storage, and/or distribution facilities of Mesa Water District or any agency supplying water to its service area.
- v. Acts of nature which in the opinion of the District constitute an emergency situation.

Section 3. Program Designation; Purpose; Intent and Integration.

- a. The purpose of the Conservation Program enacted by this Ordinance is to establish a water conservation and water supply emergency program that will reduce water consumption within the District's service area through water conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within the District's service area to avoid and minimize the effect and hardship of water shortages to the greatest extent possible.
- b. This Conservation Program enacted by this Ordinance establishes permanent water conservation standards intended to alter behavior related to water use efficiency at all times and further establishes three levels of water supply shortage response actions to be implemented during times of declared water shortage or declared water shortage emergency, with increasing restrictions on water use in response to worsening drought or emergency conditions and decreasing supplies as determined by the Board.
- c. This Ordinance, and the Conservation Program enacted hereby, is intended solely to further the conservation of water. It is not intended to implement any provision of federal, State, or local statutes, ordinances, or regulations relating to protection of water quality or control of drainage or runoff. This Ordinance, and the Conservation Program enacted hereby, shall not act to repeal, supersede or amend any federal, State or local law, ordinance or regulation relating to protection of water quality or control of drainage or runoff (including, but not limited to, any and all NPDES permits or requirements which

may be applicable in such instance) or exempt any person or party from compliance therewith.

- d. Mesa Water's prior Water Conservation Programs, as adopted, supplemented, and amended pursuant to the Prior Ordinances, are rescinded and superseded upon this Ordinance becoming effective.

Section 4. Conservation Program Provisions.

- a. The Conservation Program provisions are set forth in Exhibit A to this Ordinance and are incorporated herein by this reference.
- b. The Conservation Program shall be referred to in Mesa Water's Rules and Regulations for Water Service.
- c. The Board reserves the right to amend, revise, and/or supplement this Ordinance and/or the Conservation Program provisions in the future based upon the District's needs, circumstances and requirements.
- d. This Ordinance and the Conservation Program are adopted by this Board pursuant to the provisions and authority set out in the California Constitution and California law as referenced herein.
- e. All penalties set forth in the Conservation Program are administrative and regulatory penalties and are not fees or charges for water service or water capacity.

Section 5. CEQA Exemption.

The Board finds that this Ordinance, the Water Conservation and Water Supply Emergency Program (Conservation Program), and actions taken hereafter pursuant to the Conservation Program are exempt from the California Environmental Quality Act as specific actions necessary to prevent or mitigate an emergency pursuant to 14 California Code of Regulations, Sections 15269, 15273, and 15321, and the applicable statutes of the Public Resources Code.

The General Manager is hereby authorized and directed to file a Notice of Exemption as soon as possible following the adoption of this Ordinance.

Section 6. Terms and Provisions. The terms and provisions of this Ordinance, and the Conservation Program enacted hereby, shall be subject to, and shall be interpreted pursuant to, State law.

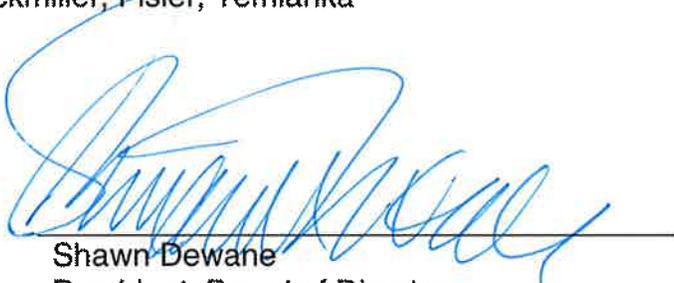
Section 7. Notice and Provisions: Notice of the adoption of this Ordinance, and the provisions hereof, shall be provided as set out in State law, including, but not limited to, Water Code Section 31027.

Section 8. Other Actions. Mesa Water District staff and officers are hereby authorized and directed to take such other and further action(s) as may be reasonably necessary to carry out the determinations, findings and directives set forth herein, and in the Conservation Program enacted hereby, within the limits set forth by, and in accordance with, direction of the Board.

Section 9. Effective Date. This Ordinance No. 26, and the Conservation Program enacted hereby, shall take effect on May 14, 2015.

ADOPTED, SIGNED, AND APPROVED this 14th day of May 2015 by a roll call vote:

AYES: DIRECTORS: Atkinson, Bockmiller, Fislser, Temianka
NOES: DIRECTORS:
ABSENT: DIRECTORS: Dewane
ABSTAIN: DIRECTORS:



Shawn Dewane
President, Board of Directors

ATTEST:



Coleen L. Monteleone
District Secretary

ORDINANCE NO. 26

EXHIBIT A

**ORDINANCE OF THE
MESA WATER DISTRICT BOARD OF DIRECTORS
ADOPTING THE MESA WATER DISTRICT
WATER CONSERVATION AND
WATER SUPPLY EMERGENCY PROGRAM
RESCINDING ORDINANCE NOS. 8, 19, 24**

Mesa Water District
Water Conservation and
Water Supply Emergency Program

Adopted: May 14, 2015

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Section 1: **Title.** This program is designated as the Water Conservation and Water Supply Emergency Program (Conservation Program).

Section 2. **Authority.** The Conservation Program is adopted pursuant to California law and the provisions of Mesa Water District Ordinance No. 26. The General Manager is hereby authorized and directed to implement the provisions of this Conservation Program as provided for herein.

Section 3. **Definitions.** The following words and phrases whenever used in this Conservation Program have the meaning(s) defined in this section:

- a. **“Board”** means the Board of Directors of Mesa Water District.
- b. **“Conservation Program”** means the Mesa Water District Water Conservation and Water Supply Emergency Program.
- c. **“Conservation Fee”** means any monetary fee assessed by Mesa Water District for violations of the Conservation Program.
- d. **“Customer”** means any person, persons, firm, corporation, association, or agency receiving water or services from Mesa Water District.
- e. **“General Manager”** means the duly appointed and acting General Manager of the Mesa Water District, or an authorized agent.
- f. **“Landscape Irrigation System”** means an irrigation system with pipes, hoses, spray heads, or sprinkling devices that are operated by hand or through an automated system.
- g. **“Large Landscape Areas”** means a lawn, landscape, or other vegetated area, or combination thereof, equal to more than 5,000 square feet of irrigable land.
- h. **“Mesa Water® or District”** means the Mesa Water District, a county water district organized pursuant to California Water Code Sections 33200 and following and operating pursuant to Water Code Sections 30000 and following. References to Mesa Water® or the District also include its Directors, officers, agents, and employees, as applicable.
- i. **“Person”** means any natural person or persons, corporation, public or private entity, governmental agency or institution, including Mesa Water District, or any other user of water provided by the District.
- j. **“Potable Water”** means water that is suitable for drinking.

- k. **“Recycled Water”** means the reclamation and reuse of non-potable water for beneficial use as defined in Title 22 of the California Code of Regulations.
- l. **“Single Pass Cooling Systems”** means equipment where water is circulated only once to cool equipment before being disposed.
- m. **“Water Conservation Coordinator”** means the person (who may be an officer or employee of Mesa Water District) charged with the principal enforcement of this Conservation Program. The Water Conservation Coordinator may be the General Manager or another person so designated in writing by the General Manager.
- n. **“Water Flow Restrictor”** means a device that is inserted into the service connection and is designed to limit the water flow capacity.

Section 4. Application.

- a. The provisions of this Conservation Program apply to any customer, Person, and property using water provided by Mesa Water District.
- b. The provisions of this Conservation Program do not apply to uses of water necessary to protect public health and safety or for essential government services, such as police, fire, and other similar emergency services.
- c. The provisions of this Conservation Program do not apply to the use of Recycled Water, with the exception of Sections 6(b), 6(d), 6(m), 6(n), 7(b)(2), 8(b)(2), and 9(b)(2).
- d. The provisions of this Conservation Program do not apply to the use of water by commercial nurseries and commercial growers to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale, with the exception of Section 6(b).
- e. This Conservation Program is intended solely to further the conservation of water.

Section 5. Procedures for Determination of Water Supply Shortage and Level Implementation.

The existence of a Level 1, Level 2 or Level 3 Water Supply Shortage condition may be declared by resolution adopted by the Board at a regular, adjourned regular, or special Board meeting.

The Board shall determine the extent of the Water Supply Shortage condition, and the corresponding conservation required through the implementation and/or termination of particular levels, which may be made upon recommendation by the General Manager.

In the event of an extreme emergency, requiring immediate action that cannot be delayed until the next regular, adjourned regular, or special Board meeting, the General Manager shall determine the extent of the conservation required and implement the appropriate level necessary to achieve the required level of conservation. In such event, the General Manager shall notify the Board as soon thereafter as practical and shall consult with the Board President with regard to the calling of an emergency meeting of the Board.

The General Manager will provide a plan to the Board that specifies a timeline for noticing of customers and the implementation of the Water Supply Shortage Level determined by the Board. In addition, the Board of Directors shall be notified at the next regular, adjourned regular, or special Board Meeting of any action taken by the General Manager under this Conservation Program.

A Water Supply Shortage Level shall be deemed to be effective upon the date of adoption and shall remain in place until rescinded, superseded, or modified by further action of the Board.

Section 6: Permanent Water Conservation Requirements – Prohibition Against Waste.

This Section is intended to provide for up to a 10 percent reduction in water usage.

The following water conservation requirements shall be effective at all times as prescribed by the Board and shall be permanent. Violations of this Section constitute waste and an unreasonable use of water.

- a. **Limits on Watering Hours:** Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time on any day. Hand-held watering cans, buckets, or similar containers reasonably used to convey water for irrigation purposes are not subject to these time restrictions. Similarly, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device may be used during the otherwise restricted period. If necessary, and for very short periods of time for the express purpose of adjusting or repairing it, one may operate an irrigation system during the otherwise restricted period.

- b. **No Excessive Water Flow or Runoff:** No person shall cause or allow watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive runoff from the property. Additionally, to the extent prohibited by any Statewide statute, or regulation adopted by any State agency with jurisdiction to adopt such regulations, including, but not limited to, the State Water Resources Control Board, no person shall cause or allow water to flow or runoff their property onto adjacent property, non-irrigated areas, private and public walkways, driveways, roadways, gutters or ditches, parking lots, or structures.
- c. **No Washing Down Hard or Paved Surfaces:** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, is prohibited except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with a fully functioning, positive self-closing water shut-off device, a low-volume, high-pressure cleaning machine equipped to recycle any water used, or a low-volume high-pressure water broom.
- d. **Obligation to Fix Leaks, Breaks or Malfunctions:** Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than seven (7) days of receiving notice from the District, is prohibited.
- e. **Re-circulating Water Required for Water Fountains and Decorative Water Features:** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.
- f. **Limits on Washing Vehicles:** Using water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a fully functioning, positive self-closing water shut-off nozzle or device that causes it to cease dispensing water immediately when not in use. This subsection does not apply to any commercial car washing facility.
- g. **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, or other public place where food or drinks are sold,

served, or offered for sale, are encouraged not to provide drinking water to any person unless expressly requested.

- h. **Commercial Lodging Establishments Must Provide Guests Option to Decline Daily Linen Services:** Hotels, motels and other commercial lodging establishments must provide customers the option of not having towels and linen laundered daily. Commercial lodging establishments shall prominently display notice of this option in each bathroom using clear and easily understood language.
- i. **No Installation of Single Pass Cooling Systems:** Installation of single pass cooling systems is prohibited in buildings requesting new water service from Mesa Water District.
- j. **No Installation of Non-re-circulating in Commercial Car Wash and Laundry Systems:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.
- k. **Restaurants Required to Use Water Conserving Dish Wash Spray Valves:** Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.
- l. **Commercial Car Wash Systems:** All commercial conveyor car wash systems must utilize re-circulating water systems, or must secure a waiver of this requirement from Mesa Water District.
- m. **Recycled Water Use Required if Available:** After the District has provided to the user an analysis demonstrating that Recycled Water is available, cost effective, and safe for the intended use, and the user has been given a reasonable time to make the conversion to recycled water, the use of potable water, is prohibited.
- n. **Water Recycling – New Service:** Prior to the connection of any new commercial, industrial, or multi-residential water service, the District shall perform an evaluation to determine whether recycled water is available, cost effective, and safe for the intended use to supply all or some of the water needed by the new user. If available, cost effective, and safe for the intended use, recycled water must be used.

Section 7: Level 1 Water Supply Shortage: Water Alert.

This Section is intended to provide for up to a 20 percent reduction in water usage.

- a. A Level 1 Water Supply Shortage exists when Mesa Water District determines, in its sole discretion, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration of a Level 1 Water Supply Shortage condition, the District will implement all of the mandatory Level 1 conservation measures identified in this Section.
- b. **Additional Water Conservation Measures:** In addition to the prohibited uses of water identified in Section 6, the following water conservation requirements shall apply during a declared Level 1 Water Supply Shortage as prescribed by the Board:
 - 1. **Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of three (3) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.
 - 2. **Obligation to Fix Leaks, Breaks or Malfunctions:** All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within seventy-two (72) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.
 - 3. **Irrigation During Rain Events:** Irrigation is prohibited during rain events.
- c. **Other Measures Available for Consideration:** In addition to the conservation requirements specified in Sections 6 and 7(b), other measures are available for additional consideration by the Board that may be necessary to achieve immediate or short term water conservation, and are referenced in Section 10.

Section 8. Level 2 Water Supply Shortage: Water Warning.

This Section is intended to provide for up to a 30 percent reduction in water usage.

- a. A Level 2 Water Supply Shortage exists when Mesa Water District determines, in its sole discretion, that due to drought or other water

supply conditions, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions. Upon the declaration of a Level 2 Water Supply Shortage condition, the District will implement all of the mandatory Level 2 conservation measures identified in this Section.

- b. **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Sections 6 and 7, the following additional water conservation requirements shall apply during a declared Level 2 Water Supply Shortage as prescribed by the Board:
 - 1. **Designated Watering Days:** Watering or irrigating of lawn, landscape, or other vegetated area is limited up to a maximum of two (2) days per week on a schedule established and posted by Mesa Water District by a Resolution of the Board of Directors. This provision does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system, and then only while under the supervision of a competent person.
 - 2. **Obligation to Fix Leaks, Breaks or Malfunctions:** All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within forty-eight (48) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.
 - 3. **Limits on Filling Ornamental Fountains, Lakes, and Ponds:** Filling or re-filling ornamental fountains, lakes, and ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals have been actively managed within the water feature prior to declaration of a supply shortage level under this Conservation Program.
- c. **Other Measures Available for Consideration:** In addition to the conservation requirements specified in Sections 6, 7, and 8, other measures are available for additional consideration by the Board that may be necessary to achieve immediate or short term water conservation, and are referenced in Section 10.

Section 9. Level 3 Water Supply Shortage – Water Emergency.

This Section is intended to provide for up to a 50 percent reduction in water usage.

- a. A Level 3 Water Supply Shortage condition is also referred to as an “Emergency” condition. A Level 3 condition exists when Mesa Water District declares a water shortage emergency and notifies its residents and businesses that a significant reduction in consumer demand is necessary to maintain sufficient water supplies for public health and safety. Upon the declaration of a Level 3 Water Supply Shortage condition, the District may implement all of the mandatory Level 3 conservation measures identified in this section as prescribed by the Board.
- b. **Additional Conservation Measures:** In addition to the prohibited uses of water identified in Sections 6, 7, and 8, the following water conservation requirements shall apply during a declared Level 3 Water Supply Shortage Emergency:
 1. **No Watering or Irrigating:** Watering or irrigating of lawn, landscape, or other vegetated area is prohibited. This restriction does not apply to the following categories of use:
 - i. Maintenance of vegetation, including trees and shrubs, that are watered using a hand-held bucket or similar container, hand-held hose equipped with a positive self-closing water shut-off nozzle or device.
 - ii. Maintenance of existing landscape necessary for fire protection.
 - iii. Maintenance of existing landscape for soil erosion control.
 - iv. Maintenance of plant materials identified to be rare or essential to the well-being of protected species.
 - v. Maintenance of landscape within active public parks and playing fields, day care centers, golf course greens, and school grounds, provided that such irrigation does not exceed a maximum of two (2) days per week according to the schedule established in Section 8(b)(1) and time restrictions in Section 6(a).
 - vi. Actively irrigated environmental mitigation projects.

2. **Obligation to Fix Leaks, Breaks or Malfunctions:** All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired within twenty four (24) hours of notification by Mesa Water District, or turned off, unless other arrangements are made with the District.
3. **Car Washing at Commercial Facilities Only:** Washing of motor vehicles, trailers, boats, aircraft and other types of mobile equipment shall be done only at a commercial car wash with water recycling facilities. No restrictions apply where the healthy, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables.
4. **No Initial Filling or Re-Filling of Swimming Pools & Spas:** Filling and Re-Filling of residential swimming pools or outdoor spas with water is prohibited.
5. **No New Potable Water Service:** No new potable water service will be provided, no new temporary meters or permanent meters will be provided, and no statements of immediate ability to serve or provide potable water service (such as, will-serve letters, certificates, or letters of availability) will be issued, except under the following circumstances:
 - i. A valid, unexpired building permit has been issued for the project; or
 - ii. The project is necessary to protect the public health, safety, and welfare; or
 - iii. A parcel that has or previously had a water meter; or
 - iv. The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the District.

This provision does not preclude the resetting or turn-on of meters to provide continuation of water service or the restoration of service that has been interrupted prior to declaration of a supply shortage level under this Conservation Program.

- c. **Other Measures Available for Consideration:** In addition to the conservation requirements specified in Sections 6, 7, 8, and 9, other measures are available for additional consideration by the Board that

may be necessary to achieve immediate or short term water conservation, and are referenced in Section 10.

Section 10. Other Conservation Measures Available for Implementation.

The following water conservation measures may be implemented at any Water Supply Shortage Level, in addition to, or supplementary to, the Water Conservation Measures set out in Sections 6-9, inclusive, pursuant to the directive(s) of the Board.

- a. **Large Landscape Areas – Rain Sensors:** Large landscape areas, such as parks, cemeteries, golf courses, school grounds, and playing fields, that use landscape irrigation systems to water or irrigate, must use landscape irrigation systems with rain sensors that automatically shut off such systems during periods of rain or irrigation timers which automatically use information such as evapotranspiration sensors to set an efficient water use schedule.
- b. **Recycled Water for Construction Purposes:** Recycled or non-potable water must be used for construction purposes when available, feasible, and cost-effective.
- c. **Water Conserving Plumbing Standards – Change in Service:** Upon the establishment of new water service or a new customer of record for an existing service, all existing plumbing fixtures (including but not limited to: toilets, showerheads, and faucets) must be retrofitted exclusively with water-conserving plumbing fixtures. The water use standards permitted will be those current standards approved by the California Energy Commission.
- d. **Irrigation During Rain Events:** The application of potable water to outdoor landscapes during and up to forty-eight (48) hours after measurable rainfall is prohibited.
- e. **Irrigated Medians:** The use of potable water to irrigate ornamental turf on public street medians is prohibited.
- f. **Irrigated Parkways:** The use of potable water to irrigate ornamental turf on public street parkways is prohibited.
- g. **Drinking Water Served Upon Request Only:** Eating or drinking establishments, including but not limited to a restaurant, hotel, cafe, cafeteria, bar, or other public place where food or drinks are sold, served, or offered for sale, are prohibited from providing drinking water to any person unless expressly requested.

- h. **Other Measures:** Other measures as may be required by the State or deemed necessary by the Board.

Section 11. Penalties, Violations, and Enforcement.

During Effective Period of Permanent Water Conservation Requirements

- a. **Penalties:** Penalties for failure to comply with any provisions of the Conservation Program while Mesa Water District is enforcing the Permanent Water Conservation stage are as follows:
 - 1. **First Violation:** Mesa Water District will issue a written warning and deliver a copy of this Conservation Program to the service address and/or by mail.
 - 2. **Second Violation:** A second violation within the preceding twelve (12) calendar months will receive a second written warning and an attempt to contact the customer of record via telephone.
 - 3. **Third Violation:** A third violation within the preceding twelve (12) calendar months will receive a third written warning with reference to the previous two violations and possibility of future actions including, but not limited to, water flow restriction and discontinued water service.
 - 4. **Fourth and Subsequent Violations:** A fourth and any subsequent violation within the preceding twelve (12) calendar months may result in the installation of a water flow restrictor.
 - 5. **Water Flow Restrictor:** In addition to any written warnings, Mesa Water District may install a water flow restrictor device of approximately one gallon per minute capacity for services up to one and one-half inch size and comparatively sized restrictors for larger services after written notice of intent to install a flow restrictor until the prohibited actions or practices have been deemed by the District to be satisfactorily discontinued or remedied and for a minimum of forty-eight (48) hours.
 - 6. **Discontinuing Service:** In addition to any fines and the installation of a water flow restrictor, Mesa Water District may disconnect a customer's water service for willful violations of mandatory restrictions in this Conservation Program.

During Effective Period of Level 1, Level 2, and Level 3 – Water Supply Shortage(s)

- b. **Penalties:** Penalties for failure to comply with any provisions of the Conservation Program while Mesa Water District is enforcing Water Supply Shortage Level 1, Level 2, or Level 3 are as follows:
1. **First Violation:** A written warning will be issued and a copy of this Conservation Program delivered to the service address and/or by mail.
 2. **Second Violation:** A second violation within the preceding twelve (12) calendar months will receive a second written warning and an attempt to contact the customer of record via telephone.
 3. **Third Violation:** A third violation within the preceding twelve (12) calendar months will receive a third written warning with reference to the previous two violations and a Conservation Fee of \$100, or the current charge per the schedule of fees and charges as then in effect, will be assessed to the customer's water account.
 4. **Fourth and Subsequent Violations:** A fourth and any subsequent violation within the preceding twelve (12) calendar months will receive an additional written warning with reference to the previous violations and a Conservation Fee of \$200, or the current charge per the schedule of fees and charges as then in effect, will be assessed to the customer's water account.
 5. **Discontinuing Service:** In addition to any fines, Mesa Water District may disconnect a customer's water service for a willful violation of mandatory restrictions in this Conservation Program.
- c. **Cost of Flow Restrictor, Conservation Fees, and Disconnecting Service:** A person or entity that violates this Conservation Program is responsible for payment of charges for installing and/or removing any flow restricting device, Conservation Fees, and for disconnecting and/or reconnecting service per the schedule of fees and charges as then in effect. The charge for installing and/or removing any flow restricting device must be paid before the device is removed. Nonpayment thereof will be subject to the same remedies as nonpayment of water rates.
- d. **Separate Offenses:** Each day that a violation of this Conservation Program occurs is a separate offense.

e. **Notice and Hearing:**

1. Mesa Water District will issue a Notice of Violation by mail or personal delivery at least ten (10) days before taking enforcement action on a particular violation. Such notice shall describe the violation and the date by which corrective action(s) must be taken. A customer may appeal the Notice of Violation by filing a written notice of appeal attention the District Secretary no later than the close of business on the day before the date scheduled for enforcement action. Any Notice of Violation not timely appealed will be final. Upon receipt of a timely appeal, a hearing on the appeal will be scheduled by the General Manager, and a written notice of the hearing date will be mailed to the customer at least ten (10) days before the date of the hearing.

f. **Additional Actions, Penalties:** The Board may prescribe additional action(s) and/or penalties for violation of the prohibited actions or practices described herein. Mesa Water District may also implement additional actions or programs to educate its customers, ratepayers, and Persons in the District's service area as to the on-going need to conserve and use water wisely.

g. **Application of Penalties:** The General Manager or Water Conservation Coordinator, as applicable, shall have discretion as to the application of penalties and enforcement actions set forth herein. The overall intention of this Conservation Program is to implement water conservation actions as described herein.

h. The penalties established and set forth herein are regulatory and administrative in nature. Such penalties are not imposed for water service or water capacity to any particular customer or person.

Section 12. Hardship Waiver.

a. **Undue and Disproportionate Hardship:** If, due to unique circumstances, a specific requirement of this Conservation Program would result in undue hardship to a Person using water or to property upon which water is used, then the Person may apply for a waiver to the requirements as provided in this Section.

b. **Written Finding:** The waiver may be granted or conditionally granted only upon a written finding of the existence of facts demonstrating an undue hardship to a person using water or to property upon which water is used.

1. **Application:** An application for a waiver must be on a form prescribed by Mesa Water District and is available upon request from the Water Conservation Coordinator. The application must be submitted to the Water Conservation Coordinator and be accompanied by a written statement of the applicant.
2. **Approval Authority:** The Water Conservation Coordinator, as applicable, must act upon any completed application no later than ten (10) days after submittal and may approve, conditionally approve, or deny the waiver. The applicant requesting the waiver will be promptly notified in writing of any action taken. Unless specified otherwise at the time the waiver is approved, the waiver will apply to the subject property or person during the period of the mandatory water supply shortage condition, or a period not to exceed one (1) calendar year.
3. **Right of Appeal:** Any aggrieved applicant, who remains dissatisfied with the decision of the Water Conservation Coordinator, can appeal, in writing, such final decision to the General Manager. The General Manager shall hear such appeal and render his or her decision. The decision of the General Manager shall be final.

Section 13. Other Provisions.

Mesa Water® may provide water efficiency devices either directly or through supported programs. Such devices should remain within the District's service area at all times. Devices provided by the District should be used with the intent to conserve water and not be modified in any way or sold.

Section 14. Severability. If any section, subsection, sentence, clause or phrase in this Conservation Program is for any reason held invalid, the validity of the remainder of the Conservation Program will not be affected. The Board hereby declares it would have passed this Conservation Program and each section, subsection, sentence, clause or phrase thereof, irrespective of the fact that one or more sections, subsections, sentences, clauses, or phrases is declared invalid.