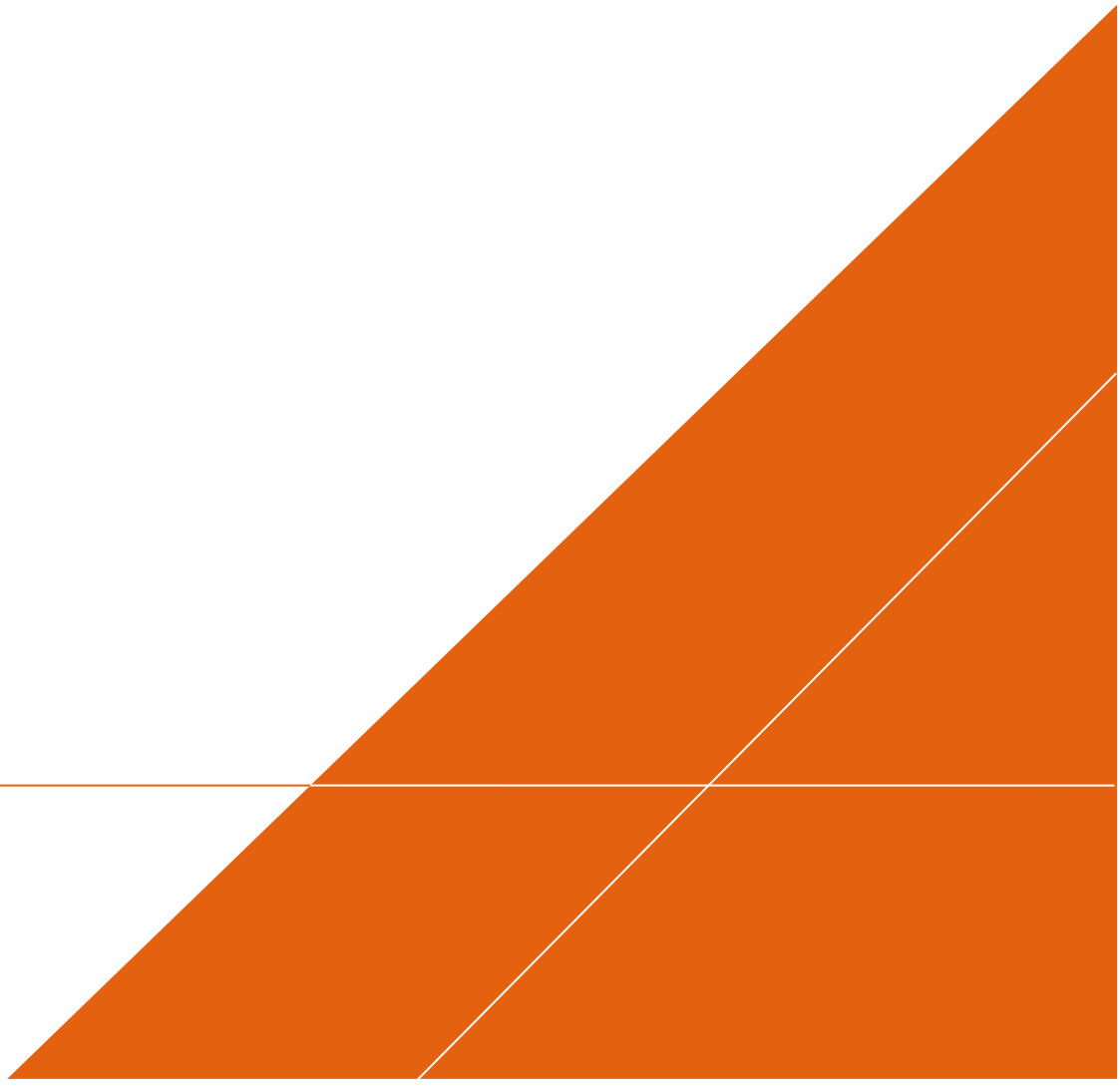
EAST ORANGE COUNTY WATER DISTRICT

ARCADIS Design & Consultancy for natural and built assets

2015

URBAN WATER MANAGEMENT PLAN

FINAL



JUNE 2016

2015 URBAN WATER MANAGEMENT PLAN

East Orange County Water District

FINAL

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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
AMI	Advanced Metering Infrastructure
AMP	Allen McColloch Pipeline
AMR	Automatic Meter Reading
AWWA	American Water Works Association
BEA	Basin Equity Assessment
Biops	Biological Opinions
BMP	Best Management Practice
BPP	Basin Production Percentage
CCC	California Coastal Commission
CDR	Center for Demographic Research
CEC	Constituents of Emerging Concern
CFS	Cubic Feet per Second
CII	Commercial/Industrial/Institutional
CRA	Colorado River Aqueduct
CUP	Conjunctive Use Program
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
Delta	Sacramento-San Joaquin River Delta
District	East Orange County Water District
DMM	Demand Management Measure
DOF	Department of Finance
DVL	Diamond Valley Lake
DWR	Department of Water Resources
EOCF#2	East Orange County Feeder No. 2
EIR	Environmental Impact Report
FY	Fiscal Year
GAP	Green Acres Project
GCM	General Circulation Model
GPCD	Gallons per Capita per Day
GSWC	Golden State Water Company
GWRS	Groundwater Replenishment System
H_2O_2	Hydrogen Peroxide
IPR	Indirect Potable Reuse
IRP	Integrated Water Resource Plan
IRWD	Irvine Ranch Water District

IWA	International Water Association
LAFCO	Local Agency Formation Commission
LBCWD	Laguna Beach County Water District
LRP	Local Resources Program
LTFP	Long-Term Facilities Plan
MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
MF	Microfiltration
MG	Million Gallon
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
NDMA	N-nitrosodimethylamine
OC	Orange County
OC Basin	Orange County Groundwater Basin
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
OWWD#8	Orange Waterworks District No. 8
Poseidon	Poseidon Resources LLC
PPCP	Pharmaceuticals and Personal Care Product
RA	Replenishment Assessment
RHNA	Regional Housing Needs Assessment
RO	Reverse Osmosis
SAC	Santiago Aqueduct Commission
SBx7-7	Senate Bill 7 as part of the Seventh Extraordinary Session
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCWD	South Coast Water District
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program
Study	Colorado River Basin Water Supply and Demand Study
SWP	State Water Project
SWRCB	California State Water Resources Control Board
TDS	Total Dissolved Solids
USBR	United States Bureau of Reclamation
UV	Ultraviolet
UWMP	Urban Water Management Plan

VOC	Volatile Organic Compound
WEROC	Water Emergency Response Organization of Orange County
WF-21	Water Factory 21
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 UWMP provides DWR with a detailed summary of present and future water resources and demands within the East Orange County Water District's (District) service area and assesses the District's 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. The District'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
- 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

- 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 the District's 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 and wholesale 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**
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☑	Water Supplier is also a member of a Regional Alliance	Orange County 20x2020 Regional Alliance
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Table 1-2: Agency Identification

Agency Identification	
Type of Agency (select one or both)	
☑	Agency is a wholesaler
☑	Agency is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables Are in Calendar Years
☑	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
7/1	
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF
NOTES:	

1.2 Agency Overview

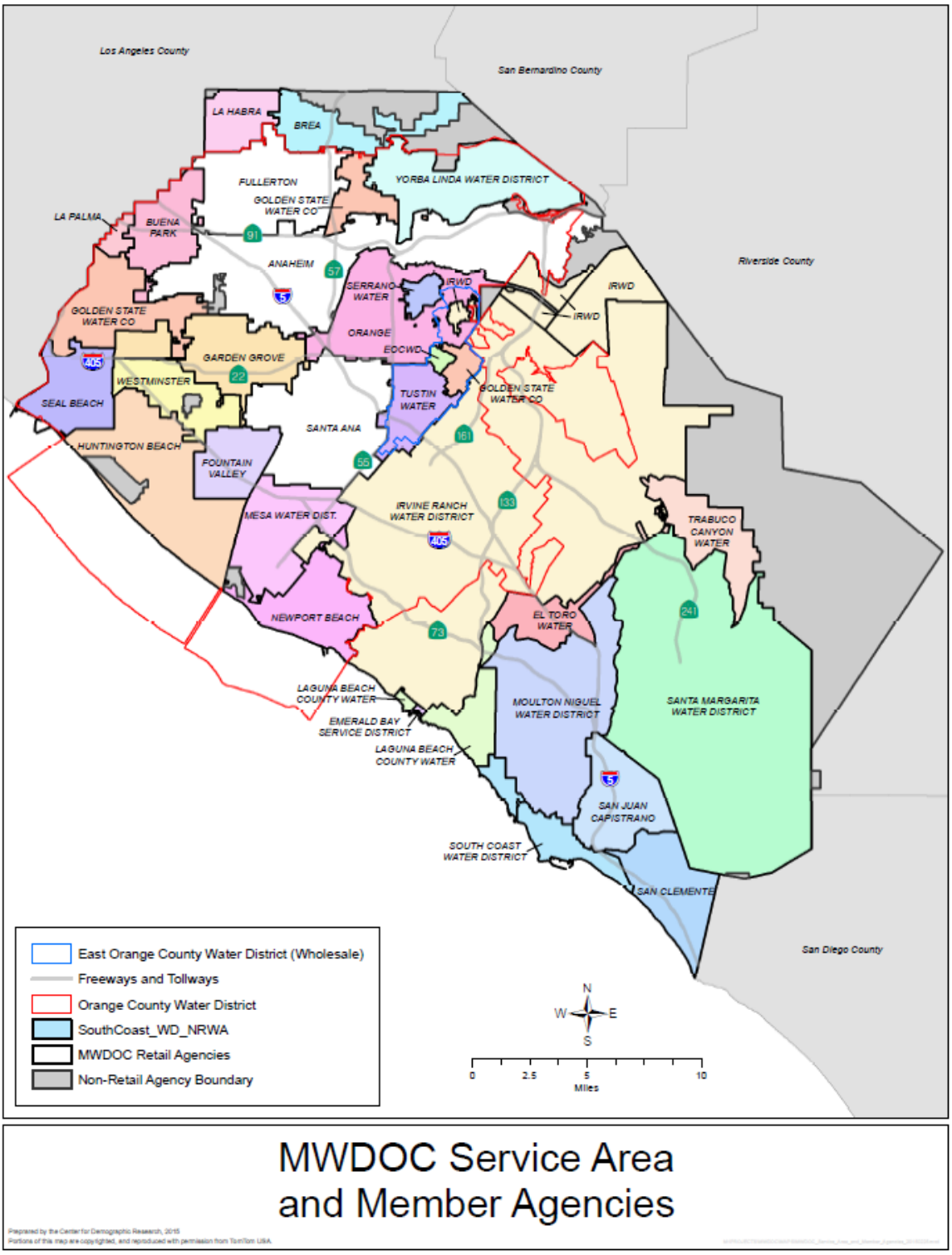
The District, which encompasses an area of approximately 10,000 acres, operates as a wholesale and a retail water supplier. The District was formed in December of 1961 to provide wholesale water to the areas within its boundaries. The District operates under the County Water District Law, which is contained in Division 12 of the California Water Code, Sections 30000 - 33901. The District is an independent special district governed by a Board of Directors elected to four year terms by the voters within the District. Current members of the Board of Directors are

- Douglass S. Davert, President
- Richard B. Bell, Vice President
- John Dulebohn, Director
- Seymour (Sy) Everett, Director
- John L. Sears, Director

In July of 1985, the District assumed the operations of the County of Orange Waterworks District No. 8 (OWWD#8), which until that time had been one of the District's sub agencies (it should also be noted that OWWD#8 acquired the water system in 1951 from the El Modena Mutual Irrigation Company). Upon acquisition of this water system, it was named the District's "Retail Zone" and the original system was renamed the "Wholesale Zone." Thus, the District has been both a wholesale and retail water purveyor

since 1985. A portion of the District's retail supply is pumped from the Lower Santa Ana River Groundwater Basin, also known as the Orange County Groundwater Basin (OC Basin), administered by OCWD, while the balance of the Retail Zone water supply is furnished from the Wholesale Zone.

The District receives its water from two main sources, local well water from the OC Basin, which is managed by the Orange County Water District (OCWD) and imported water from Metropolitan through 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). The District's location within MWDOC is shown on Figure 1-1.



MWDOC Service Area and Member Agencies

Figure 1-1: Regional Location of Urban Water Supplier

1.3 Service Area and Facilities

1.3.1 East Orange County Water District Service Area

1.3.1.1 Wholesale Zone Service Area

The District provides wholesale water to an area of central Orange County, which encompasses the City of Tustin, a portion of the City of Orange and the adjoining unincorporated communities of North Tustin, East Tustin, Red Hill, Lemon Heights, Cowan Heights, Orange Park Acres and Panorama Heights. Generally speaking, most of the District lies east of the Costa Mesa (55) Freeway, north of the Santa Ana (5) Freeway, west of the Jamboree Road and south of Santiago Canyon Road. Figure 1-2 shows the District's Wholesale water service area.

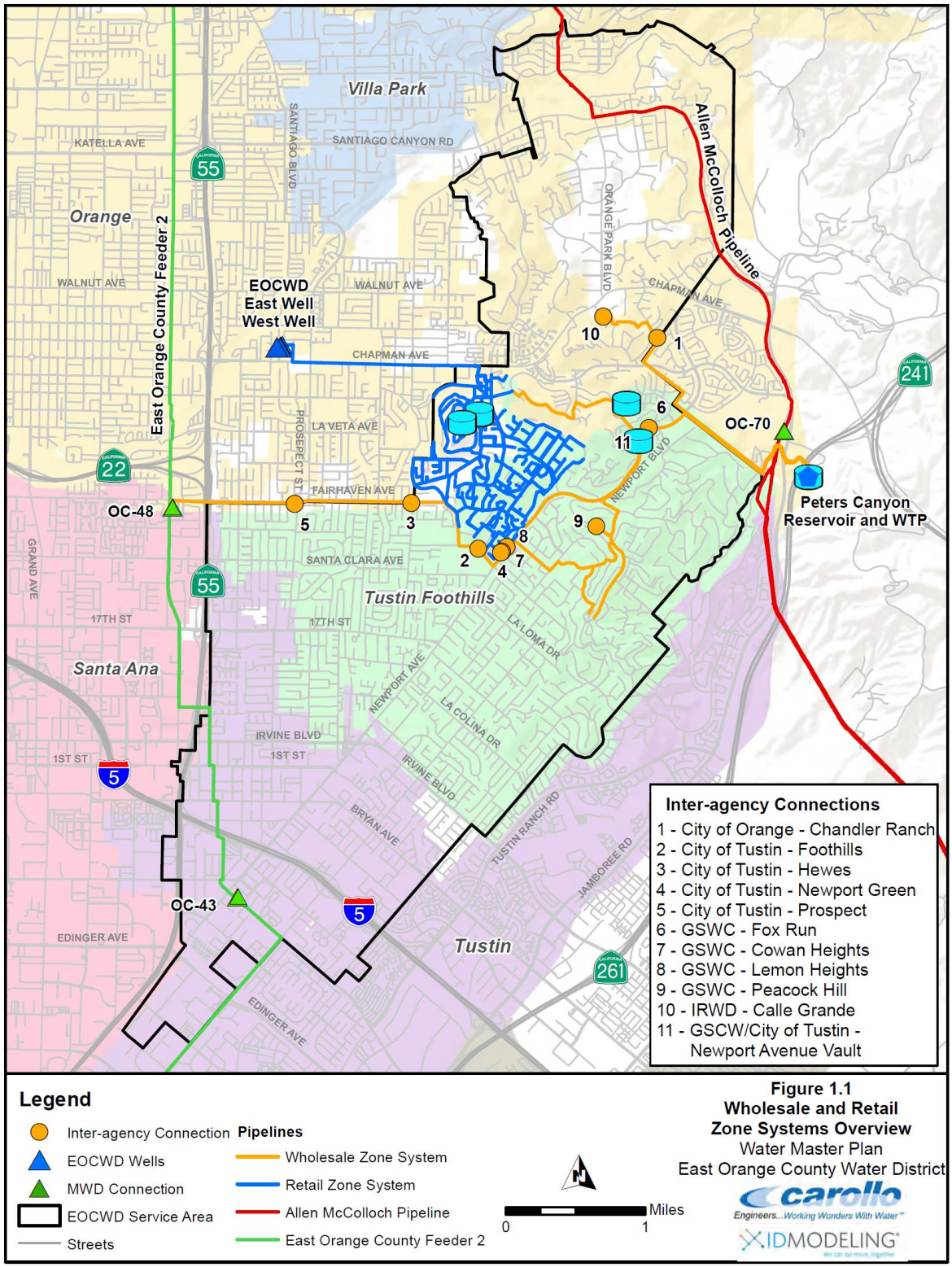


Figure 1-2: East Orange County Water District Wholesale Zone

1.3.1.2 Retail Zone Service Area

The District's Retail Zone system lies within the central portion of the Wholesale Zone about equidistant from the northern and southern boundaries and on the western side of the District. Most of the Retail Zone lies within the unincorporated community of Panorama Heights generally bounded on the west by Hewes Avenue, on the south by Foothill Boulevard, on the east by Newport Boulevard and Crawford Canyon Road and on the north by Chapman Avenue. The Retail Zone is depicted graphically on Figure 1-3.

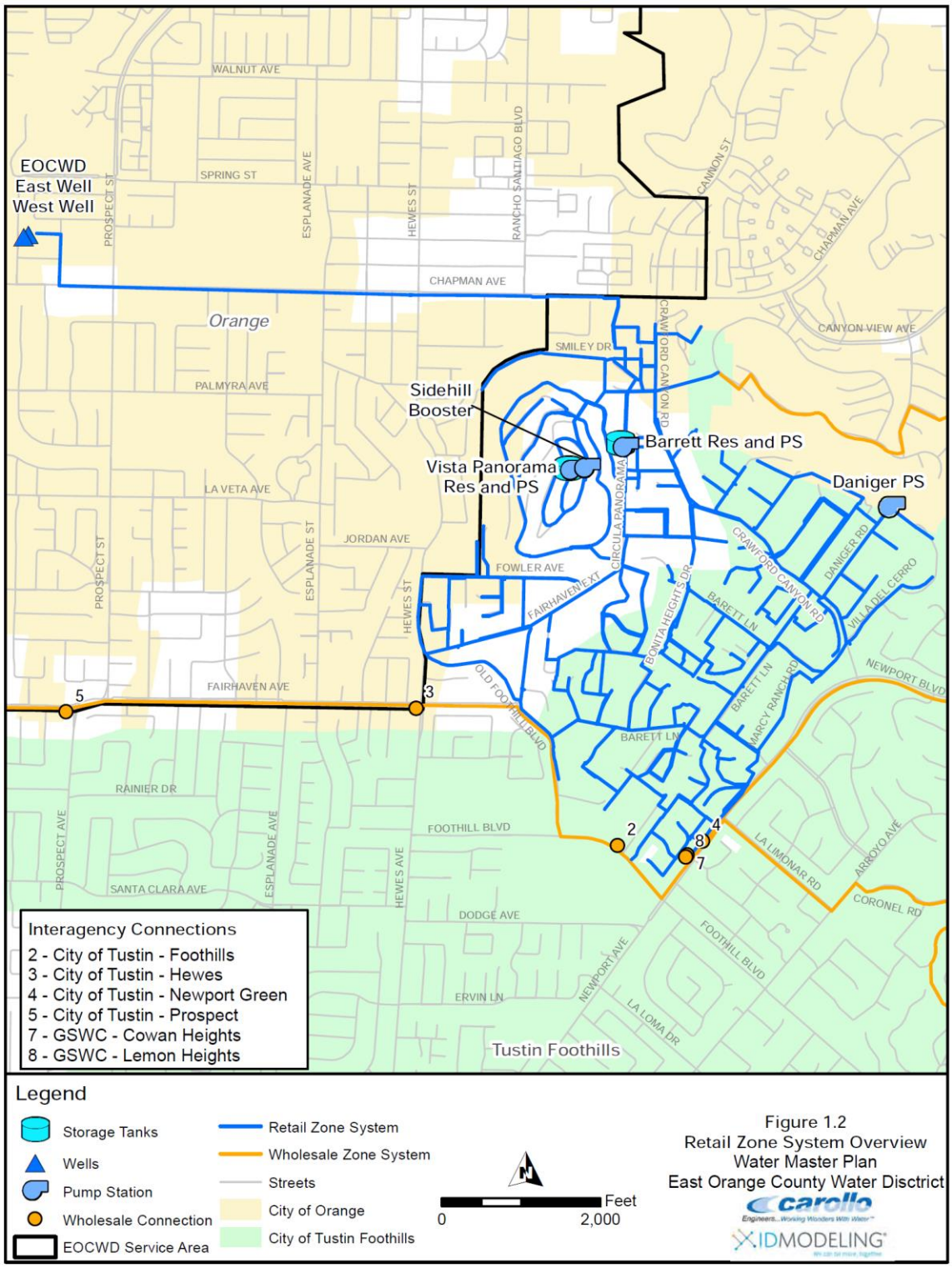


Figure 1-3: East Orange County Water District Retail Zone

1.3.2 East Orange County Water District Facilities

1.3.2.1 Wholesale Zone Facilities

The District's Wholesale Zone includes imported water connections, storage, pumping, transmission and flow control facilities as well as metered connections to each of its five sub-agencies. Included among its assets are the following specific facilities:

- Two treated imported water connections to Metropolitan's East Orange County Feeder No. 2 (EOCF#2), which also originates the Robert B. Diemer Filtration Plant in Yorba Linda, California. These two connections are referred to by Metropolitan as the "OC 43" and "OC-48" Turnouts.
- One treated imported water connection to Metropolitan's Allen McColloch Pipeline (AMP), which also originates at Metropolitan's Robert B. Diemer Filtration Plant. This connection is referred to by Metropolitan as the "OC-70" Turnout.
- A pump station at the OC-70 Turnout
- A flow-control facility located near the OC-48 Turnout
- Three storage facilities including a 6.0 million gallon (MG) trapezoidal reservoir with earth embankments, an 11.5 MG steel tank and a 1.0 MG Steel Tank
- Approximately 12 miles of transmission main varying in size from eight to 27 inch diameter including miscellaneous underground vaults and appurtenances
- Seventeen metered water connections to the aforementioned five sub-agencies
- An emergency interconnection with the City of Orange

In addition to these facilities, the District also owns capacity in the untreated Santiago Aqueduct, operated by the Santiago Aqueduct Commission (SAC). This facility delivers water from Lake Mathews in Riverside County, which was once treated at a now abandoned District-owned water treatment plant.

The District's wholesale water customers were informed of its water supplies in accordance with CWC 10631 as shown in Table 1-3.

Table 1-3: Water Supplier Information Exchange

Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with CWC 10631. **Complete the table below.**
EOCWD Retail Zone	
IRWD	
GSWC	
City of Orange	
City of Tustin	
NOTES:	

1.3.2.2 Retail Zone Facilities

The District's Retail Zone consists of domestic water wells, storage reservoirs, pump stations, transmission and distribution pipelines, metered water connections and various administrative facilities. Included among its assets are the following specific facilities:

- Two adjacent domestic potable water wells including pumps and related equipment
- An on-site chlorine generator (at the wells)
- Three storage reservoirs including a 0.25 MG steel tank, a 0.1 MG concrete reservoir and a 1.5 MG capacity ownership in the Wholesale Zone's 11.5 MG Reservoir
- A hydro-pneumatic tank
- Three pump stations including one located at the 0.25 MG reservoir site; a second one located at the 0.1 MG reservoir site; and a third fire pump station that is activated during high flow conditions
- Approximately 24 miles of transmission and distribution piping varying in diameter from 2-inches to 16-inches including miscellaneous underground vaults and appurtenances
- Two connections to the District's Wholesale Zone system
- An emergency connection to the City of Orange water system
- 1,207 domestic water meter connections to retail customers
- An administrative office building, warehouse, a single family residence (occupied by the District's Maintenance and Operations Superintendent), a mobile home located at the site of the 6.0 MG reservoir (occupied by the District's Distribution Worker II) and a corporation yard, all located in the City of Orange.

The system connections and water volume supplied are summarized in Table 1-4, and the wholesalers informed of this water use as required are displayed in Table 1-5.

Table 1-4: Public Water Systems

Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015 (AF)
EOCWD Retail Zone	CA3010068	1,207	897
	TOTAL	1,207	897
NOTES:			

Table 1-5: 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
EOCWD Wholesale Zone
NOTES:

2 DEMANDS

2.1 Overview

Since the last UWMP update, southern California's urban water demand has been largely shaped by the efforts to comply with the Water Conservation Act of 2009 (SBx7-7). This law requires all California retail urban water suppliers serving more than 3,000 acre-feet per year (AFY) or 3,000 service connections to achieve a 20 percent water demand reduction (from a historical baseline) by 2020. The District has been actively engaged in efforts to reduce water use in its Retail Zone to meet the 2015 interim 10 percent reduction and the 2020 final water use target. Meeting this target is critical to ensure the District's eligibility to receive future state water grants and loans. The District's wholesale demand is not subject to SBx7-7 or the demand reductions described below; this is dealt with by the purchasing retail agencies.

In April 2015 Governor Brown issued an Emergency Drought Mandate as a result of one of the most severe droughts in California's history, requiring a collective reduction in statewide urban water use of 25 percent by February 2016, with each agency in the state given a specific reduction target by DWR. In response to the Governor's mandate, the District is carrying out more aggressive conservation efforts. It is also implementing higher (more restrictive) stages of its water conservation ordinance in order to achieve its demand reduction target of 36 percent within the Retail Zone (discussed later in Section 2.5).

In addition to local water conservation ordinances, the District has been a signatory member of the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMP) Memorandum of Understanding and partnered with MWDOC on educational programs, indoor retrofits and training.

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

This section analyzes the District'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 the District's 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 District's service area are dependent on many factors such as local climate conditions and the evolving hydrology of the region, demographics, land use characteristics, and economics. In addition to local factors, southern California's imported water sources are also experiencing drought conditions that impact availability of current and future water supplies.

2.2.1 Climate Characteristics

The District 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.

Local rainfall has limited impacts on reducing demand for the District. 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. Orange County Water District (OCWD) is one agency that has successfully captured stormwater along the Santa Ana River and in recharge basins for years and used it as an additional source of supply for groundwater recharge.

The District's imported 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

2.2.2.1 Retail Zone Demographics

The District's Retail Zone has a 2015 population of 3,257 according to the California State University at Fullerton's Center of Demographics Research (CDR). The District is almost built-out with few remaining vacant lots, its population is projected to increase 43.9 percent by 2040, representing an average growth rate of 1.75 percent per year. Demand projections for the retail service area were provided by the District.

Current population and projected growth have increased slightly since the 2010 UWMP. Table 2-1 shows the population projections in five-year increments out to 2040 within the District's retail service area.

Table 2-1: Retail Zone Population – Current and Projected

Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	3,257	4,200	4,300	4,350	4,400	4,686
NOTES:						

2.2.2.2 Wholesale Zone Demographics

As a non-municipal special district, the District's boundaries are not contiguous with those of the cities it serves, thereby making it difficult to obtain accurate demographic data specific to the District. Data obtained from the U.S. Census Bureau, County of Orange Planning Department, Orange County Registrar of Voters, and the CDR at California State University at Fullerton was compiled to determine the District's population for the 2010 UWMP. The findings from that report were extrapolated to determine an estimated 2015 value.

Although no specific data is available for the unincorporated areas of North Tustin, Cowan Heights, Lemons Heights, Panorama Heights and Orange Park Acres, the averages presented above are generally representative for the region. The District's wholesale area has a 2015 population of approximately 91,600. Moderate growth is anticipated within the wholesale service area and its population is projected to increase 7.1 percent by 2040, representing an average growth rate of 0.28 percent per year.

Table 2-2 shows the population projections in five-year increments out to 2040 within the District's wholesale service area.

Table 2-2: Wholesale Zone Population – Current and Projected

Wholesale: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	91,600	92,900	94,200	95,500	96,800	98,100
NOTES:						

2.2.3 Land Use

The District's Retail Zone can best be described as a predominately single and multi-family residential community located in central Orange County. The retail area lies within the Panorama Heights community of unincorporated Orange County. The District's Wholesale Zone is also in central Orange County and includes portions of Irvine Ranch Water Company (IRWD), Golden State Water Company (GSWC), City of Orange, and all imported water needs for the City of Tustin. Each of these communities is primarily residential with pockets of commercial, industrial, institutional and dedicated landscape users.

2.3 Water Use by Customer Type

An agency's retail water consumption can be projected by understanding the type of use and customer type creating the demand. Developing local water use profiles helps to identify quantity of water used, and by whom within the agency's service area. A comprehensive profile of the agency's retail 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 the District's 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 (Retail Zone)

There are 1,207 current customer active and inactive service connections in the District's water distribution system with all existing connections metered. Approximately 97 percent of the District's water demand is residential; commercial, industrial, and institutional accounts for 3 percent of the total demand. There is one agricultural account with a demand of less than one percent of total demand.

Table 2-3 contains a summary of the District's total potable water demand in fiscal year (FY) 2014-15 for potable water.

Table 2-3: Retail Zone Demands for Potable and Raw Water – Actual (AF)

Retail: Demands for Potable and Raw Water – Actual			
Use Type	2015 Actual		
	Additional Description	Level of Treatment When Delivered	Volume
Single Family		Drinking Water	848
Multi-Family		Drinking Water	18
Other	Commercial/Industrial/Institutional	Drinking Water	30
Other		Drinking Water	1
		TOTAL	897
NOTES:			

2.3.2 Non-Residential (Retail Zone)

Non-residential use includes commercial, industrial, and institutional (CII) demands, these accounts are grouped together within the District's records. CII water use accounts for about 3.4 percent of total water demands. The District has a mix of commercial uses (Orange County Mining Restaurant) and public entities (El Modena Park, Panorama Elementary School).

2.3.3 Sales to Other Agencies (Wholesale Zone)

Within the Wholesale Zone of the District, five agencies purchase imported water: EOCWD Retail Zone, IRWD, GSWC, City of Orange, and the City of Tustin. Each of these agencies sell treated water at the retail level to residential, industrial, and commercial customers.

The sale of water to all of these agencies is highly dependent upon the agencies' ability to meet customer demand without imported water. Each agency pumps OCWD water from the groundwater basin; historically there has been periodic groundwater operational issues that have caused agencies to rely on the District for up to 100 percent of their demand. Table 2-4 contains a summary of the District's Wholesale Zone total water demand in FY 2014-15 for potable water from Metropolitan.

Table 2-4: Wholesale Zone Demands for Potable and Raw Water – Actual (AF)

Wholesale: Demands for Potable and Raw Water - Actual			
Use Type	2015 Actual		
	Additional Description	Level of Treatment When Delivered	Volume
Sales to other agencies	GSWC	Drinking Water	1438
Sales to other agencies	IRWD	Drinking Water	201
Sales to other agencies	Orange	Drinking Water	109
Sales to other agencies	Tustin	Drinking Water	2,913
Sales to other agencies	Retail Zone	Drinking Water	7.3
		TOTAL	4,668
NOTES: EOCWD Wholesale Master Plan, Carollo 2015			

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). The District owns distribution systems that connect to its retail and wholesale customers; a water loss audit was conducted for each system.

A water loss audit was conducted per AWWA methodology for the District 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 the District to achieve regulatory standards and manage their existing resources.

Table 2-5 below is a result of the AWWA Water Audit completed for the District's Retail Zone distribution network and the 2015 UWMP. The water loss summary was calculated over a one-year period from available data by the District. The volume of water loss calculated for this period represents 2.6 percent of the District's annual water supplied to the Retail Zone. This presents an opportunity to identify areas of high water loss and develop strategies to minimize it.

Table 2-5: Retail Zone Water Loss Audit Summary (AF)

Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
07/2014	20
NOTES:	

Table 2-6 below is a result of the AWWA Water Audit completed for the District's Wholesale Zone distribution network and the 2015 UWMP. The water loss summary was calculated over a one-year period from available data by the District. The volume of water loss calculated for this period represents 0.9 percent of the District's annual water supplied to the Wholesale Zone; the majority of total water loss is from real losses. Conducting a leak detection survey or more extensive audit can help to identify locations where real loss is occurring.

Table 2-6: Wholesale Zone Water Loss Audit Summary (AF)

Wholesale: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
07/2014	36
NOTES:	

2.4 Demand Projections

Demand projections were developed by MWDOC for each agency within their service area based on available data as well as land use, population and economic growth. Three trajectories were developed representing three levels of conservation: 1) continued with existing levels of conservation (lowest conservation), 2) addition of future passive measures and active measures (baseline conservation), and 3) aggressive turf removal program - 20 percent removal by 2040 (aggressive conservation). The baseline demand projection was selected for the 2015 UWMP. The baseline scenario assumes the implementation of future passive measures affecting new developments, including the Model Water Efficient Landscape, plumbing code efficiencies for toilets, and expected plumbing code for high-efficiency clothes washers. It also assumes the implementation of future active measures, assuming the implementation of Metropolitan incentive programs at historical annual levels seen in Orange County

2.4.1 Demand Projection Methodology

The water demand projections were an outcome of the Orange County (OC) Reliability Study led by MWDOC where demand projections were divided into three regions within Orange County: Brea/La Habra, OC Basin, and South County. The demand projections were obtained based on multiplying a unit water use factor and a demographic factor for three water use sectors, including single-family and multi-family residential (in gallons per day per household), and non-residential (in gallons per day per employee). The unit water use factors were based on a survey of Orange County water agencies (FY 2013-14) and represent a normal weather, normal economy, and non-drought condition. The

demographic factors are future demographic projections, including the number of housing units for single and multi-family residential areas and total employment (number of employees) for the non-residential sector, as provided by CDR.

The OC Reliability Study accounted for drought impacts on 2016 demands by applying the assumption that water demands will bounce back to 85 percent of 2014 levels i.e. pre-drought levels by 2020 and 90 percent by 2025 without future conservation, and continue at 90 percent of unit water use through 2040. The unit water use factor multiplied by a demographic factor yields demand projections without new conservation. To account for new conservation, projected savings from new passive and active conservation were subtracted from these demands.

As described above, the OC Reliability Study provided demand projections for three regions within Orange County: Brea/La Habra, the Basin, and South County. The District's water demand represents a portion of the Basin region total demand. The District's portion was estimated as the percentage of the City's five-year (FY 2010-11 to FY 2014-15) average usage compared to the OC Groundwater Basin region total demand for the same period.

2.4.2 Agency Refinement

Demand projections were developed by the District for its Retail Zone as part of the 2015 UWMP effort. For the Wholesale Zone, demand projections were developed for 2015 as part of the District Wholesale Zone Master Plan (EOCWD Wholesale Zone Master Plan, Carollo, 2015). The four wholesale customers were contacted as part of the Master Plan for their future water demand projections, the only agency projecting increased demand was IRWD. GSWC and the Cities of Orange and Tustin are projecting reduced demands with the overall demand on the District's Wholesale Zone half of 2015 demands. The District has elected to use the 2015 demand values going forward as a conservative measure.

2.4.3 Retail Zone 25 Year Projections

A key component of the 2015 UWMP is to provide insight into the District's future water demand outlook. The District's current Retail Zone water demand is 897 AFY, met through locally pumped groundwater and purchased imported water from MWDOC. Table 2-7 is a projection of the District's retail water demand for the next 25 years.

Table 2-7: Retail Zone Demands for Potable and Raw Water – Projected (AF)

Retail: Demands for Potable and Raw Water - Projected						
Use Type	Additional Description	Projected Water Use *Report To the Extent that Records are Available*				
		2020	2025	2030	2035	2040
Single Family		903	969	976	976	977
Multi-Family		19	21	21	21	21
Other	Commercial/Industrial /Institutional	32	34	34	34	34
Other		1	1	1	1	1
TOTAL		955	1,025	1,032	1,032	1,033
NOTES:						

The above demand values were provided by the District as part of the UWMP effort. The District will aim to decrease its reliance on imported water by pursuing a variety of water conservation strategies, per capita water use is developed in Section 2.5 below.

Table 2-8: Retail Zone 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 and 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 Wholesale Zone 25 Year Projections

Wholesale Zone demand is also projected over the 25-year planning horizon. The 2015 demand for purchased imported water was 4,668 AFY, Table 2-9 is a projection of the District's wholesale water demand for the next 25 years. The demand projection values for the Wholesale Zone are based off of discussion from the District's Master Plan. (EOCWD Wholesale Zone Master Plan, Carollo, 2015).

Table 2-9: Wholesale Zone Demands for Potable and Raw Water – Projected (AF)

Wholesale: Demands for Potable and Raw Water - Projected						
Use Type	Additional Description	Projected Water Use *Report To the Extent that Records are Available*				
		2020	2025	2030	2035	2040
Sales to other agencies	GSWC	1,212	1,270	1,327	1,385	1,443
Sales to other agencies	IRWD	150	157	165	172	179
Sales to other agencies	Orange	257	269	281	293	305
Sales to other agencies	Tustin	2,999	3,142	3,284	3,427	3,569
Sales to other agencies	EOCWD Retail Zone	283	296	310	323	337
	TOTAL	4,901	5,134	5,367	5,600	5,833
NOTES: EOCWD Wholesale Master Plan, Carollo 2015						

2.4.5 Retail Zone Total Water Demand Projections

Based on the information provided above, the total demand in the Retail Zone is listed below in Table 2-10. The District has no plans to provide recycled water in its service area.

Table 2-10: Retail Zone Total Water Demands (AF)

Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water	897	955	1,025	1,032	1,032	1,033
Recycled Water Demand	0	0	0	0	0	0
TOTAL WATER DEMAND	897	955	1,025	1,032	1,032	1,033
NOTES: Wastewater is conveyed to the OCSD/OCWD GWRS to maximize reclaimed water production						

2.4.6 Wholesale Zone Total Water Demand Projections

Based on the information provided above, the total demand in the Wholesale Zone is listed below in Table 2-11. The District only provides imported water to its wholesale customers.

Table 2-11: Wholesale Zone Total Water Demands (AF)

Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water	4,668	4,901	5,134	5,367	5,600	5,833
Recycled Water Demand	0	0	0	0	0	0
TOTAL WATER DEMAND	4,668	4,901	5,134	5,367	5,600	5,833
NOTES:						

2.4.7 Water Use for Lower Income Households (Retail Zone)

Since 2010, the UWMP 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 the district 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 with the district's 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 the district 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 district's service area covers the unincorporated portions of Orange County, the household distribution of unincorporated areas for all households of various income levels provides an estimate of low income households in the District. The RHNA Plan projects low-income households for the unincorporated areas of Orange County as 25.58 percent of total housing need (SCAG, RHNA, November 2013).

Table 2-12 provides a breakdown of the projected water needs for low income single family and multifamily units. The projected water demands shown here represent 25.58 percent of the projected water demand for the single-family and multifamily categories provided in Table 2-7 above. For example, the total low income single family residential demand is projected to be 231 AFY in 2020 and 250 AFY in 2040.

Table 2-12: 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	922	990	997	997	998
SF Residential Demand - Low Income Households	231	248	250	250	250
MF Residential Demand - Low Income Households	5	5	5	5	5
Total Low Income Households Demand	***236***	***253***	***255***	***255***	***255***

2.5 SBx7-7 Requirements (Retail Zone)

The Water Conservation Act of 2009, also known as 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. The District, as a retailer, must determine baseline water use for its Retail Zone, during a baseline period and water use targets for the years 2015 and 2020 to meet the state's water reduction goal. The District may choose to comply with SBx7-7 individually or as a region in collaboration with other retail water suppliers. Under the regional compliance option, the District is still required to report its individual water use targets. The District 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, the District's Retail Zone must demonstrate compliance with its 2015 water use target to indicate whether or not they are on track to meeting the 2020 water use target. The District also revised their 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 the District's Retail Zone 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 the District, 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 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 District's water use targets is to determine its base daily per capita water use (baseline water use). 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. There was no recycled water use in the District's retail delivery in 2008; therefore, a 10-year baseline period is used.

The District's baseline water use is 291 GPCD, obtained from the 10-year period 1998 to 2007.

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 the District, 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. The District's five-year baseline water use is 291 GPCD, obtained from the five-year period 2003 to 2007.

2.5.1.3 Service Area Population

The District's service area boundaries are not contiguous with those of the cities it serves. The service area population was obtained by extrapolating the population data compiled for the 2010 UWMP. The 2010 UWMP used data from the U.S. Census Bureau, County of Orange Planning Department, Orange County Registrar of Voters, and the CDR at California State University at Fullerton.

2.5.2 SBx7-7 Water Use Targets

In the 2015 UWMP, the District 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. The District 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 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:
    - Total savings includes indoor residential savings, meter savings, CII savings, and landscape and water loss savings.

With MWDOC's assistance in the calculation of the District's base daily per capita use and water use targets, the District 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 District's 2015 target is 262 GPCD and the 2020 target is 232 GPCD as summarized in Table 2-13. 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 2-13: Baselines and Targets Summary

Baselines and Targets Summary *Retail Agency*					
Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*1998*	*2007*	*291*	*262*	*232*
5 Year	*2003*	*2007*	*291*		
*All values are in Gallons per Capita per Day (GPCD)					
NOTES:					

Table 2-14 compares the District's 2015 water use target to its actual 2015 consumption. Based on this comparison, the District is in compliance with its 2015 interim target and has already met the 2020 water use target.

Table 2-14: 2015 Compliance

2015 Compliance *Retail Agency*		
Actual 2015 GPCD*	2015 Interim Target GPCD*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
207	262	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 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.

The District 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, i.e. the region has already met its 2020 GPCD goal.

2.6 SBx7-7 Requirements (Wholesale Zone)

Wholesale water suppliers are not required by SBx7-7 to establish or meet baseline and targets for daily per capita water use. However, wholesale suppliers are required to provide an assessment of its present and proposed future measures, programs and policies that will help its retail water suppliers achieve their SBx7-7 water use reduction targets.

2.6.1 Assessment of Present and Future Measures

The District's Wholesale Zone is under MWDOC's Orange Country Regional Alliance umbrella. MWDOC assumes the role of assisting each retail water supplier in Orange County in analyzing the SBx7-7 requirements and establishing their baseline and target water use as guided by DWR (DWR, Technical Methodologies, February 2011). MWDOC also provide the assessment of the present and proposed future measures that will help its retail water suppliers achieve their SBx7-7 water use reduction targets.

With MWDOC's assistance, all retail water agencies in Orange County are actively implementing BMP-based programs. Collectively, the Orange County region has met its 2015 water reduction target as well as being on track to meeting the 2020 water reduction target based on current conditions. This is indicative of the effectiveness of the water use efficiency programs implemented by MWDOC and retail agencies in Orange County.

3 WATER SOURCES AND SUPPLY RELIABILITY

3.1 Overview

The District meets all its demands with a combination of local groundwater from the OC Basin and imported water delivered from Metropolitan through MWDOC. The Wholesale Zone relies on 100 percent imported water, and the Retail Zone relies on approximately 70 percent groundwater and 30 percent imported water. The water supply mix is projected to remain roughly the same by 2040.

The District 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. The sources of imported water supplies include the Colorado River and the SWP.

3.1.1 Wholesale Zone

The District meets all of its demands in the Wholesale Zone with imported water from Metropolitan through MWDOC. The Wholesale Zone's service area encompasses an area of approximately 10,000 acres and the District's Wholesale Zone sells imported water to the District's Retail Zone, portions of IRWD, portions of GSWC, portions of the City of Orange, and the City of Tustin. The City of Tustin obtains all its imported water from the District. The Wholesale Zone's projected water supplies is shown on Figure 3-1.

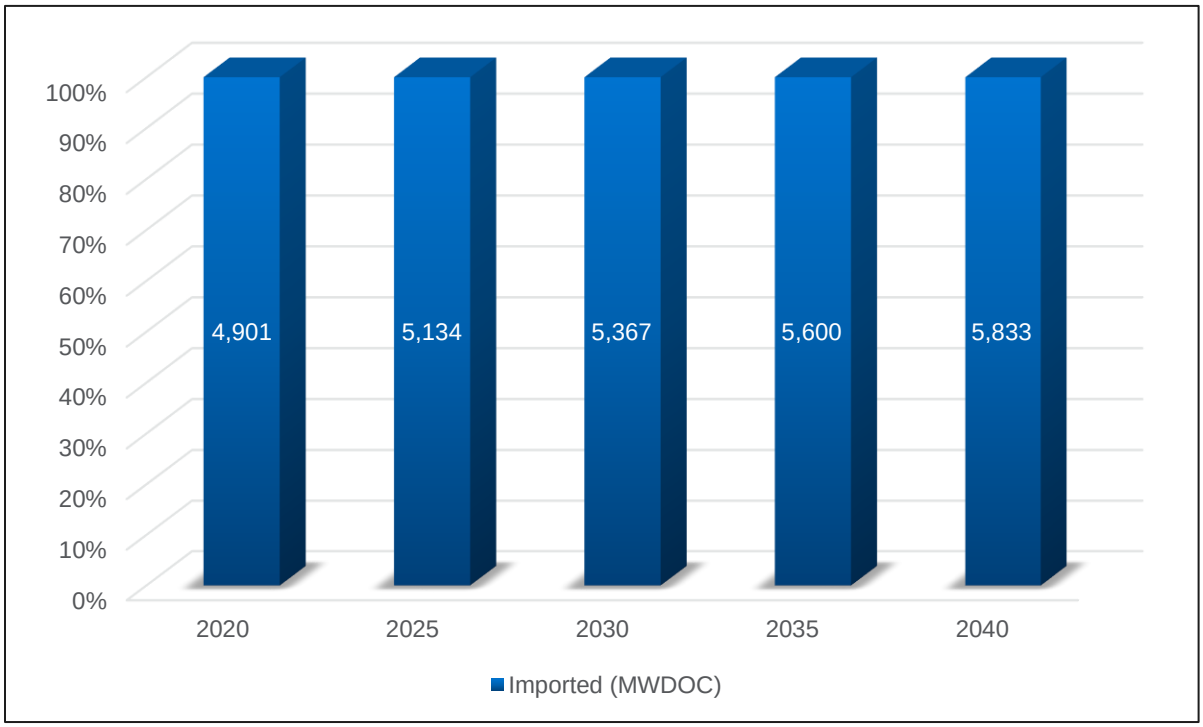


Figure 3-1: Projected Water Supplies in the Wholesale Zone through 2040 (AF)

3.1.2 Retail Zone

The District incorporated the County of Orange Waterworks District No. 8 in July 1985, which became known as the District's Retail Zone. The District's Retail Zone lies within the unincorporated community of Panorama Heights in the center of the Wholesale Zone. It is bounded on the west by Hewes Avenue, on the south by Foothill Boulevard, on the east by Newport Boulevard and Crawford Canyon Road, and on the north by Chapman Avenue (EOCWD, Retail Zone System Water Master Plan Draft, August 2015).

The District's Retail Zone relies on a combination of local groundwater and imported water to meet its demands, with groundwater as the major source of supply. The Retail Zone's projected water supplies is shown on Figure 3-2.

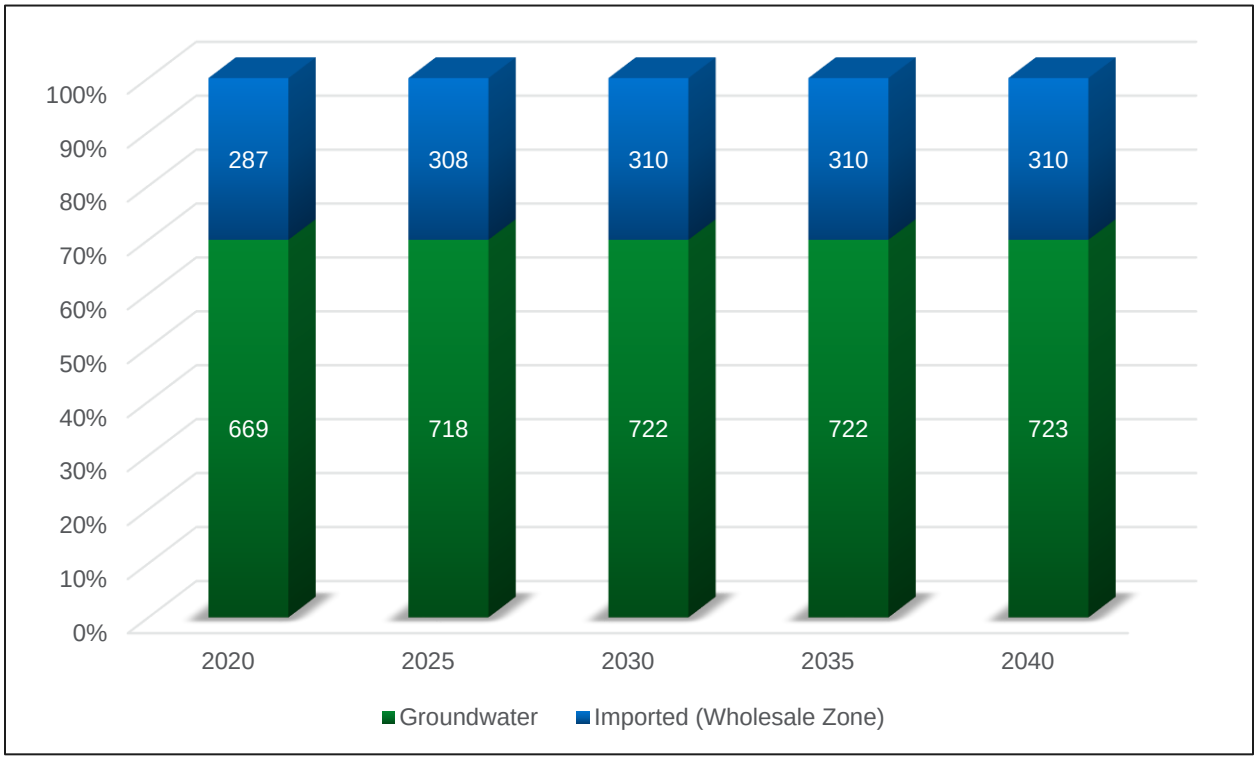


Figure 3-2: Projected Water Supplies in the Retail Zone through 2040 (AF)

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

3.2 Imported Water

The District's Wholesale Zone currently relies on 4,668 AFY of imported water supply and the District's Retail Zone currently relies on 251 AFY of imported water supply. 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 raw water obtained from these sources is, for Orange County, 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. The water from the Diemer Filtration Plant is supplied through MWDOC at three metered connections: OC-43 and OC-48, off the EOCF#2, and OC-70, off the AMP.

3.2.1 Colorado River Supplies

The Colorado River was Metropolitan's original source of water after Metropolitan's establishment in 1928. The CRA, which is owned and operated by Metropolitan, transports water from the Colorado River to its terminus at Lake Mathews in Riverside County. The actual amount of water per year that may be conveyed through the CRA to Metropolitan's member agencies is subject to the availability of Colorado River water for delivery.

The CRA includes supplies from the implementation of the Quantification Settlement Agreement and related agreements to transfer water from agricultural agencies to urban uses. The 2003 Quantification Settlement Agreement enabled California to implement major Colorado River water conservation and transfer programs, stabilizing water supplies for 75 years and reducing the state's demand on the river to its 4.4 MAF entitlement. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 million acre-feet (MAF) on an as-needed basis. Water from the Colorado River or its tributaries is available to users in California, Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming, as well as to Mexico. California is apportioned the use of 4.4 MAF of water from the Colorado River each year plus one-half of any surplus that may be available for use collectively in Arizona, California, and Nevada. In addition, California has historically been allowed to use Colorado River water apportioned to but not used by Arizona or Nevada. Metropolitan has a basic entitlement of 550,000 AFY of Colorado River water, plus surplus water up to an additional 662,000 AFY when the following conditions exists (Metropolitan, 2015 UWMP, June 2016):

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

Unfortunately, Metropolitan has not received surplus water for a number of years. The Colorado River supply faces current and future imbalances between water supply and demand in the Colorado River Basin due to long term drought conditions. Over the past 16 years (2000-2015), there have only been three years when the Colorado River flow has been above average (Metropolitan, 2015 UWMP, June 2016). The long-term imbalance in future supply and demand is projected to be approximately 3.2 MAF by the year 2060.

Approximately 40 million people rely on the Colorado River and its tributaries for water with 5.5 million acres of land using Colorado River water for irrigation. Climate change will also affect future supply and demand as increasing temperatures may increase evapotranspiration from vegetation along with an increase in water loss due to evaporation in reservoirs, therefore reducing the available amount of supply

from the Colorado River and exacerbating imbalances between increasing demands from rapid growth and decreasing supplies.

Four water supply scenarios were developed around these uncertainties, each representing possible water supply conditions. These four scenarios are as follow:

- **Observed Resampled:** future hydrologic trends and variability are similar to the past approximately 100 years.
- **Paleo Resampled:** future hydrologic trends and variability are represented by reconstructions of streamflow for a much longer period in the past (approximately 1,250 years) that show expanded variability.
- **Paleo Conditioned:** future hydrologic trends and variability are represented by a blend of the wet-dry states of the longer paleo-reconstructed period.
- **Downscaled General Circulation Model (GCM) Projected:** future climate will continue to warm, with regional precipitation and temperature trends represented through an ensemble of future downscaled GCM projections.

The Colorado River Basin Water Supply and Demand Study (Study) assessed the historical water supply in the Colorado River Basin through two historical streamflow data sets, from the year 1906 through 2007 and the paleo-reconstructed record from 762 through 2005. The following are findings from the study:

- Increased temperatures in both the Upper and Lower Colorado River Basins since the 1970s has been observed.
- Loss of springtime snowpack was observed with consistent results across the lower elevation northern latitudes of the western United States. The large loss of snow at lower elevations strongly suggest the cause is due to shifts in temperature.
- The deficit between the two year running average flow and the long-term mean annual flow that started in the year 2000 is more severe than any other deficit in the observed period, at nine years and 28 MAF deficit.
- There are deficits of greater severity from the longer paleo record compared to the period from 1906 through 2005. One deficit amounted to 35 MAF through a span of 16 years.
- A summary of the trends from the observed period suggest declining stream flows, increases in variability, and seasonal shifts in streamflow that may be related to shifts in temperature.

Findings concerning the future projected supply were obtained from the Downscaled GCM Projected scenario as the other methods did not consider the impacts of a changing climate beyond what has occurred historically. These findings include:

- Increased temperatures are projected across the Colorado River Basin with larger changes in the Upper Basin than in the Lower Basin. Annual Basin-wide average temperature is projected to increase by 1.3 degrees Celsius over the period through 2040.
- Projected seasonal trends toward drying are significant in certain regions. A general trend towards drying is present in the Colorado River Basin, although increases in precipitation are projected for

some higher elevation and hydrologically productive regions. Consistent and expansive drying conditions are projected for the spring and summer months throughout the Colorado River Basin, although some areas in the Lower Basin are projected to experience slight increases in precipitation, which is thought to be attributed to monsoonal influence in the region. Upper Basin precipitation is projected to increase in the fall and winter, and Lower Basin precipitation is projected to decrease.

- Snowpack is projected to decrease due to precipitation falling as rain rather than snow and warmer temperatures melting the snowpack earlier. Areas where precipitation does not change or increase is projected to have decreased snowpack in the fall and early winter. Substantial decreases in spring snowpack are projected to be widespread due to earlier melt or sublimation of snowpack.
- Runoff (both direct and base flow) is spatially diverse, but is generally projected to decrease, except in the northern Rockies. Runoff is projected to increase significantly in the higher elevation Upper Basin during winter but is projected to decrease during spring and summer.

The following future actions must be taken to implement solutions and help resolve the imbalance between water supply and demand in areas that use Colorado River water (U.S. Department of the Interior Bureau of Reclamation, Colorado River Basin Water Supply and Demand Study, December 2012):

- Resolution of significant uncertainties related to water conservation, reuse, water banking, and weather modification concepts.
- Costs, permitting issues, and energy availability issues relating to large-capacity augmentation projects need to be identified and investigated.
- Opportunities to advance and improve the resolution of future climate projections should be pursued.
- Consideration should be given to projects, policies, and programs that provide a wide-range of benefits to water users and healthy rivers for all users.

3.2.2 State Water Project Supplies

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by DWR and is an integral part of the effort to ensure that business and industry, urban and suburban residents, and farmers throughout much of California have sufficient water. The SWP is the largest state-built, multipurpose, user-financed water project in the United States. Nearly two-thirds of residents in California receive at least part of their water from the SWP with approximately 70 percent of SWP's contracted water supply going to urban users and 30 percent to agricultural users. The primary purpose of the SWP is to divert and store water during wet periods in Northern and Central California and distribute it to areas of need in Northern California, the San Francisco Bay area, the San Joaquin Valley, the Central Coast, and southern California.

The availability of water supplies from the SWP can be highly variable. A wet water year may be followed by a dry or critically dry year and fisheries issues can restrict the operations of the export pumps even when water supplies are available.

The Sacramento-San Joaquin River Delta (Delta) is key to the SWP's ability to deliver water to its agricultural and urban contractors. All but five of the 29 SWP contractors receive water deliveries below

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

Ongoing regulatory restrictions, such as those imposed by federal biological opinions (Biops) on the effects of SWP and the federal Central Valley Project (CVP) operations on certain marine life, also contributes to the challenge of determining the SWP's water delivery reliability. In dry, below-normal conditions, Metropolitan has increased the supplies delivered through the California Aqueduct by developing flexible CVP/SWP storage and transfer programs. The goal of the storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Harvey O. Banks pumping plant capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions. In addition, the California State Water Resources Control Board (SWRCB) has set water quality objectives that must be met by the SWP including minimum Delta outflows, limits on SWP and CVP Delta exports, and maximum allowable salinity level.

Metropolitan's Board approved a Delta Action Plan in June 2007 that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. The Delta action plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Delta while a long-term solution is implemented. Currently, Metropolitan is working towards addressing three basin elements: Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development.

"Table A" water is the maximum entitlement of SWP water for each water contracting agency. Currently, the combined maximum Table A amount is 4.17 MAFY. Of this amount, 4.13 MAFY is the maximum Table A water available for delivery from the Delta pumps as stated in the State Water Contract. However, deliveries commonly are less than 50 percent of the Table A.

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

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

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

SWP Delta exports are the water supplies that are transferred directly to SWP contractors or to San Luis Reservoir storage south of the Delta via the Harvey O. Banks pumping plant. Estimated average annual Delta exports and SWP Table A water deliveries have generally decreased since 2005, when Delta

export regulations affecting SWP pumping operations became more restrictive due to the Biops. A summary SWP water deliveries from the years 2005 and 2013 is summarized in Table 3-1.

Table 3-1: Metropolitan Colorado River Aqueduct Program Capabilities

Year	Average Annual Delta Exports (MAF)	Average Annual Table A Deliveries (MAF)
2005	2.96	2.82
2013	2.61	2.55
Percent Change	-11.7%	-9.4%

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

- Water availability at the source: Availability depends on the amount and timing of rain and snow that fall in any given year. Generally, during a single-dry year or two, surface and groundwater storage can supply most water deliveries, but multiple-dry years can result in critically low water reserves.
- Water rights with priority over the SWP: Water users with prior water rights are assigned higher priority in DWR's modeling of the SWP's water delivery reliability, even ahead of SWP Table A water.
- Climate change: mean temperatures are predicted to vary more significantly than previously expected. This change in climate is anticipated to bring warmer winter storms that result in less snowfall at lower elevations, reducing total snowpack. From historical data, DWR projects that by 2050, the Sierra snowpack will be reduced from its historical average by 25 to 40 percent. Increased precipitation as rain could result in a larger number of "rain-on-snow" events, causing snow to melt earlier in the year and over fewer days than historically, affecting the availability of water for pumping by the SWP during summer.
- Regulatory restrictions on SWP Delta exports due to the Biops to protect special-status species such as delta smelt and spring- and winter-run Chinook salmon. Restrictions on SWP operations imposed by state and federal agencies contribute substantially to the challenge of accurately determining the SWP's water delivery reliability in any given year.
- Ongoing environmental and policy planning efforts: the California WaterFix involves water delivery improvements that could reduce salinity levels by diverting a greater amount of lower salinity Sacramento water to the South Delta export pumps. The EcoRestore Program aims to restore at least 30,000 acres of Delta habitat, and plans to be well on the way to meeting that goal by the year 2020.
- Delta levee failure: The levees are vulnerable to failure because most original levees were simply built with soils dredged from nearby channels and were not engineered. A breach of one or more levees and island flooding could affect Delta water quality and SWP operations for several months. When islands are flooded, DWR may need to drastically decrease or even cease SWP Delta exports to evaluate damage caused by salinity in the Delta.

The Delta Risk Management Strategy addresses the problem of Delta levee failure and evaluates alternatives to reduce the risk to the Delta. Four scenarios were developed to represent a range of possible risk reduction strategies (Department of Water Resources, The State Water Project Final Delivery Capability Report 2015, July 2015). They are:

- ***Trial Scenario 1 Improved Levees:*** This scenario looks at improving the reliability of Delta levees against flood-induced failures by providing up to 100-year flood protection. The report found that improved levees would not reduce the risk of potential water export interruptions, nor would it change the seismic risk of most levees.
- ***Trial Scenario 2 Armored Pathway:*** This scenario looks at improving the reliability of water conveyance by creating a route through the Delta that has high reliability and the ability to minimize saltwater intrusion into the south Delta. The report found that this scenario would have the joint benefit of reducing the likelihood of levee failures from flood events and earthquakes, and of significantly reducing the likelihood of export disruptions.
- ***Trial Scenario 3 Isolated Conveyance:*** This scenario looks to provide high reliability for conveyance of export water by building an isolated conveyance facility on the east side of the Delta. The effects of this scenario are similar to those for Trial Scenario 2 but with the added consequence of seismic risk of levee failure on islands that are not part of the isolated conveyance facility.
- ***Trial Scenario 4 Dual Conveyance:*** This scenario is a combination of Scenarios 2 and 3 as it looks to improve reliability and flexibility for conveyance of export water by constructing an isolated conveyance facility and through-Delta conveyance. It would mitigate the vulnerability of water exports associated with Delta levee failure and offer flexibility in water exports from the Delta and the isolated conveyance facility. However, seismic risk would not be reduced on islands not part of the export conveyance system or infrastructure pathway.

DWR has altered the SWP operations to accommodate species of fish listed under the Biops, and these changes have adversely impacted SWP deliveries. DWR's Water Allocation Analysis indicated that export restrictions are currently reducing deliveries to Metropolitan as much as 150 TAF to 200 TAF under median hydrologic conditions.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. New Biops for listed species under the Federal ESA or by the California Department of Fish and Game's issuance of incidental take authorizations under the Federal ESA and California ESA might further adversely affect SWP and CVP operations. Additionally, new litigation, listings of additional species or new regulatory requirements could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations.

3.2.3 Storage

Storage is a major component of Metropolitan's dry year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing its Water Supply Allocation Plan (WSAP), is dependent on its storage resources.

Lake Oroville is the SWP's largest storage facility, with a capacity of about 3.5 MAF. The water is released from Oroville Dam into the Feather River as needed, which converges with the Sacramento River while some of the water at Bethany Reservoir is diverted from the California Aqueduct into the South Bay Aqueduct. The primary pumping plant, the Harvey O. Banks pumping plant, pumps Delta water into the California Aqueduct, which is the longest water conveyance system in California.

3.3 Groundwater

Historically, local groundwater has been the cheapest and most reliable source of supply for the District's Retail Zone. The District's Retail Zone relies on approximately 646 AFY from the OC Basin to meet its demands.

This section describes the OC Basin and the management measures taken by OCWD and the basin manager to optimize local supply and minimize overdraft. This section also provides information on historical groundwater production as well as a 25-year projection of the District'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 OC Basin's full volume is approximately 66 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 3-3.

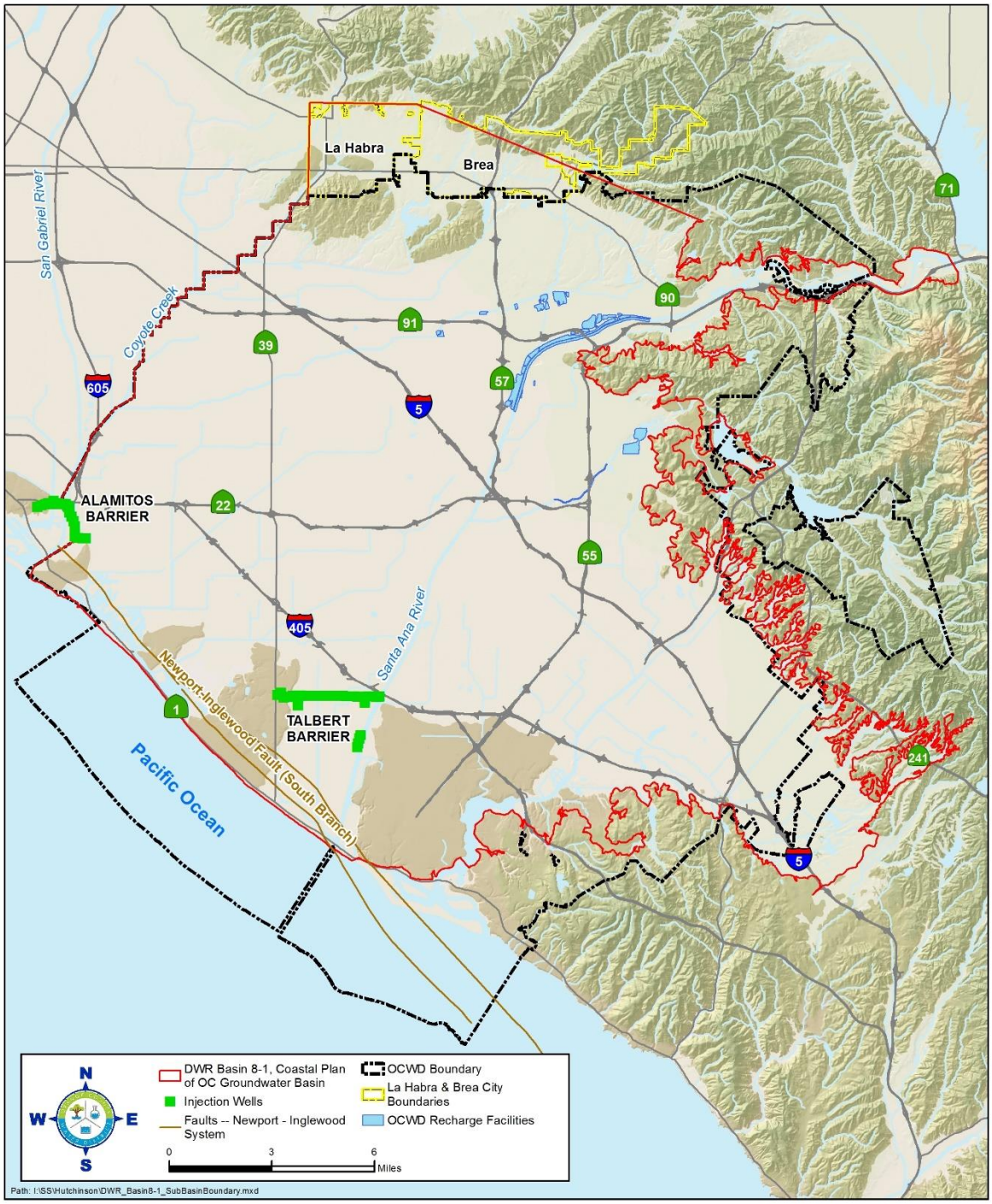


Figure 3-3: Map of the OC Basin and its Major Aquifer Systems

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 would endeavor to transition to the 75 percent BPP between 2013 and 2015 as construction of the GWRS Initial Expansion Project is completed. This expansion will provide an additional 31,000 AFY of water for recharging the groundwater basin.
- 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 groundwater 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 groundwater 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 District, 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 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).

3.3.4 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.

3.3.5 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).

3.3.6 Wholesale Zone Groundwater Historical Extraction

The District's Wholesale Zone relies completely on imported water. Therefore, no groundwater is produced and supplies to the Wholesale Zone.

3.3.7 Retail Zone Groundwater Historical Extraction

The District's Retail Zone is supplied with groundwater from two groundwater wells, East Well and West Well. Both wells are located at the McPherson Well Field and pump water from the OC Basin. Storage capacity in the Retail Zone is provided by the 11.5 MG Reservoir, the Vista Panorama 0.10 MG Reservoir, and the Barrett 0.25 MG Reservoir.

A summary of the groundwater volume pumped by the District is shown in Table 3-3.

Table 3-2: Groundwater Volume Pumped for the District's Retail Zone (AF)

Retail: Groundwater Volume Pumped						
Groundwater Type	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	Orange County Groundwater Basin	307	192	605	751	646
	TOTAL	307	192	605	751	646
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

3.4.1 Wholesale Zone

The actual sources and volume of water for the District's Wholesale Zone for the year 2015 is displayed in Table 3-4.

Table 3-3: Wholesale Zone Water Supplies, Actual (AF)

Wholesale: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	2015	
		Actual Volume	Water Quality
Purchased or Imported Water	MWDOC	4,668	Drinking Water
Total		4,668	4,668
NOTES: From EOCWD's Wholesale Zone Master Plan			

A summary of the current and planned sources of water for the District's Wholesale Zone is shown in Table 3-5.

Table 3-4: Wholesale Zone Water Supplies, Projected (AF)

Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*				
		2020	2025	2030	2035	2040
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Purchased or Imported Water	MWDOC	4,901	5,134	5,367	5,600	5,833
Total		4,901	5,134	5,367	5,600	5,833
NOTES:						

3.4.2 Retail Zone

The actual sources and volume of water for the District's Retail Zone in 2015 is displayed in Table 3-6.

Table 3-5: Retail Zone 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	646	Drinking Water
Purchased or Imported Water	EOCWD Wholesale Zone	251	Drinking Water
	Total	897	
NOTES:			

A summary of the current and planned sources of water for the District's Retail Zone is shown in Table 3-7.

Table 3-6: Retail Zone Water Supplies, Projected (AF)

Retail: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	**Projected Water Supply** *Report To the Extent Practicable*				
		2020	**2025**	**2030**	**2035**	**2040**
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Groundwater	Orange County Groundwater Basin	669	718	722	722	723
Purchased or Imported Water	EOCWD Wholesale Zone	287	308	310	310	310
	Total	955	1,025	1,032	1,032	1,033
NOTES: Groundwater/Imported Water mix may vary depending on OCWD basin production percentage projections						

3.5 Recycled Water

There is no direct recycled water use in the District's service area. The District does not own or operate any recycled water facilities and sends all collected wastewater to Orange County Sanitation District (OCSD) for treatment and complete recycling. However, the District does use groundwater from the OC Basin, which is recharged with recycled water from OCWD's GWRS.

OCWD's GWRS allows southern California to decrease its dependency on imported water and creates a local and reliable source of water. GWRS purifies treated wastewater from OCSD through a three-step advanced process consisting of microfiltration, reverse osmosis, and ultraviolet light with hydrogen peroxide. The end result is high quality water that meets and exceeds all state and federal drinking water standards that is injected into a seawater barrier and pumped to recharge basins where it naturally percolates into the OC Basin and supplements Orange County's drinking water supplies (OCWD, GWRS, 2015).

The District is eligible to receive recycled water credit as it uses water supplies from the OC Basin, which is supplemented from recycled water from the GWRS. This credit allows the District to deduct 141 AF from its 2015 gross water use, lowering its daily per capita water usage from 246 GPCD to 207 GPCD. As a result, the District is able to achieve its 2015 interim target of 262 GPCD and is on track to meeting its 2020 target of 232 GPCD.

More information concerning potential 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, single-dry, and multiple-dry water years. The District depends on a combination of imported and local supplies to meet its water demands and has taken numerous steps to ensure it has adequate supplies. Development of local supplies augments the reliability of the 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.

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.

The District is developing a program to construct a new water treatment plant (WTP) adjacent to the Peters Canyon Reservoir, which would use untreated water from Metropolitan's Lower Feeder/Lake Mathews. The WTP would provide additional potable supply (approximately 2,500 AFY) and increase the reliability of District service, particularly during an emergency leading to an extended outage of Metropolitan's Diemer Water Filtration Plant.

The basis of the water year data for Wholesale Zone and Retail Zone is displayed in Tables 3-8 and 3-9, respectively. The bump in demands for single and multiple-dry years in the Wholesale Zone range from one to four percent, with an average of approximately three percent. The bump in demands for single and multiple-dry years in the Retail Zone is six percent.

Table 3-7: Wholesale Zone Basis of Water Year Data

Wholesale: Basis of Water Year Data			
Year Type	**Base Year**	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	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		103%
Multiple-Dry Years 1st Year	2012		103%
Multiple-Dry Years 2nd Year	2013		103%
Multiple-Dry Years 3rd Year	2014		103%
NOTES:			

Table 3-8: Retail Zone Basis of Water Year Data

Retail: Basis of Water Year Data			
Year Type	**Base Year**	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	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:			

3.6.2 Factors Impacting Reliability

The following are some of the factors identified by Metropolitan that may have an impact on the reliability of Metropolitan supplies.

3.6.2.1 Environment

Endangered species protection needs in the Delta have resulted in operational constraints to the SWP system, as mentioned previously in the State Water Project Supplies section.

3.6.2.2 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.

3.6.2.3 Water Quality

3.6.2.3.1 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.

3.6.2.3.2 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 Cites 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 negative 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 pharmaceuticals, personal care products, 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).

3.6.2.4 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 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 emphases 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, environmental, 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, water quality, and environmental factors. Climatic conditions have been projected based on historical patterns but severe pattern changes are still a possibility in the future.

3.6.3 Wholesale Zone Normal-Year Reliability Comparison

The water demand forecasting model developed for the OC 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).

The District is 100 percent reliable for normal year demands from 2020 through 2040. The District has entitlements to receive imported water from Metropolitan through MWDOC via connections to Metropolitan's regional distribution system. Although pipeline and connection capacity rights do not guarantee the availability of water, per se, 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 the District from existing water transmission facilities.

3.6.4 Retail Zone Normal-Year Reliability Comparison

Imported water supplies are the same as stated above for the Wholesale Zone. The demand and supplies listed below for the Retail Zone also include local groundwater supplies that are available to the District through OCWD by a pre-determined pumping percentage.

Similar to the Wholesale Zone, 1990 through 2014 was the range selected as the normal year.

3.6.5 Wholesale Zone 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 OC 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).

The District has documented that it is 100 percent reliable for the Wholesale Zone for single-dry year demands from 2020 through 2040 with an average demand increase of approximately three percent using FY 2013-14 as the single-dry year. The demand increase percentages from 2020 through 2040 varied from one percent to four percent.

3.6.6 Retail Zone Single-Dry Year Reliability Comparison

Similar to the Wholesale Zone, the District documented that it is 100 percent reliable for the Retail Zone for single-dry year demands from 2020 through 2040 with a demand increase of six percent using FY 2013-14 as the single-dry year for the OC Basin area where the Retail Zone's 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.

3.6.7 Wholesale Multiple-Dry Year Period Reliability Comparison

Multiple-dry years are defined as three or more years with minimal rainfall within a period of average precipitation. The District is capable of meeting all Wholesale Zone customers' demands with significant reserves held by Metropolitan and conservation in multiple-dry years from 2020 through 2040 with an average demand increase of approximately three percent using FY 2011-12 through FY 2013-14 as the driest years. MWDOC chose the highest average demand over a three year period for the multi-dry year demand increase. This value was repeated over the three year span as a conservative assumption where demand would increase significantly in a prolonged drought and would remain constant through the years. The demand increase percentages from 2020 through 2040 varied from one percent to four percent.

3.6.8 Retail Zone Multiple-Dry Year Period Reliability

Similar to the Wholesale Zone, the District is capable of meeting all Retail Zone 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 using FY 2011-12 through FY 2013-14 as the driest years. MWDOC chose the highest average demand over a three year period for the multi-dry year demand increase. This value was repeated over the three year span as a conservative assumption where demand would increase significantly in a prolonged drought and would remain constant through the years.

3.7 Wholesale Zone Supply and Demand Assessment

A comparison between the supply and demand for the Wholesale Zone for the projected years between 2020 and 2040 is shown in Table 3-10. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

Table 3-9: Wholesale Zone Normal Year Supply and Demand Comparison (AF)

Wholesale: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	4,901	5,134	5,367	5,600	5,833
Demand totals	4,901	5,134	5,367	5,600	5,833
Difference	0	0	0	0	0
NOTES:					

A comparison between the supply and the demand in a single-dry year is shown in Table 3-11. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

Table 3-10: Wholesale Zone Single-Dry Year Supply and Demand Comparison (AF)

Wholesale: Single-Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	4,948	5,228	5,508	5,788	6,068
Demand totals	4,948	5,228	5,508	5,788	6,068
Difference	0	0	0	0	0
NOTES:					

A comparison between the supply and the demand in multiple-dry years is shown in Table 3-12.

Table 3-11: Wholesale Zone Multiple-Dry Years Supply and Demand Comparison (AF)

Wholesale: Multiple-Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First year	Supply totals	4,948	5,228	5,508	5,788	6,068
	Demand totals	4,948	5,228	5,508	5,578	6,068
	Difference	0	0	0	0	0
Second year	Supply totals	4,948	5,228	5,508	5,578	6,068
	Demand totals	4,948	5,228	5,508	5,788	6,068
	Difference	0	0	0	0	0
Third year	Supply totals	4,948	5,228	5,508	5,788	6,068
	Demand totals	4,948	5,228	5,508	5,788	6,068
	Difference	0	0	0	0	0
NOTES:						

3.8 Retail Zone Supply and Demand Assessment

A comparison between the supply and demand for the Retail Zone for the projected years between 2020 and 2040 is shown in Table 3-13. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

Table 3-12: Retail Zone Normal Year Supply and Demand Comparison (AF)

Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	955	1,025	1,032	1,032	1,033
Demand totals	955	1,025	1,032	1,032	1,033
Difference	0	0	0	0	0
NOTES:					

A comparison between the supply and the demand in a single-dry year is shown in Table 3-14. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

Table 3-13: Retail Zone Single-Dry Year Supply and Demand Comparison (AF)

Retail: Single-Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	1,012	1,087	1,094	1,094	1,095
Demand totals	1,012	1,087	1,094	1,094	1,095
Difference	0	0	0	0	0
NOTES:					

A comparison between the supply and the demand in multiple-dry years is shown in Table 3-15.

Table 3-14: Retail Zone 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	1,012	1,087	1,094	1,094	1,095
	Demand totals	1,012	1,087	1,094	1,094	1,095
	Difference	0	0	0	0	0
Second year	Supply totals	1,012	1,087	1,094	1,094	1,095
	Demand totals	1,012	1,087	1,094	1,094	1,095
	Difference	0	0	0	0	0
Third year	Supply totals	1,012	1,087	1,094	1,094	1,095
	Demand totals	1,012	1,087	1,094	1,094	1,095
	Difference	0	0	0	0	0
NOTES:						

4 DEMAND MANAGEMENT MEASURES

The goal of the Demand Management Measures (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 the District the requirements changed from having 14 specific measures to six more general requirements plus an "other" category.

4.1 Water Waste Prevention Ordinances

Ordinance No. 2009-01, adopted on June 18, 2009 by the District's Board of Directors, instituted water conservation measures, prohibition against water waste and water shortage supply contingencies. The following water conservation requirements are effective at all times and are permanent:

- Limits on watering duration
- Automatic rain shut-off for automated irrigation systems
- No excessive water flow or runoff
- No washing down hard or paved surfaces
- Obligation to fix leaks, breaks, or malfunctions
- Re-circulating water required for water fountains and decorative water features
- No Hosing or washing down vehicles
- Unauthorized use of fire hydrants prohibited
- Drinking water served upon request only in restaurants
- Commercial lodging establishments must provide option to not launder linen daily
- No installation of single pass cooling systems
- No installation of non-re-circulating water systems in commercial car wash and laundry systems
- Restaurant required to use water conserving dish wash spray valves, best-available water-conserving technology, minimum water flow in scoop sinks, and automatic shutoff nozzles and may not defrost food with running water
- Construction sites must use recycled or non-potable water when available and use water hoses with automatic shut-off valves
- Indiscriminate water use prohibited

The ordinance also established three stages of water supply shortage and 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. This is further discussed in Section 5. Ordinance No. 2009-01 is included in Appendix D.

Periodic site visits are conducted by District personnel to enforce the Water Waste Ordinance. Some warnings have been issued, with successful results. District personnel quickly and effectively respond to occasional system leaks. Customer complaints have decreased, and numerous positive comments have been received about the District's excellent customer service. The District has used an extensive public information and education program.

4.2 Metering

All connections to the District's Wholesale Zone System have been metered since its formation in 1961. The District has required meters on all service connections since acquisition of the Retail Zone system in 1985. The District requires metering of all new water connections and bills by volume of use. All water service connections, with the exception of dedicated fire services, are metered and the District has retrofitted all existing unmetered connections to be metered.

The District has an ongoing meter replacement program, and has included the replacement of critical system meters in the capital improvement program. Municipal meters provide both domestic and irrigation water service. The District is currently evaluating the benefits and constraints of an AMR program.

4.3 Conservation Pricing

Conservation pricing can be defined as "rates designed to recover the cost of providing service." The District's Retail Zone rates include a fixed commodity charge ($2.67/100 cubic feet in as of August 16, 2014), a fixed metered account charge (ranging from $18.10 to $128.75 depending on meter size), and a capital recovery charge ($20/month). The rates have been designed to recover the full cost of water service in the commodity charge, and a portion of the fixed costs. In December 2010, the Board of Directors reviewed a proposal to establish "water budgets" (e.g., allocating a fixed indoor and outdoor portion of water to a residence based upon the number of residents and the irrigable area and evapotranspiration rate that occurred during a billing period) and "water-budget based rates" (seeing rates based upon in-budget and out-of-budget usage). The Board decided to proceed with setting up water budgets for each parcel, however they delayed the implementation of water budged based rates for a later date.

The Wholesale operation sells water at its cost from MWDOC. As of January 1, 2016, the rate is $942/AF and will increase to $979/AF on January 1, 2017.

4.4 Public Education and Outreach

The District's public education and outreach program is administered by its wholesaler, MWDOC. MWDOC has established an extensive public education and outreach program to assist its retail agencies in promoting 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 OC 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 OC 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 OC 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, 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 OC 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 the key water infrastructure.

The District also has an active public outreach program that supplements MWDOC's regional programs as described below:

The District prepares and distributes a newsletter with each bimonthly bill that includes information regarding water use efficiency measures ranging from Metropolitan/MWDOC sponsored rebates to leak detection and simple measures to take to reduce water usage. Customers are also counseled by customer service representatives and field personnel on the availability of rebates and water efficiency measures customers can implement. The District informs its water customers of upcoming public information events and encourages participation in water conservation efforts and programs sponsored by MWDOC and Metropolitan.

The District regularly distributes a variety of information materials to the public in addition to the newsletter discussed above, including fact sheets, brochures, issue bulletins, manager's reports, and annual water quality and financial reports.

4.5 Programs to Assess and Manage Distribution System Real Loss

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 the AWWA. SB 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 the District's Wholesale and Retail Zones which identified areas for improvement and quantified total loss. Based on the data presented, the three priority areas identified for the Wholesale Zone were water imported, variable production cost (applied to real losses), and systematic data handling errors. The three priority areas identified for the Retail Zone were customer meter inaccuracies, billed metered, and volume from own sources. Multiple criteria are a part of each validity score and a system wide approach will need to be implemented for the District's improvement. Quantified water loss for the FY 2014-15 was 36 AFY and 20 AFY, in the Wholesale and Retail Zones, respectively.

The District's unaccounted for water percentage is monitored on a monthly basis. The District aggressively repairs main breaks, hydrant leaks or breaks, and meter leaks. A team of water service workers are available to permanently repair main or hydrant breaks, and promptly restore water service. Both proactive and "inform and response" approaches are used for water meter leaks. All meter leaks are investigated and repaired the same day, unless it is not possible to do so, then next day service is

performed. This method of response audits has been conducted for many years and will continue as part of normal operations and emergency response. Additionally, the District has undertaken a program of systematically analyzing the condition of and replacing old pipelines on an annual basis.

4.6 Water Conservation Program Coordination and Staffing Support

The District does not directly employ a water conservation coordinator. MWDOC provides this service on behalf of the District. The District assigns staff to work closely with the Water Use Efficiency staff at MWDOC to provide successful execution of regional programs, and those conducted on behalf of the District. The District may either directly participate in or be represented by MWDOC in regional workgroups including the Water Use Efficiency Workgroup, Public Affairs Workgroup, County of Orange Supervisor's Water Task Force, and the Orange County Water Use Efficiency Steering Committee. Funding for these activities is included in the District's O&M budget.

4.7 Other Demand Management Measures

The District has implemented an effective public information and education program that has resulted in a significant reduction of water demands (36 percent). The program will continue in the next five years. Additionally, during the past five years, FY 2010-11 to 2014-15, the District, 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. The District will continue to implement all applicable programs in the next five years.

4.7.1 Residential Programs

Water Smart Home Survey Program

The Water Smart Home Survey Program provides free home water surveys (indoor and outdoor). The Water Smart Home Survey Program uses a Site Water Use Audit program format to perform comprehensive, single-family home audits. Residents choose to have outdoor (and indoor, if desired) audits to identify opportunities for water savings throughout their properties. A customized home water audit report is provided after each site audit is completed and provides the resident with their survey results, rebate information, and an overall water score.

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

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 high efficiency toilets, ultralow volume urinals, air-cooled ice machines, weather-based irrigation controllers, and rotating nozzles.

Socal Water$mart Rebate Program for CII

The District 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 high efficiency toilets, 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 (WBICs) 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

The District through MWDOC 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 with recent water supply challenges, the State Water Resources Control Board found that California has been subject to multi-year droughts in the past, and the 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 on January 2014 and signed the 2014 Executive Order that 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 domestic water use is the highest use of water and the next highest use is irrigation. This section describes the water supply shortage policies Metropolitan and the District have in place to respond to events including catastrophic interruption and 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.

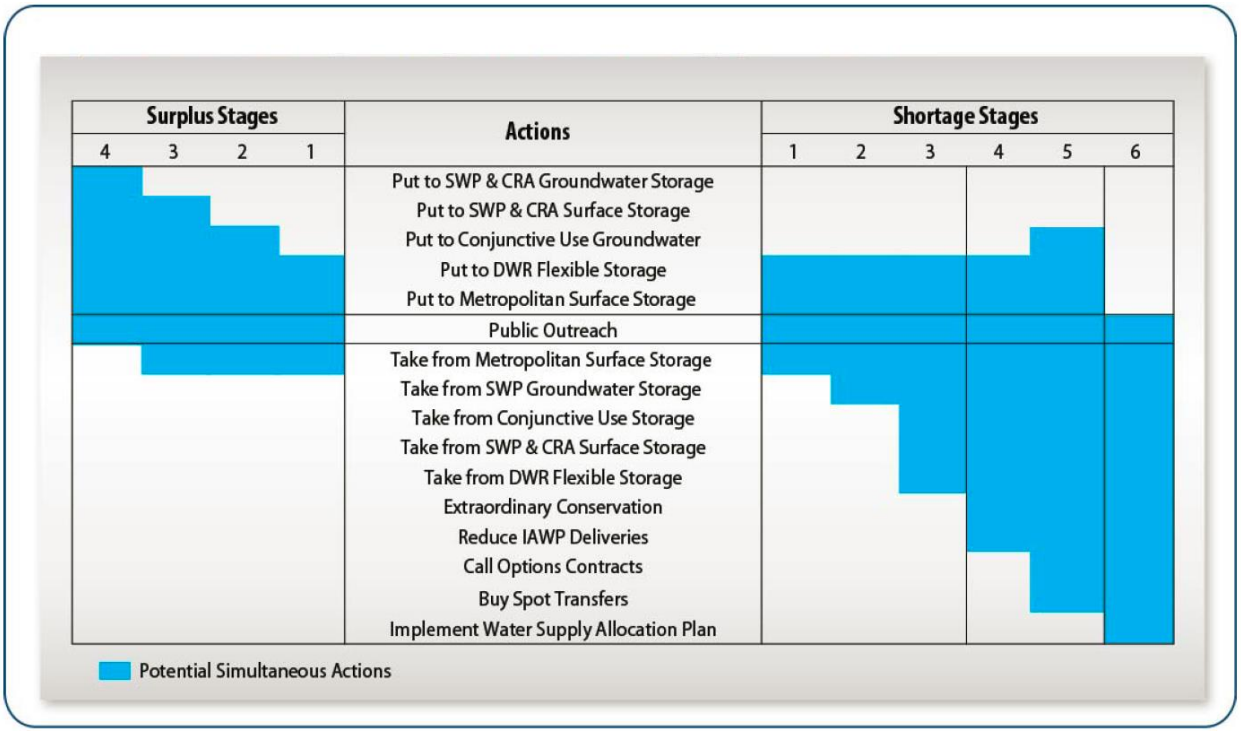


Figure 5-1: Resource Stages, Anticipated Actions, and Supply Declarations

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 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 UWMP, June 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 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 applies 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, June 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 29 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 it 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 East Orange County Water District

The District's Board of Directors adopted Water Conservation Ordinance No. 2009-01 on June 18, 2009, establishing a Retail Zone water conservation program. This Ordinance will encourage reduced water consumption within the District through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize efficient use of water within the District. Along with permanent water conservation requirements, the Ordinance consists of three stages to respond to a reduction in potable water available to the District for distribution to its customers. A summary of the stages of water shortage is displayed in Table 5-1. Permanent mandatory water conservation measures are in effect at all times and its water use restrictions are applicable during each water shortage stage (EOCWD, Ordinance No. 2009-01, June 2009).

Table 5-1: Stages of Water Shortage Contingency Plant

Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction	Water Supply Condition
1	11% to 20%	A Level 1 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that a reduction in consumer demand is necessary due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to existing water conditions.
2	21% to 30%	A Level 2 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that an additional reduction in consumer demand is necessary due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to water conditions.
3	31% to 40%	A Level 3 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that a further additional reduction in consumer demand is necessary due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to existing water conditions.
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 15 percent region 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 storages 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. The three year minimum supply for the District's Wholesale Zone and the District's Retail Zone is shown in Table 5-2 and 5-3, respectively (MWDOC, Water Shortage Allocation Model, November 2015).

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

Wholesale: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	13,444	13,444	13,444
NOTES: MWDOC Shortage Allocation Model FY 2015-16			

Table 5-3: Minimum Supply Next Three Years – Retail Zone (AF)

Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	1,060	1,060	1,060
NOTES: MWDOC Shortage Allocation Model FY 2015-16			

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.

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, including the District and the Orange County Fire Authority. The District is working on a program to upgrade several of its water reservoirs to be available during a regional emergency.

5.4.3 East Orange County Water District

A water shortage emergency could arise from a catastrophic event. For catastrophic water supply interruptions, the District's Emergency Response Plan outlines the water shortage emergency response responsibilities. The plan provides a step by step procedure for responding to different types of emergencies and also provides detailed contact information for adjoining cities, special districts, and regulatory agencies. Preparation actions that the District can take or activate during a catastrophic event include WEROC, Metropolitan Member Agency Radio System, State of California Master Mutual Aid Agreement, California Water Agencies Response Network, Plan Bulldozer, and the District's Water Shortage Contingency Plan.

5.4.4 Prohibitions

The District's Water Conservation Ordinance No. 2009-01 lists water conservation requirements that will take effect upon implementation by the Board of Directors. These prohibitions shall promote the efficient use of water, reduce or eliminate water waste, and enable implementation of the District's Water Shortage Contingency Measures. Water conservation measures become more restrictive per each progressive stage in order to address the increasing differential between water supply and demand.

A list of restrictions and prohibitions that are applicable to each stage is shown in Table 5-4 (EOCWD, Ordinance No. 2009-01, June 2009).

Table 5-4: 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 - Other landscape restriction or prohibition	Watering or irrigating of lawn, landscape, or other vegetated area with potable water using a landscape irrigation system or a watering device that is not continuously attended is limited to no more than ten (10) minutes watering per day per station. This does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems and weather-based controllers or stream rotor sprinklers that meet a seventy percent efficiency standard.	Yes
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation	-	Yes
Permanent Year-Round	Landscape - Other landscape restriction or prohibition	New and existing residential automated irrigation systems must be equipped with rain sensors that shut off the system when it rains, or smart controllers or evapo-transpiration sensors that use weather-based data to set efficient watering schedules.	Yes
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Leaks, breaks, and other malfunctions must be corrected in no more than three (3) days of receiving notice from the District.	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?
Permanent Year-Round	Other - Prohibit use of potable water for washing hard surfaces	This restriction does not apply to situations where it is necessary to wash surfaces to alleviate safety or sanitary hazards. Only then may the surface be washed with a hand-held bucket or similar container, a hand-held hose equipped with a positive shut-off valve, or a low-volume high-pressure cleaning machine or "water broom."	Yes
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	-	Yes
Permanent Year-Round	Water Features - Restrict water use for decorative water features, such as fountains	All decorative water fountains and water features must recirculate water or users must secure a waiver from the District.	Yes
Permanent Year-Round	Other	No person may use water from any fire hydrant for any purpose other than fire suppression or emergency aid without first requesting and posting the appropriate fees at the District or obtaining a hydrant meter to record all water consumption for a specified project.	Yes
Permanent Year-Round	CII - Restaurants may only serve water upon request	-	Yes
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service	-	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?
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves	-	Yes
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service.	Yes
Permanent Year-Round	Other	Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry operations.	Yes
Permanent Year-Round	Other - Prohibit use of potable water for construction and dust control	-	Yes
1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is limited to three (3) days per week from the months of April to October on a schedule established a posted by the District. During the months of November through March, watering or irrigating of lawn, landscape, or other vegetated area with potable water is limited to no more than two (2) days per week on a schedule established and posted by the District. An exception is made for the use of hand-water shut-off nozzle or device, watering with a hand-held bucket or similar container, landscape irrigation systems that exclusively use very low-flow drip, and for fruit trees and vegetable gardens.	Yes
2	Landscape - Limit landscape irrigation to specific days	Watering lawns, landscaping and other vegetated areas is limited to no more than two (2) days per week from April to October. The number of watering days permitted from November to March will be no more than one (1) day per week.	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	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Leaks, breaks, and other malfunctions must be corrected in no more than two (2) days of receiving notice from the District.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling ornamental lakes and ponds is prohibited except for those that sustain aquatic life provided such life is of significant value and was actively managed in the water feature prior to declaring the shortage.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling uncovered residential swimming pools or uncovered outdoor spas is prohibited. Refilling of covered pools and/or outdoor spas of up to one (1) foot of water per week is allowed. This is exempt for individuals for health reasons.	Yes
2	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	-	Yes
3	Landscape - Limit landscape irrigation to specific days	Watering lawns, landscaping and other vegetated areas is limited to no more than one (1) day per week from April to October. The number of watering days permitted from November to March remains the same at no more than one (1) day per week.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Leaks, breaks, and other malfunctions must be corrected in no more than one (1) days of receiving notice from the District.	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 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 will be issued except under the following circumstances: 1) District-approved plans and specifications have been issued, 2) a valid, unexpired building permit has been issued for the project, 3) the project is necessary to protect the public's health, safety, and welfare, or 4) 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 the District.	Yes
NOTES:			

5.4.5 Penalties

Any customer who violates any provision of the Water Conservation Ordinance 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 the District and may be subject to written notices, surcharges, fines, flow restrictions, service disconnection, and/or service termination.

The following are penalties that are a result of non-compliance with water use measures during a Permanent, Level 1, and Level 2 Mandatory Conservation Stage:

- The first instance of non-compliance will result in the District issuing a written warning and a copy of the Ordinance by mail to the customer in violation.
- The second instance of non-compliance will result in a fine not to exceed fifty dollars.
- The third instance of non-compliance will result in a fine not to exceed one hundred dollars.
- The fourth and subsequent instances of non-compliance will result in a fine not to exceed two hundred fifty dollars.

Non-compliance of Level 3 Mandatory Conservation Measures are subject to a separate set of penalties. The following are penalties applicable for persons or entities that fail to comply with Level 3 mandatory water conservation measures.

- The first instance of non-compliance will result in the District issuing a written warning and a copy of the Ordinance by main to the customer in violation.
- The second instance of non-compliance will result in a fine not to exceed two hundred and fifty dollars.
- The third instance of non-compliance will result in a fine not to exceed five hundred dollars.

Customers that violate any water use measure may have a water flow restrictor installed by the District for minimum of forty eight hours. The District may also disconnect and/or terminate a customer's water service. The customer in non-compliance with the District's Ordinance is responsible for payment of the District's charges for installing and/or removing any flow restricting device at the rate of charges then in effect (EOCWD, Ordinance No. 2009-01, June 2009).

5.4.6 Consumption Reduction Methods

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

Table 5-5: 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	Level 1 Water Alert Conservation Measures
2	Other	Level 2 Water Supply Warning Conservation Measures
3	Other	Level 3 Water Emergency Conservation Measures
NOTES:		

5.5 Impacts to Revenue

During a catastrophic interruption of local water supplies, prolonged drought, or water shortage of any kind, the District 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.

The District 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. The District 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, the District may use reserves. If necessary, the District 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.

5.6 Reduction Measuring Mechanism

Under normal conditions, potable water production figures are recorded daily. This data will be used to measure the effectiveness of any water shortage contingency stage that may be implemented.

As stages of water shortage are declared by Metropolitan, the District will follow implementation of those stages and continue to monitor water demand levels. It is not until Shortage Stage 5 that Metropolitan may call for extraordinary conservation. During this stage, Metropolitan's Drought Program Officer will coordinate public information activities and monitor the effectiveness of ongoing conservation programs. Monthly reporting on estimated conservation water savings will be provided.

The District will participate in monthly member agency manager meetings with both MWDOC and OCWD to monitor and discuss monthly water allocation. This will enable the District to be aware of import water use and groundwater conditions on a timely basis as a result of specific actions taken responding to the District's Water Shortage Contingency Plan.

MWDOC will provide each client agency with water use monthly reports that will compare each client agency's current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on it 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 imported 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

The District does not own or operate wastewater treatment facilities and sends all collected wastewater to OCSD for treatment and disposal. 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 Green Acres Project (GAP) and 2) OCWD Groundwater Replenishment System (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. The District does not receive any GAP water.

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 (H_2O_2) 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 H_2O_2 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 130,000 AFY. The GWRS is the world's largest water purification system for IPR.

6.2 Wastewater Collection and Reclamation System

The District's retailers operate and maintain their local sewer systems that feed into the OCSD's trunk sewer system to convey wastewater to OCSD's treatment plants. 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.

The District has been working with OCSD since 2013 to transfer sewer ownership and operation in Sewer Area #7. Sewer Area #7 is a system of local sewer lines where 95 percent are located with the District's boundaries. In March 2014 the District submitted an application with the OC Local Agency Formation Commission (LAFCO) to obtain formal approval to take ownership and maintain the sewer lines. LAFCO has completed this process, and recently approved the transfer of the Sewer District #7 local sewers to the District.

Currently no wastewater collection system operated by the District and no wastewater is treated or disposed in the District's Retail and Wholesale Zone service area as OCSD treats and disposes all of the District's wastewater. Effective August 1, 2016, the District will 1) become the owner and O&M provider for the wastewater collection system, and 2) convey all wastewater in the EOCWD UWMP service area for treatment and recycling by OCSD/OCWD at the GWRS.

6.3 Current Recycled Water Uses

There is currently no recycled water use within the District's Retail and Wholesale Zone service area. All wastewater is conveyed to OCSD for treatment, and OCWD recycling in the GWRS.

6.4 Potential Recycled Water Uses

While the District recognizes the potential for beneficial reuse in their service area, there is no source of recycled water supply in proximity to the District. The District's wastewater is conveyed to OCSD's regional treatment facilities where the wastewater is treated and recycled. Recycled water analyses performed over the years have shown that local treatment and reuse facilities are not feasible. The District supports, encourages, and contributes to the continued development of recycled water and potential uses throughout the region with OCWD's GWRS.

6.4.1 Direct Non-Potable Reuse

The District does not have any direct non-potable uses within their service area and does not currently have the potential for non-potable reuse as a result of nonexistent or planned recycled water infrastructure.

6.4.2 Indirect Potable Reuse

The District benefits from OCWD's GWRS system that provides IPR through replenishment of Orange County's Groundwater Basin with water that meets state and federal drinking water standards.

6.5 Optimization Plan

Studies of water recycling opportunities within southern California provide a context for promoting the development of water recycling plans. Currently, most of the recycled water available is being directed toward replenishment of the groundwater basin and improvements in groundwater quality. As a user of groundwater, the District supports the efforts of OCWD and OCSD to use recycled water as a primary resource for groundwater recharge in Orange County.

Public Education

The District participates in the MWDOC public education and school education programs, which include extensive sections on water recycling. MWDOC's water use efficiency public information programs are a partnership with agencies throughout the county.

Through a variety of public information programs, MWDOC reaches the public, including those in the District, with information regarding present and future water supplies, the demands for a suitable quantity and quality of water, including recycled water, and the importance of implementing water efficiency techniques and behaviors. Through MWDOC, water education programs have reached thousands of students in the District with grade-specific programs that include information on recycled water.

Financial Incentives

The implementation of recycled water projects involves a substantial upfront capital investment for planning studies, Environmental Impact Reports (EIR), engineering design and construction before there is any recycled water to market. For some water agencies, these capital costs exceed the short-term expense of purchasing additional imported water supplies from Metropolitan.

The establishment of new supplemental funding sources through federal, state and regional programs now provides significant financial incentives for water agencies to develop and make use of recycled water locally. Potential sources of funding include federal, state and local funding opportunities. These funding sources include the U.S. Department of Interior Bureau of Reclamation (USBR), California Proposition 13 Water Bond, Proposition 84, and Metropolitan Local Resources Program (LRP). These funding opportunities may be sought by the District or possibly more appropriately by regional agencies. The District will continue to support seeking funding for regional water recycling projects and programs.

Optimization Plan

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

7 FUTURE WATER SUPPLY PROJECTS AND PROGRAMS

7.1 Water Management Tools

Resource optimization such as desalination and IPR minimize the District's and region's reliance on imported water. Optimization efforts are typically led by 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 water systems. The District maintains three connections with Metropolitan. The following inter-agency connection is maintained:

- City of Orange: Chandler Ranch Road

7.3 Planned Water Supply Projects and Programs

The District's Wholesale and Retail Zone FY 2015-16 Capital Budget and Master Plans describe the planned water supply projects and programs for the District. Several CIP projects are being implemented or evaluated by the District to upgrade the supply, storage, and conveyance systems in the WZ and RZ.

7.4 Desalination Opportunities

In 2001, Metropolitan developed a Seawater Desalination Program (SDP) to provide incentives for developing new seawater desalination projects in Metropolitan’s service area. In 2014, Metropolitan modified the provisions of their 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 seawater produced compared to the cost of Metropolitan supplies
- Up to $475 per AF for 15 years, depending on the unit cost of seawater produced compared to the cost of Metropolitan supplies

Developing local supplies within Metropolitan's service area is part of their IRP goal of improving water supply reliability in the region. Creating new local supplies reduce pressure on imported supplies from the SWP and Colorado River.

On May 6th, 2015, the 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 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.

The District has not investigated seawater desalination as a result of economic and physical impediments.

Brackish groundwater is groundwater with a salinity higher than freshwater, but lower than seawater. Brackish groundwater typically requires treatment using desalters.

7.4.1 Groundwater

There are currently no brackish groundwater opportunities within the District's service area.

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 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 Groundwater Basin. Currently, a combination of these options could be pursued.

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 Groundwater 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.

Doheny Desalination Project – In 2013, after five years and $6.2 million to investigate use of a slant well intake for the Doheny Desalination Project, it was concluded the project was feasible and could produce 15 MGD (16,800 AFY) of new potable water supplies to five participating agencies. These agencies consist of: South Coast Water District (SCWD), City of San Clemente, City of San Juan Capistrano, Laguna Beach County Water District (LBCWD) and Moulton Niguel Water District.

Only SCWD and LBCWD expressed interest in moving forward after work was completed, with the other agencies electing to monitor the work and consider options to subsequently come back into the project while considering other water supply investments.

More recently, LBCWD has had success in using previously held water rights in the OC groundwater basin and may elect to move forward with that project instead of ocean desalination. A final decision is pending based on securing the necessary approvals on the groundwater agreement.

SCWD has taken the lead on the desalination project and has hired a consulting team to proceed with project development for the Doheny Desalination Project. Major items scheduled over the next year include:

- Preliminary Design Report and Cost Estimate
- Brine Outfall Analysis
- EIR Process
- Environmental Permitting Approvals
- Public Outreach
- Project Funding
- Project Delivery Method
- Economic Analysis

The schedule for this project includes start-up and operation of up to a 5 MGD (5,600 AFY) facility by the end of 2019. SCWD anticipates leaving the option open for other agencies to participate in a larger, 15 MGD facility, with subsequent permitting and construction of additional slant wells and treatment capacity.

Camp Pendleton Seawater Desalination Project – San Diego County Water Authority (SDCWA) is studying a desalination project to be located at the southwest corner of Camp Pendleton Marine Corps Base adjacent to the Santa Margarita River. The initial project would be a 50 (56,000 AFY) or 100 (112,100) MGD plant with expansions in 50 MGD increments to a maximum capacity of 150 MGD (168,100 AFY), making this the largest proposed desalination plant in the US.

The project is currently in the feasibility study stage and SDCWA is conducting geological surveys, analyzing intake options, and studying the effect on ocean life and routes to bring desalinated water to SDCWA's delivery system. MWDOC and south Orange County agencies are maintaining an interest in the project.

8 UWMP ADOPTION PROCESS

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, the District worked closely with entities such as MWDOC to develop and update this planning document. The District 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 the District 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)	6/1/16 & 6/8/16	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)	3/10/16	Appendix E
Held public hearing	6/16/16	Appendix E
Adopted UWMP	6/16/16	Appendix F
Submitted UWMP to DWR		-
Submitted UWMP to the California State Library and city or county within the supplier's service area		-
Made UWMP available for public review		-

This UWMP was adopted by the Board of Directors on June 16, 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 the District 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, the District sent a Letter of Notification to the County of Orange and the cities within its service area on March 10, 2016 to state that it was in the process of preparing an updated UWMP (Appendix E).

Table 8-2: Notification to Cities and Counties

Notification to Cities and Counties		
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Tustin	☑	☑
Orange	☑	☑
County Name	60 Day Notice	Notice of Public Hearing
Orange County	☑	☑
NOTES:		

8.1 Public Participation

The District encouraged community and public interest involvement in the plan update through a public hearing and inspection of the draft document on June 1, 2016 and June 8, 2016. Public hearing notifications were published in local newspapers and distributed through utility bills. 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 the District's plans for providing a reliable, safe, high-quality water supply. Copies of the draft plan were made available for public inspection at the District's office and at the City of Orange Main Library and the El Modena Branch Library.

8.2 Agency Coordination

The District's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. The District is dependent on imported water from Metropolitan through MWDOC, its regional wholesaler. The District is also dependent on groundwater from OCWD, the agency that manages the Orange County Basin. As such, the District involved these water providers as well as its sub-agencies 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, the District summarized the Water Conservation Programs implemented to date, and compared them to those as planned in its 2010 UWMP.

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

As a signatory to the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) regarding urban water use efficiency, the District's commitment to implement BMP-based water use efficiency program continues today. For the District's specific achievements in the area of conservation, please see Section 4 of the UWMP.

8.3.3 Filing of 2015 UWMP

The Board of Directors reviewed the Final Draft Plan on June 16, 2016. The five-member Board of Directors approved the 2015 UWMP on June 16, 2016. See Appendix F for the resolution approving the Plan.

By July 1, 2016, the District's Adopted 2015 UWMP was filed with DWR. By August 1, 2016, the District's Adopted 2015 UWMP was filed with California State Library, County of Orange, and cities within its service area.

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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 eitherchecklist. 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 *(Optional Column for Agency Use)*
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 2.2.2**
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 and 2.4**
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 2.4.7**
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**
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	**Section 4.6 and 6.4**
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**
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 3.3.7**

	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 & 3.4**
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 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 & Table 1-5**
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	**Table 1-3**
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 7.1**
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**
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 3.6.2.3**
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 and 3.8**
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 5.4.4**
10632(a)(5)	Specify consumption reduction methods in the most restrictive stages.	Water Shortage Contingency Planning	Section 8.4	**Section 5.4.6**
10632(a)(6)	Indicated penalties or charges for excessive	Water Shortage Contingency	Section 8.3	**Section**

	use, where applicable.	Planning		**5.4.5**
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 5.5**
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 5.6**
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	**Section 4**
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 8.3.3**
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
EOCWD Retail Zone	CA3010068	1,207	897
	TOTAL	1,207	897
NOTES:			

Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable* *drop down list*
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☑	Water Supplier is also a member of a Regional Alliance	Orange County 20x2020 Regional Alliance
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Table 2-3: Agency Identification	
Type of Agency (select one or both)	
☑	Agency is a wholesaler
☑	Agency is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables Are in Calendar Years
☑	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
7/1	
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF
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
EOCWD Wholesale Zone
NOTES:

Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☑	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with CWC 10631. **Complete the table below.**
EOCWD Retail Zone	
IRWD	
GSWC	
City of Orange	
City of Tustin	
NOTES:	

Table 3-1 Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	3,257	4,200	4,300	4,350	4,400	4,686
NOTES:						

Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	91,600	92,900	94,200	95,500	96,800	98,100
NOTES:						

Table 4-1 Retail: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Use Drop down list *May select each use multiple times* *These are the only Use Types that will be recognized by the WUEdata online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Single Family		Drinking Water	848
Multi-Family		Drinking Water	18
Other	Commercial/Industrial/Institutional	Drinking Water	30
Other		Drinking Water	1
		TOTAL	897
NOTES:			

Table 4-1 Wholesale: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Use Drop down list *May select each use multiple times* *These are the only use types that will be recognized by the WUE data online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Sales to other agencies	GSWC	Drinking Water	1,438
Sales to other agencies	IRWD	Drinking Water	201
Sales to other agencies	Orange	Drinking Water	109
Sales to other agencies	Tustin	Drinking Water	2,913
Sales to other agencies	Retail Zone	Drinking Water	7
		TOTAL	4,668
NOTES: EOCWD Wholesale Master Plan, Carollo 2015			

Table 4-2 Retail: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Use Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool*		2020	2025	2030	2035	2040
Single Family		903	969	976	976	977
Multi-Family		19	21	21	21	21
Other	Commercial/Industrial/Institutional	32	34	34	34	34
Other		1	1	1	1	1
	TOTAL	955	1,025	1,032	1,032	1,033
NOTES:						

Table 4-2 Wholesale: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.*		2020	2025	2030	2035	2040
Sales to other agencies	GSWC	1,212	1,270	1,327	1,385	1,443
Sales to other agencies	IRWD	150	157	165	172	179
Sales to other agencies	Orange	257	269	281	293	305
Sales to other agencies	Tustin	2,999	3,142	3,284	3,427	3,569
Sales to other agencies	Retail Zone	283	296	310	323	337
	TOTAL	4,901	5,134	5,367	5,600	5,833
NOTES: Extrapolated from EOCWD Wholesale Master Plan, Carollo 2015						

Table 4-3 Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water *From Tables 4-1 and 4-2*	897	955	1,025	1,032	1,032	1,033
Recycled Water Demand* *From Table 6-4*	0	0	0	0	0	0
TOTAL WATER DEMAND	897	955	1,025	1,032	1,032	1,033
NOTES: Wastewater is conveyed to the OCSD/OCWD GWRS to maximize reclaimed water production						

Table 4-3 Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water *From Tables 4-1 and 4-2*	4,668	4,901	5,134	5,367	5,600	5,833
Recycled Water Demand* *From Table 6-4*	0	0	0	0	0	0
TOTAL WATER DEMAND	4,668	4,901	5,134	5,367	5,600	5,833
NOTES:						

Table 4-4 Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
07/2014	20
NOTES:	

Table 4-4 Wholesale: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
07/2014	36
NOTES:	

Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc... utilized in demand projections are found.	Section 4.1
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes
NOTES:	

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	*1998*	*2007*	*291*	*262*	*232*
5 Year	*2003*	*2007*	*291*		
*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
207	262	Yes

**All values are in Gallons per Capita per*

NOTES:

Table 6-1 Retail: Groundwater Volume Pumped						
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	Orange County Groundwater Basin	307	192	605	751	646
	TOTAL	307	192	605	751	646
NOTES:						

Table 6-1 Wholesale: Groundwater Volume Pumped	
☑	Supplier does not pump groundwater. The supplier will not complete the table below.

Table 6-2 Retail: Wastewater Collected Within Service Area in 2015	
☑	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	
☑	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.

Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2015	
☑	Wholesale supplier neither distributes nor provides supplemental treatment to recycled water. The supplier will not complete the table below.

Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area	
☑	Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.

Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area	
☑	Recycled water is not directly treated or distributed by the supplier. The supplier will not complete the table below.

Table 6-5 Retail: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual	
☑	Recycled water was not used in 2010 nor projected for use in 2015. The supplier will not complete the table below.

Table 6-5 Wholesale: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual	
☑	Recycled water was not used or distributed by the supplier in 2010, nor projected for use or distribution in 2015. The wholesale supplier will not complete the table below.

Table 6-6 Retail: Methods to Expand Future Recycled Water Use	
☑	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	
☐	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.
☑	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 6-7 Wholesale: Expected Future Water Supply Projects or Programs	
☐	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.
☑	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			
Water Supply	Additional Detail on Water Supply	2015	
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*		Actual Volume	Water Quality *Drop Down List*
Groundwater	Orange County Groundwater Basin	646	Drinking Water
Purchased or Imported Water	Wholesale Zone	251	Drinking Water
	Total	897	
NOTES:			

Table 6-8 Wholesale: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	2015	
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*		Actual Volume	Water Quality *Drop Down List*
Purchased or Imported Water	MWDOC	4,668	Drinking Water
Total		4,668	
NOTES: From EOCWD's Wholesale Zone Master Plan			

Table 6-9 Retail: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*				
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*		**2020**	**2025**	**2030**	**2035**	**2040**
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Groundwater	Orange County Groundwater Basin	669	718	722	722	723
Purchased or Imported Water	EOCWD Wholesale Zone	287	308	310	310	310
	Total	955	1,025	1,032	1,032	1,033
NOTES: Groundwater/Imported Water mix may vary depending on OCWD basin production percentage projections						

Table 6-9 Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*				
		2020	2025	2030	2035	2040
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Purchased or Imported Water	MWDOC	4,901	5,134	5,367	5,600	5,833
Total		4,901	5,134	5,367	5,600	5,833
NOTES:						

Table 7-1 Retail: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____	
		☑ 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:			

Table 7-1 Wholesale: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	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		103%
Multiple-Dry Years 1st Year	2012		103%
Multiple-Dry Years 2nd Year	2013		103%
Multiple-Dry Years 3rd Year	2014		103%
NOTES:			

Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals (*autofill from Table 6-9)*	955	1,025	1,032	1,032	1,033
Demand totals *(autofill from Table 4-3)*	955	1,025	1,032	1,032	1,033
Difference	0	0	0	0	0
NOTES:					

Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals *(autofill from Table 6-9)*	4,901	5,134	5,367	5,600	5,833
Demand totals *(autofill fm Table 4-3)*	4,901	5,134	5,367	5,600	5,833
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	1,012	1,087	1,094	1,094	1,095
Demand totals	1,012	1,087	1,094	1,094	1,095
Difference	0	0	0	0	0
NOTES:					

Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	4,948	5,228	5,508	5,788	6,068
Demand totals	4,948	5,228	5,508	5,788	6,068
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	1,012	1,087	1,094	1,094	1,095
	Demand totals	1,012	1,087	1,094	1,094	1,095
	Difference	0	0	0	0	0
Second year	Supply totals	1,012	1,087	1,094	1,094	1,095
	Demand totals	1,012	1,087	1,094	1,094	1,095
	Difference	0	0	0	0	0
Third year	Supply totals	1,012	1,087	1,094	1,094	1,095
	Demand totals	1,012	1,087	1,094	1,094	1,095
	Difference	0	0	0	0	0
NOTES:						

Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First year	Supply totals	4,948	5,228	5,508	5,788	6,068
	Demand totals	4,948	5,228	5,508	5,788	6,068
	Difference	0	0	0	0	0
Second year	Supply totals	4,948	5,228	5,508	5,788	6,068
	Demand totals	4,948	5,228	5,508	5,788	6,068
	Difference	0	0	0	0	0
Third year	Supply totals	4,948	5,228	5,508	5,788	6,068
	Demand totals	4,948	5,228	5,508	5,788	6,068
	Difference	0	0	0	0	0
NOTES:						

Table 8-1 Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction[1] *Numerical value as a percent*	Water Supply Condition (*Narrative description)*
1	11% to 20%	A Level 1 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that a reduction in consumer demand is necessary due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to existing water conditions.
2	21% to 30%	A Level 2 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that an additional reduction in consumer demand is necessary due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to water conditions.
3	31% to 40%	A Level 3 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that a further additional reduction in consumer demand is necessary due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to existing water conditions.
[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 ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? *Drop Down List*
Permanent Year-Round	Landscape - Other landscape restriction or prohibition	Watering or irrigating of lawn, landscape, or other vegetated area with potable water using a landscape irrigation system or a watering device that is not continuously attended is limited to no more than ten (10) minutes watering per day per station. This does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems and weather-based controllers or stream rotor sprinklers that meet a seventy percent (70%) efficiency standard.	Yes
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
Permanent Year-Round	Landscape - Other landscape restriction or prohibition	New and existing residential automated irrigation systems must be equipped with rain sensors that shut off the system when it rains, or smart controllers or evapo-transpiration sensors that use weather-based data to set efficient watering schedules.	Yes
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Leaks, breaks, and other malfunctions must be corrected in no more than three (3) days of receiving notice from the District.	Yes
Permanent Year-Round	Other - Prohibit use of potable water for washing hard surfaces	This restriction does not apply to situations where it is necessary to wash surfaces to alleviate safety or sanitary hazards. Only then may the surface be washed with a hand-held bucket or similar container, a hand-held hose equipped with a positive shut-off valve, or a low-volume high-pressure cleaning machine or "water broom."	Yes
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		Yes
Permanent Year-Round	Water Features - Restrict water use for decorative water features, such as fountains	All decorative water fountains and water features must recirculate water or users must secure a waiver from the District.	Yes
Permanent Year-Round	Other	No person may use water from any fire hydrant for any purpose other than fire suppression or emergency aid without first requesting and posting the appropriate fees at the District or obtaining a hydrant meter to record all water consumption for a specified project.	Yes
Permanent Year-Round	CII - Restaurants may only serve water upon request		Yes
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service		Yes
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves		Yes
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service.	Yes
Permanent Year-Round	Other	Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry operations.	Yes
Permanent Year-Round	Other - Prohibit use of potable water for construction and dust control		Yes

1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is limited to three (3) days per week from the months of April to October on a schedule established a posted by the District. During the months of November through March, watering or irrigating of lawn, landscape, or other vegetated area with potable water is limited to no more than two (2) days per week on a schedule established and posted by the District. An exception is made for the use of hand-water shut-off nozzle or device, watering with a hand-held bucket or similar container, landscape irrigation systems that exclusively use very low-flow drip, and for fruit trees and vegetable gardens.	Yes
2	Landscape - Limit landscape irrigation to specific days	Watering lawns, landscaping and other vegetated areas is limited to no more than two (2) days per week from April to October. The number of watering days permitted from November to March will be no more than one (1) day per week.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Leaks, breaks, and other malfunctions must be corrected in no more than two (2) days of receiving notice from the District.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling ornamental lakes and ponds is prohibited except for those that sustain aquatic life provided such life is of significant value and was actively managed in the water feature prior to declaring the shortage.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling uncovered residential swimming pools or uncovered outdoor spas is prohibited. Refilling of covered pools and/or outdoor spas of up to one (1) foot of water per week is allowed. This is exempt for individuals for health reasons.	Yes
2	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		Yes
3	Landscape - Limit landscape irrigation to specific days	Watering lawns, landscaping and other vegetated areas is limited to no more than one (1) day per week from April to October. The number of watering days permitted from November to March remains the same at no more than one (1) day per week.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Leaks, breaks, and other malfunctions must be corrected in no more than one (1) days of receiving notice from the District.	Yes
3	Other	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 will be issued except under the following circumstances: 1) District-approved plans and specifications have been issued, 2) a valid, unexpired building permit has been issued for the project, 3) the project is necessary to protect the public's health, safety, and welfare, or 4) 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 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 ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*
1	Other	Level 1 Water Alert Conservation Measures
2	Other	Level 2 Water Supply Warning Conservation Measures
3	Other	Level 3 Water Emergency Conservation Measures
NOTES:		

Table 8-4 Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	1,060	1,060	1,060
NOTES: MWDOC Shortage Allocation Model FY 2015-16			

Table 8-4 Wholesale: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	13,444	13,444	13,444
NOTES: MWDOC Shortage Allocation Model FY 2015-16			

Table 10-1 Retail: Notification to Cities and Counties		
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Orange County	☑	☑
NOTES:		

Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Tustin	☑	☑
Orange	☑	☑
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Orange County	☑	☑
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

District Ordinance

2009
RETAIL ZONE WATER CONSERVATION PROGRAM ORDINANCE

June 2009

Table of Contents

ORDINANCE NO. 2009-01

AN ORDINANCE OF THE BOARD OF DIRECTORS OF THE EAST ORANGE COUNTY WATER DISTRICT ESTABLISHING A RETAIL ZONE WATER CONSERVATION PROGRAM

Section I. Title

East Orange County Water District Water Retail Zone Conservation Ordinance ("Ordinance")

Section II. Findings

1. **A reliable minimum supply of water is essential** to the public health, safety and welfare of the people and economy of Southern California.

2. **Southern California is a semi-arid region, largely dependent on imported water** supplies from Northern California and the Colorado River. Population growth, drought, climate change, environmental concerns, government policy changes, restrictions on pumping and other factors in our region, in other parts of the State and in the western U.S. make Southern California highly-susceptible to water supply reliability issues.

3. **Careful water management requires active conservation measures** not only in times of drought but at all times. It is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.

4. **California Constitution Article X, Section 2** declares for the general welfare:

    a. Water resources be put to beneficial use

    b. Prevention of water waste and unreasonable water use or methods of water use

    c. Full exercise of water conservation with a view to reasonable and beneficial water use

5. **California Water Code Section 375** authorizes water suppliers to adopt and enforce a comprehensive water conservation program to reduce water consumption and conserve supplies.

6. **California Water Code Section 31027** sets forth the public notification, public meeting and public hearing requirements for water providers proposing the establishment of a water conservation program, ordinance or resolution.

7. **California Water Code Sections 350, et. seq.,** sets forth the determination and notification procedures for water suppliers seeking to declare a water shortage or a water emergency.

8. **California Water Code Section 356** allows for the adoption of regulations and restrictions that include discontinuance of service as an enforcement option where a water shortage emergency condition has been declared.

9. **California Water Code Section 377** authorizes water suppliers to enforce a comprehensive water conservation program to reduce water consumption through establishment of non-compliance charges and other penalties, subject to advance notification to water users.

10. **Health and Safety Code Section 5471** authorizes the District to apply charges or fees to persons or entities that fail to comply with any provision of this Water Conservation Ordinance in order to recover administrative and enforcement costs due to non-compliance (including but not limited to notices, postings, hearings, shut offs, account management, data collection).

11. **California Water Code Section 370, et. seq.,** authorizes water suppliers to adopt water allocation programs for water users and allocation-based conservation water conservation pricing.

12. **California Water Code Sections 13550 and 13551** declare a statewide policy that the use of domestic water for irrigation purposes when reclaimed (recycled) water is available constitutes a waste or unreasonable use of water within the meaning of the State Constitution.

13. **The adoption and enforcement of a Water Conservation Ordinance is necessary to manage the District's water supply** short- and long-term and to minimize and/or avoid the effects of drought and water shortage within the District. Such a program is essential to ensure a reliable and sustainable minimum supply of water for public health, safety and welfare.

14. **The proposed Ordinance shall replace the District's Ordinance No 1991-1, adopted March 21, 1991.**

Section III. Declaration of Purpose and Intent

1. To minimize or avoid the effect and hardship of potential shortages of **water** to the greatest extent possible, this Ordinance establishes a Water Conservation Program for the Retail Zone designed to:

    a. Reduce water consumption (demand) through conservation

    b. Enable effective water supply planning

    c. Assure reasonable and beneficial use of water

    d. Prevent waste of water and maximize efficient use in the District

2. **The Ordinance establishes**:

    a. **Permanent water conservation standards** designed to alter behaviors related to water-use efficiency during non-shortage conditions

    b. **Three levels of potential response to escalating water supply shortages** which the East Orange County Water District Board may choose to implement during times of declared water shortage or water emergency. The three levels of response consist of increasing water use restrictions as a result of worsening drought conditions, emergencies, and/or decreasing supplies.

Section IV. Definitions

1. **General**

    a. **"The District"** means East Orange County Water District.

    b. **"The Board"** means the East Orange County Water District Board of Directors.

    c. **"Retail Zone"** means that sub-portion of the District to which the District directly provides local and imported water supplies to residential and commercial customers.

    d. **"Wholesale Zone"** means that sub-portion of the District to which the District provides imported water supplies to five retail entities: the City of Orange, the City of Tustin, the Irvine Ranch Water District, the Golden State Water Company and the Retail Zone of the East Orange County Water District.

e. **"Person"** means any person or persons, corporation, public or private entity, governmental agency or institution, or any other user of water provided by the District.

f. **"Water"** means water that is suitable for drinking.

g. **"Water Waste"** refers to uses of water that are limited or prohibited under the Ordinance because they exceed necessary or intended use and could reasonably be prevented, such as runoff from outdoor watering.

h. **"Billing Unit"** is equal to 100 cubic feet (1 CCF) of water, which is 748 gallons. Water use is measured in units of 100-cubic-feet and multiplied by applicable water usage rates for billing. Also known as a "Unit of Water."

i. **"Undue Hardship"** is a unique circumstance in which a requirement of the Ordinance would result in a disproportionate impact on a water user or property upon which water is used compared to the impact on water users generally or similar properties or classes of water use.

j. "Imported Water Supply" refers to the District's total imported water supply over a given period, e.g. calendar year 2004, 2005 and 2006 or as defined by the Metropolitan Water District of Southern California (Met).

k. "User's Base Consumption" refers to the average amount of water used by an Person during the calendar year 2004, 2005 and 2006 or as defined by the District.

l. "Covered Pool or Covered Spa" refers to pools and/or spas that have a cover that minimizes evaporation.

2. **Irrigation**

a. **"Automatic Shut-Off Nozzle"** refers to a water-efficient nozzle for use with residential or commercial hoses that has a feature that must be pressed to start the flow or releasing the feature stops the flow of water. -

b. **"Irrigation Controller"** is the part of an automated irrigation system that instructs the valves to open and close to start or stop the flow of water.

1. **"Sensor-based irrigation controller"** operates based on input from a combination of sensors (rain, solar, soil moisture) installed in or around the landscaped area.

2. **"Weather-based irrigation controller"** operates automatically based on evapo-transpiration rates and historic or real-time weather data.

c. **"Irrigation System"** refers to a manual or automated watering system consisting of pipes, hoses, spray heads and/or sprinkler devices or valves. Also known as a "Landscape Irrigation System."

d. **"Positive Shut-Off Valve"** refers to a water-efficient valve for residential or commercial hoses that users can quickly and positively start or stop the flow of water. A ball valve would satisfy this requirement.

e. **"Valves"** refer to the part of an irrigation system that opens and closes manually or electronically to start or stop the flow of water.

3. **Other**

a. **"Pre-Rinse Kitchen Spray Valves"** refer to highly water-efficient sprayers that commercial kitchens use to rinse dishes in the sink before washing and for other preliminary cleaning purposes.

b. **"Single-Pass Cooling System"** refers to an air conditioning, refrigeration or other cooling system that removes heat by transferring it to a supply of clean water and dumping the water down the drain – after a single use. This type of cooling system is extremely water-inefficient compared to systems that re-circulate the water.

Section V. Application of Ordinance

1. **Ordinance provisions apply to any person or entity using water provided by the District.** This includes individuals, persons, corporations, public or private entities, governmental agencies or institutions, or any other users of District water.

2. **The provisions of the Ordinance <u>may not</u> apply to the following:**

a. **Water use necessary to protect public health and safety** or for essential government services, such as police, fire and similar services.

b. **Recycled water use for irrigation.** Use of recycled water requires a permit that has specific use restrictions, many of which focus on water efficiency. Given such permits and the interest in promoting the use of recycled water as a means to preserve, recycled water is exempt from all requirements of this Ordinance.

c. **Water used by commercial nurseries and growers** to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale.

3. **This Ordinance 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. Refer to the local jurisdiction or Regional Water Quality Control Board for information on storm water ordinances or management plans.

Section VI: Permanent Mandatory Water Conservation Measures

The following Permanent Mandatory Water Conservation Measures are in effect at all times, whether or not there is a water supply shortage or emergency.

1. **General Restrictions – Residential, Commercial and Public Customers**

   a. **Limits on Watering Duration**

      1. **Watering or irrigating with a device or system that is <u>not</u> continuously attended is limited to no more than 10 minutes per valve, per day.**

      2. This applies to lawns, landscaping and all other vegetated areas.

      3. The following irrigation systems are **exempt:**

         a. Low-flow drip-type systems that will achieve the conservation goals of this Ordinance.
         b. Systems equipped with weather-based controllers or stream-rotor sprinklers that meet a 70% efficiency standard

   b. **No Excessive Water Flow or Runoff:** It is prohibited to water lawns, landscaping and vegetated areas in a manner that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter or ditch.

   c. **Automatic Rain Shut-Off for Automated Irrigation Systems**

      1. **<u>New residential</u>** automated irrigation systems must be equipped with:

         a. Rain sensors that shut off the system when it rains, **<u>or</u>**
         b. Smart controllers or evapo-transpiration sensors that use weather-based data to set efficient watering schedules

      2. *As of July 1, 2010,* **<u>new and existing</u>** automated irrigation systems connected to dedicated irrigation meters must be equipped with:

         a. Rain sensors that shut off the system when it rains, **<u>or</u>**
         b. Smart controllers or evapo-transpiration sensors that use weather-based data to set efficient watering schedules

   d. **Obligation to Fix Leaks, Breaks or Malfunctions in lines, fixtures or facilities**

1. Excessive use, loss or escape of water through breaks, leaks or malfunctions in the water user's plumbing or distribution system:

    a. Is prohibited for any period of time after such water waste should have reasonably been discovered and corrected
    b. Must be immediately shut-off upon District notification, unless Undue Hardship occurs
    c. Must be corrected within **no more than three (3) days of District notification**

e. **No Hosing or Washing Down Hard or Paved Surfaces**

1. It is prohibited to hose or wash down hard or paved surfaces, such as sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys.

2. When it is necessary hose or wash down hard or paved surfaces to alleviate safety or sanitary hazards, the following may be used:

    a. Hand-held bucket or similar container
    b. Hand-held hose equipped with a positive shut-off valve.
    c. Low-volume high-pressure cleaning machine or "water broom"

f. **No Hosing or Washing Down Vehicles**

1. It is prohibited to use water to hose or wash down a motorized or non-motorized vehicle, including but not limited to automobiles, trucks, vans, buses, motorcycles, boats or trailers.

2. The following are **exempt** from this restriction:

    a. Use of a hand-held bucket or similar container
    b. Use of a hand-held hose equipped with a positive shut-off valve
    c. Commercial car washing facility

g. **Re-Circulating Decorative Water Fountains and Features:** *Effective January 1, 2011,* all decorative water fountains and water features must re-circulate water -- or users must secure a waiver from the District.

h. **Unauthorized Use of Fire Hydrants Prohibited**

1. No person may use water from any fire hydrant for any purpose other than fire suppression or emergency aid without first:

    a. Requesting and posting the appropriate fees at the District.

b. Obtaining a hydrant meter to record all water consumption for a specified project. Absent a meter, water theft and meter tampering fees will be applied as appropriate.

2. **Commercial Food-Serving & Lodging Requirements**

a. **Water Served Only Upon Request.** Eating or drinking establishments, including but not limited to restaurants, hotels, cafes, bars or other public places where food or drinks are sold, or served or offered for sale, are prohibited from providing drinking water to any person unless requested.

b. **Option Not To Have Towels/Linens Laundered.** Hotels, motels and other commercial lodging establishments must provide guests the option of not having their used towels and linens laundered. Lodging establishments must prominently display notice of this option in each room and/or bathroom, using clear and easily understood language.

3. **Commercial Kitchen Requirements**

a. **Water-Efficient Pre-Rinse Kitchen Spray Valves.** Food preparation establishments, such as restaurants, cafes and hotels, are prohibited from using non-water efficient kitchen spray valves, as follows:

1. **New** kitchen spray valves must use 1.6 gallons or less per minute.

2. *Effective January 1, 2010,* **existing** kitchen spray valves must be retrofitted to models using 1.6 gallons of water or less per minute.

b. **Best-Available Water-Conserving Technology**. All water-using equipment in new or remodeled commercial kitchens must use the best-available, water-conserving technology, for example, technologies cited on the California Urban Water Conservation Council (CUWCC) website.

c. **No Defrosting With Water.** Defrosting food with running water is prohibited.

d. **Scoop Sinks.** Scoop sinks shall be set at minimum water flow at all times of use and shut off during non-working hours.

e. **Automatic Shut-Off Nozzles.** When hosing or washing kitchen or garbage areas or other areas for sanitary reasons as required by the Health Dept., hoses shall be equipped with positive shut-off valve.

4. **Commercial Water Recirculation Requirements**

   a. **Car Wash and Laundry System Requirements:** All **new** commercial car-wash and laundry facilities and systems must re-circulate the wash water -- or secure a waiver of this requirement from the District.

   b. **No Single-Pass Cooling Systems:** Buildings requesting **new** water service or being **remodeled** are prohibited from installing single-pass systems.

5. **Construction Site Requirements**

   a. **Recycled or non-potable water** must be used, when available.

   b. **No water may be used for soil compaction or dust control** where there is a reasonably-available source of recycled or non-potable water approved by the Dept. of Public Health and appropriate for such use.

   c. **Water hoses shall be equipped with automatic shut-off valves,** given such devices are available for the size and type of hoses in use.

6. **Indiscriminate Water Use.** Upon notice by the District, persons shall cease to cause or permit the indiscriminate use of water not otherwise prohibited above which is wasteful and without reasonable purpose.

7. **Public Health and Safety.** These regulations shall not be construed to limit water use which is immediately necessary to protect public health and/or safety.

Section VII: Level 1 Water Supply Shortage (Water Alert) *11% to 20% shortage in imported water supplied to the District and/or 11% to 20% reduction needed in consumer demand*

1. **Level 1 Water Supply Shortage**

   a. A Level 1 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that **a reduction in consumer demand is necessary** due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to existing water conditions.

   b. The type of event that may prompt the Board to declare a Level 1 Water Supply Shortage could include, among other factors, a finding that its **wholesale water provider has reduced allocations to the District from 11% to 20% of the District's Imported Water Supply.** At this water allocation level, the District could experience a **shortage in supplies between 11% to 20%.**

2. **Mandatory Permanent Water Conservation Measures** identified in Section VI **remain in effect.**

3. **Level 1 Water Conservation Measures take effect** upon declaring a Level 1 Water Supply Shortage and apply for the duration of the shortage:

    a. **Limits on Watering Days**

        1. No more than **three (3) days per week from April – October** and no more than **two (2) days per week from November – March.** This applies to lawns, landscaping and all other vegetated areas. The District will establish and post the new watering schedules.

        2. The following are **exempt** from these restrictions:

            a. Watering with a hand-held bucket or similar container.
            b. Watering with a hand-held hose equipped with a positive shut-off valve.
            c. Irrigation systems that exclusively use low-flow drip type systems that will achieve the conservation goals of this Section.
            d. Fruit trees and vegetable gardens, providing steps are taken to meet the conservation goals of this Section.

4. **Other Prohibited Uses:** The District may implement other prohibited water uses as deemed necessary, after notice to customers.

Section VIII: Level 2 Water Supply Shortage (Water Supply Warning) ***21% to 30% shortage in imported water supplied to the District and/or 21%- 30% reduction needed in consumer demand***

1. Level 2 Water Supply Shortage

a. A Level 2 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that **an additional reduction in consumer demand is necessary** due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to water conditions.

b. The type of event that may prompt the Board to declare a Level 1 Water Supply Shortage could include, among other factors, a finding that its **wholesale water provider has reduced allocations to the District by up to 30% of the District's Imported Water Supply.** At this water allocation level, the District could experience a **shortage in supplies of 21% to 30%.**

2. The following **mandatory water conservation measures remain in effect** during a Level 2 Water Supply Shortage:

a. **Permanent Water Conservation Measures** identified in Section VI
b. **Level 1 Water Conservation Measures** identified in Section VII

3. The following **water conservation measures take effect** upon declaration of a Level 2 Water Supply Shortage and apply for the duration of the Shortage:

a. **Additional Limits on Watering Days**

1. Watering lawns, landscaping and other vegetated areas is limited to **no more than two (2) days per week from April – October.** This is one (1) day less than required during a Level 1 Water Shortage. The number of watering days permitted from November – March will be no more than one (1) day per week.

2. The District will establish and post the new watering schedule.

b. **Shorter Timeframe to Fix Leaks, Breaks or Malfunctions** in water users' pipelines, fixtures or facilities.

1. Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system must be **fixed in no more than two (2) days following notification from the District** – unless other arrangements are made with the District.

2. This shorter timeframe is one (1) day less than required under Permanent Water Conservation Measures, Section VI.

c. **No Filling or Refilling Ornamental Lakes and Ponds**

1. Filling or refilling ornamental lakes and ponds is prohibited.

2. **Exempt** are ornamental lakes and ponds that sustain aquatic life -- provided such life is of significant value and was actively managed in the water feature prior to declaring the shortage.

d. **No Filling or Refilling Residential Pools or Spas**

1. Filling or refilling uncovered residential swimming pools or uncovered outdoor spas is prohibited. Refilling of covered pools and/or outdoor spas of up to one (1) foot of water per week is allowed.

2. **Exempt** are individuals who, due to health reasons or medical conditions, find it necessary to fill or refill their pools or spas. Persons desiring to claim such exemption shall apply for a Hardship Waiver under the provisions contained in Section XII.

e. **No Hosing or Washing Down Vehicles:** It is prohibited to use water to hose or wash down a motorized or non-motorized vehicle, including but not limited to automobiles, trucks, vans, buses, motorcycles, boats or trailers. The **only exemption** from this restriction is washing vehicles at a commercial car washing facility that recycles its wash water.

4. **Other Prohibited Uses:** The District may implement other prohibited water uses as deemed necessary, following notification of customers.

5. **Optional Water Conservation Programs**

a. The District Board of Directors, at its sole discretion, may establish Optional Water Conservation Programs, during a **Level 2** Water Supply Shortage **and/or** during a **Level 3** Water Shortage Emergency.

b. If any of the following Optional Water Conservation Programs is established, **public notification** will precede program implementation.

c. **Water Allocation or Water Budget Program**

1. The District Board of Directors, at its sole discretion, may establish water allocations or water budgets for properties served by the District -- using a method that does not penalize persons for either the implementation of the conservation method or installation of water-saving devices and includes the User's Base Consumption.

2. Following the effective date of a water allocation or budget program, any person using water in excess of the allocation or budget will be subject to a penalty as determined by the District rate schedule.

3. The penalty for excess water use will be cumulative to any other remedy or penalty imposed for violation of this Ordinance.

d. **Increased Water Usage Rates:** The District Board of Directors, at its sole discretion, may increase water usage rates, , by an amount deemed necessary, as determined by the District's rate schedule.

e. **Percentage-Use Reduction for Commercial Customer:** The District Board of Directors, at its sole discretion, may require commercial customers to reduce water use by a certain percentage, as determined by the District.

Section IX. Level 3 Water Shortage (Water Emergency) ***31% to 40% shortage in imported water supplied to the District and/or 31% to 40% reduction needed in consumer demand***

1. **Level 3 Water Supply Shortage Emergency**

    a. A Level 3 Water Supply Shortage exists when the District Board of Directors, at its sole discretion, determines that **a further additional reduction in consumer demand is necessary** due to drought or water supply cutbacks in order to make more efficient use of water and appropriately respond to existing water conditions.

    b. The type of event that may prompt the Board to declare a Level 3 Water Supply Shortage could include, among other factors, a finding that its **wholesale water provider has reduced allocations to the District by up to 40% of the District's Imported Water Supply.** At this water allocation level, the District could experience a **shortage in supplies of up to 40%.**

2. The following **mandatory water conservation measures remain in effect**:

    a. **Permanent Water Conservation Measures** identified in Section VI
    b. **Level 1 Water Conservation Measures** identified in Section VII
    c. **Level 2 Water Conservation Measures** identified in Section VIII

3. The following **mandatory water conservation measures take effect** upon declaring a Level 3 Water Emergency and apply for the duration of the Emergency:

    a. **Additional Limits on Watering Days**

        1. Watering lawns, landscaping and other vegetated areas is limited to **no more than two (2) days per week from April – October.** This is one (1) day less than required during a Level 1 Water Shortage. The number of watering days permitted from November – March remains the same at no more than one (1) day per week.

        2. The District will establish and post the new watering schedule.

        3. **Exempt** from this restriction are the following:

            a. Public works projects and actively-irrigated environmental mitigation projects
            b. Maintenance of vegetation, trees and shrubs using (subject to hour restrictions in Section VII.4.a):
                1. A hand-held bucket or similar container
                2. A hand-held hose equipped with a positive shut-off valve.

3. Irrigation systems that exclusively use low-flow drip type systems that will achieve the conservation goals of this Section.

c. Maintenance of (subject to hour restrictions, Section VIII.4.a):
   1. Existing landscaping necessary for fire protection and/or soil erosion control
   2. Plant materials identified as rare or essential to the well being of endangered/rare species
   3. Fruit trees and vegetable gardens provided steps are taken to meet the conservation goals of this Section.

b. **Shorter Timeframe to Fix Leaks, Breaks or Malfunctions** in pipelines, fixtures or facilities.

   1. Excessive use, loss or escape of water through breaks, leaks or malfunctions in the water user's plumbing or distribution system must be fixed in **no more than one (1) day** following District notification – unless other arrangements are made with the District. The timeframe is one (1) day less than for Level 2.

c. **No New Water Service**

   1. During a Level 3 Water Emergency, the **District will not provide:**

      a. New water service
      b. New water meters (temporary or permanent)
      c. Will-serve letters

   2. The District will **only issue** will-serve letters in the following cases:

      a. Projects necessary to protect public health, safety & welfare
      b. Projects that have a valid, unexpired city or county building permit
      c. Projects in which applicants can provide -- to the satisfaction of the District -- substantial evidence of an enforceable commitment that water demands will be offset prior to the provision of a new water meter(s)

   3. This prohibition **does not preclude** resetting or turning-on meters to restore or continue water service interrupted for one year or less.

4. **Discontinue Service**: Per Water Code Section 356,[1] the District, in its sole discretion, may discontinue service to customers who willfully violate Section IX provisions.

[1] Water Code Section 356 allows for the adoption of regulations and restrictions that include discontinuance of service as an enforcement option where a water shortage emergency condition has been declared.

5. **Other Prohibited Uses:** The District may implement other prohibited water uses as deemed necessary, following notification of customers

Section X. Other Provisions

1. **Customer Water Conservation Plans:**

    a. **Customers with high annual water usage.** During Level 1, Level 2 **or** Level 3 Water Shortages or Emergencies, the District Board of Directors, at its sole discretion and by written request, may require residential, commercial and/or public customers using **five thousand (5,000) or more billing units per year** to submit a Water Conservation Plan to the District and to submit quarterly progress reports on such plan. The conservation plan must make recommendations for increased water savings, including increased use of recycled water based on feasibility. Quarterly progress reports must include status on implementation of recommendations.

Section XI. Declaration & Notification of Water Shortages/Emergencies

1. **Declaration of Level 1 & Level 2 Water Shortages**: The District Board of Directors may declare a Level 1 or Level 2 Water Shortage and adopt a water shortage resolution at a regular or special public meeting in accordance with State law. Thereafter, penalties and violations under Section XIII.1 shall apply.

2. **Declaration of Level 3 Water Shortage Emergency:** The District Board of Directors may declare a Level 3 Water Shortage Emergency in accordance with the procedures specified in Water Code Sections 351 and 352. Thereafter, penalties and violations under Section XIII.2 shall apply.

3. **Notification of Declared Water Shortages and Emergencies**

    a. The District must publish a copy of the water shortage/emergency resolution in a newspaper used for the publication of official notices within the jurisdiction of the District within **ten (10) business days** of the date that the shortage level is declared.

    b. Additional mandatory conservation requirements will take effect on the **fifteenth (15) business day** after the date that the shortage level is declared

4. **Notification of Declared Water Allocation or Water Budget Program**

    a. If the District Board of Directors, at its sole discretion, establishes a water allocation or water budget program **during a Level 2 Water Shortage or Level 3 Water Emergency:**

1. The District will provide **notice of the program** to customers via U.S. mail, other mailings in which the District customarily sends billing statements, and/or e-mail outreach and/or automated calling.

2. The program will take effect on the date of the notification mailing or at such later date as specified in the notice.

Section XII. Hardship Waiver

1. **Undue and Disproportionate Hardship:** If, due to unique circumstances, a specific requirement of the Ordinance would result in undue hardship to a person using water or to property upon which water is used, that is disproportionate to the impacts to water users generally or to similar property or classes of water users, then the person may apply for a waiver to the requirements as provided in this section.

2. **Written Finding:** The waiver may be granted or conditionally granted only upon a written finding of the existence of facts demonstrating an undue hardship.

    a. **Application for a Waiver**: Application for a waiver must be on a form prescribed by the District and accompanied by a non-refundable processing fee in an amount set by the District.

    b. **Supporting Documentation**: The application must be accompanied by photographs, maps, drawings, and other information, including a written statement of the applicant.

    c. **Required Findings for Waiver:** Based on the information and supporting documents provided in the application, additional information provided as requested, and water use information for the property as shown by the records of the District, the District **General Manager** in making the waiver determination will take into consideration the following:

        1. That the waiver does not constitute a grant of special privilege inconsistent with the limitations upon other residents and businesses;

        2. That because of special circumstances applicable to the property or its use, the strict application of this Ordinance would have a disproportionate impact on the property or use that exceeds the impacts to residents and businesses generally;

        3. That the authorizing of such waiver will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the District to effectuate the purpose of this Ordinance and will not be detrimental to the public interest; and

4. That the condition or situation of the subject property or the intended use of the property for which the waiver is sought is not common, recurrent or general in nature.

d. **Approval Authority**

1. The District General Manager or his designee(s) must act upon any completed **Application for a Waiver** no later than ten (10) business days after receipt by the District.

2. The General **Manager or his designee(s) may approve, conditionally approve, or deny the waiver** and the decision will be final.

3. The applicant requesting the waiver must be promptly notified in writing of any action taken. Unless specified otherwise, at the time a waiver is approved, it will apply to the subject property for the duration of the water supply shortage or emergency.

Section XIII: Non-Compliance Charges and Penalties

1. **Non-Compliance with Permanent, Level 1 & Level 2 Mandatory Conservation**

a. The following will apply to persons or entities that fail to comply with any provision of the Ordinance for Permanent, Level 1 and Level 2 mandatory water conservation measures.

1. **First Instance of Non-Compliance:** The District will issue a **written warning** and send it and a copy of the Ordinance by mail

2. **Second Instance of Non-Compliance:** A second instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **fifty dollars ($50).**

3. **Third Instance of Non-Compliance:** A third instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **one hundred dollars($100)**

4. **Fourth and Subsequent Instances of Non-Compliance:** A fourth or any subsequent instance of non-compliance with this Ordinance is punishable by a non-compliance charge not to exceed **two hundred fifty dollars ($250).**

b. **Misdemeanor:** Pursuant to water Code Section 377, any instance of non-compliance with the Ordinance may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty (30) days or by a fine not exceeding one thousand dollars ($1,000) or by both.

c. **Separate Offenses**: Each day that a person or entity is non-compliant with the Ordinance is a separate offense after the initial citation is issued.

2. **Non-Compliance with Level 3 Mandatory Conservation Measures**

a. **Non-Compliance Charges:** The following will apply to persons or entities failing to comply with any provision of the Ordinance for Level 3 mandatory water conservation measures:

1. **First Instance of Non-Compliance:** The District will issue a **written warning** and send it and a copy of the Ordinance by mail.

2. **Second Instance of Non-Compliance:** A second instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **two hundred and fifty dollars ($250)**.

3. **Third Instance of Non-Compliance:** A third instance of non-compliance with the Ordinance within the preceding twelve (12) calendar months is punishable by a non-compliance charge not to exceed **five hundred dollars ($500)**.

b. **Water Flow Restrictor and/or Termination of Service**

1. **Water Flow Restrictor Device.** In addition to any non-compliance charges, the District may install a water flow restrictor device. If the District determines to install a water flow restrictor, installation of the flow restrictor would follow written notice of intent to the customer and would be in place for a minimum of forty eight (48) hours.

2. **Termination of Service:** In addition to any non-compliance charges and the installation of a water flow restrictor, the District may disconnect and/or terminate a customer's water service, pursuant to Water Code Section 356.

3. **Costs for Water Flow Restrictors and Service Disconnection**

a. A person or entity in non-compliance with this Ordinance is responsible for payment of the District's charges for installing and/or removing any flow restricting device and for disconnecting and/or reconnecting service per the District's schedule of charges then in effect.

b. The charge for installing and/or removing any flow restricting device must be paid to the District before the device is removed.

c. Nonpayment will be subject to the same remedies as nonpayment of basic water rate

c. **Misdemeanor:** Pursuant to Water Code Section 377, any instance of non-compliance with the Ordinance may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty (30) days or by a fine not exceeding one thousand dollars ($1,000) or by both.

3. **Separate Offenses**: Each day that a person or entity is non-compliant with the Ordinance is a separate offense.

4. **Notice of Non-Compliance/ Appeal and Hearing Process**

a. The District will issue a **Notice of Non-Compliance** by mail or personal delivery at least ten (10) business days before taking enforcement action. The notice will describe the violation and the date by which corrective action must be taken.

b. **A customer may appeal the Notice of Non-Compliance** by filing a written Notice of Appeal with the District no later than the close of business on the day before the date scheduled for enforcement action. A customer appeal shall state the grounds for the appeal.

1. **Any Notice of Non-Compliance not timely appealed will be final.**

2. Upon receipt of a timely appeal, **the District will schedule a hearing on the appeal** and mail written notice of the hearing date to the customer at least ten (10) business days before the hearing.

3. The District General Manager or his designee(s) will hear the appeal and issue a written **Notification of Decision** within ten (10) days of the hearing.

c. **A customer may appeal a Hearing Determination** to the District Board of Directors by written request for a hearing within ten business (10) days after the certified date of delivery or date of first class mailing of the Notification of Decision. The request shall state the grounds for appeal. At a public meeting, the Board **shall review the appeal** and, at its sole discretion, may affirm, reverse or modify the Hearing Determination. The **decision of the Board is final**.

d. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the District **may take appropriate steps to prevent the unauthorized use of water** given the nature and extent of the violations and the current declared water shortage level condition, including restricting the level of water use until the appeal is heard.

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

Section XV: Repeal of Ordinance No. 1991-1: Ordinance No. 1991-1 is hereby repealed in its entirety.

Section XVI: Effective Date: This Ordinance shall take effect 30 days after its passage. The Secretary shall certify to the passage and adoption of this Ordinance and shall cause the same to be published according to law.

THE FOREGOING ORDINANCE was introduced at a meeting of the board of Directors of EOCWD held on April 16, 2009, following a public hearing, notice of which was published on April 3 and April 10, 2009.

PASSED AND ADOPTED by the Board of Directors of the East Orange County Water District at a regular meeting held on the 18th day of June, 2009.

William VanderWerff
President
EAST ORANGE COUNTY WATER DISTRICT
and the Board of Directors
thereof

Joan C. Arneson
Secretary
EAST ORANGE COUNTY WATER DISTRICT
and the Board of Directors
thereof

STATE OF CALIFORNIA)
) ss
COUNTY OF ORANGE)

I, JOAN C. ARNESON, Secretary of the Board of Directors of the EAST ORANGE COUNTY WATER DISTRICT, do hereby certify that the foregoing Ordinance No. 2009-01 was duly adopted by the Board of Directors of said District at a Regular Meeting of said District held on June 18, 2009, and that it was so adopted by the following vote:

AYES: BARRETT, BELL, CHAPMAN, DULEBOHN, VANDERWERFF

NOES: NONE

ABSENT: NONE

ABSTAIN: NONE

Secretary
EAST ORANGE COUNTY WATER DISTRICT
and of the Board of Directors
thereof

STATE OF CALIFORNIA)
) ss.
COUNTY OF ORANGE)

I, Joan C. Arneson, Secretary of the EAST ORANGE COUNTY WATER DISTRICT, do hereby certify that the above and foregoing is a full, true and correct copy of Ordinance No. 2009-01 of the Board of Directors of the EAST ORANGE COUNTY WATER DISTRICT and that the same has not been amended or repealed.

Dated: August 20, 2009.

Secretary
EAST ORANGE COUNTY WATER DISTRICT

APPENDIX E

Notification of Public and Service Area Suppliers

EAST ORANGE COUNTY WATER DISTRICT

185 N. McPherson Rd.
Orange, California
92869-3720

714.538.5815 *phone*
714.538.0334 *fax*

www.eocwd.com

March 10, 2016

Art Valenzuela
Water Services Manager
City of Tustin
1472 Service Road
Tustin, CA 92780

Dear Mr. Valenzuela:

The East Orange County Water District (EOCWD) is in the process of 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 1062 (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 considering amendments or changes to the plan.

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

If your agency would like more information or has any questions, please contact Lisa Ohlund at 714-538-5815.

Sincerely,

Lisa Ohlund
General Manager

cc: Bill Everest, EOCWD
Manuel Alvarez, Arcadis

EAST ORANGE COUNTY WATER DISTRICT

185 N. McPherson Rd.
Orange, California
92869-3720

714.538.5815 *phone*
714.538.0334 *fax*

www.eocwd.com

March 10, 2016

Jose Diaz
Water Manager
City of Orange
189 S. Water Street
Orange, CA 92866

Dear Mr. Diaz:

The East Orange County Water District (EOCWD) is in the process of 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 1062 (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 considering amendments or changes to the plan.

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

If your agency would like more information or has any questions, please contact Lisa Ohlund at 714-538-5815.

Sincerely,

Lisa Ohlund
General Manager

cc: Bill Everest, EOCWD
Manuel Alvarez, Arcadis

EAST ORANGE COUNTY WATER DISTRICT

185 N. McPherson Rd.
Orange, California
92869-3720

714.538.5815 *phone*
714.538.0334 *fax*

www.eocwd.com

March 10, 2016

Ken Vecchiarelli, P.E.
General Manager
Golden State Water Company
1920 W. Corporate Way
Anaheim, CA 92801

Dear Mr. Vecchiarelli:

The East Orange County Water District (EOCWD) is in the process of 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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Sincerely,

Lisa Ohlund
General Manager

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Manuel Alvarez, Arcadis

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185 N. McPherson Rd.
Orange, California
92869-3720

714.538.5815 *phone*
714.538.0334 *fax*

www.eocwd.com

March 10, 2016

Patrick Sheilds
Executive Director, Operations
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92618

Dear Mr. Sheilds:

The East Orange County Water District (EOCWD) is in the process of 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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If your agency would like more information or has any questions, please contact Lisa Ohlund at 714-538-5815.

Sincerely,

Lisa Ohlund
General Manager

cc: Bill Everest, EOCWD
Manuel Alvarez, Arcadis

AFFIDAVIT OF PUBLICATION

STATE OF CALIFORNIA,)
) ss.
County of Orange)

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 above entitled matter. I am the principal clerk of **The Orange County Register**, a newspaper of general circulation, published in the city of Santa Ana, County of Orange, and which newspaper has been adjudged to be a newspaper of general circulation by the Superior Court of the County of Orange, State of California, under the date of November 19, 1905, Case No. A-21046, that the notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

June 1, 8, 2016

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

Executed at Santa Ana, Orange County, California, on

Date: June 8, 2016

Signature

The Orange County Register
625 N. Grand Ave.
Santa Ana, CA 92701
(714) 796-2209

PROOF OF PUBLICATION

NOTICE OF PUBLIC HEARING
EAST ORANGE COUNTY WATER DISTRICT

PUBLIC HEARING ON ADOPTION OF THE
EAST ORANGE COUNTY WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that the EAST ORANGE COUNTY WATER DISTRICT ("EOCWD") will hold a public hearing to consider adoption of EOCWD's updated Urban Water Management Plan in accordance with Section 10640 of the Urban Water Management Planning Act. The purpose of the hearing will be to solicit public comment prior to the adoption of the updated plan.

Copies of the Urban Water Management Plan are available for public inspection at the East Orange County Water District, 185 N. McPherson, Orange, California. Additional information on the plan and/or public hearing may be obtained by contacting the District's General Manager, Lisa Ohlund, at 714 538-5815.

The Board of Directors of EOCWD will hold the hearing on Thursday evening, June 16, 2016, at 5:00 p.m. or as soon thereafter as is reasonably practicable, in the offices of EOCWD located at 185 N. McPherson Rd., Orange, California.

DATED: June 1, 2016

/s/
JOAN C. ARNESON, Secretary
EAST ORANGE COUNTY WATER DISTRICT
and of the Board of Directors
thereof

Published: Orange County Register June 1, 8, 2016 R-982 10168758

APPENDIX F

Adopted UWMP Resolution

RESOLUTION NO. 767

RESOLUTION OF THE BOARD OF DIRECTORS OF THE EAST ORANGE COUNTY WATER DISTRICT ADOPTING UPDATED URBAN WATER MANAGEMENT PLAN

WHEREAS, every urban water supplier is required by California Water Code Section 10610 *et seq.* to prepare and adopt an urban water management plan; and

WHEREAS, the East Orange County Water District (EOCWD) is an urban water supplier, which is defined to include a publicly owned supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre feet annually; and

WHEREAS, the conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level; and

WHEREAS, EOCWD has completed a 2015 Urban Water Management Plan (2015 Plan) in order to update its prior 2010 plan, as amended, pursuant to the requirements of the Urban Water Management Planning Act; and

WHEREAS, the 2015 Plan is a general information document that is intended to provide an analysis of the current and alternative water demand and supplies, and conservation activities of EOCWD including effects and measures of coping with short-term and chronic water shortages within the EOCWD boundaries; and

WHEREAS, a public hearing on the 2015 Plan has been duly called and held as required by law.

NOW, THEREFORE, the Board of Directors of the East Orange County Water District DOES HEREBY RESOLVE, DETERMINE AND ORDER as follows:

Section 1. The 2015 Urban Water Management Plan, as presented to this meeting, is hereby approved and adopted by EOCWD.

Section 2. The General Manager is directed to file a copy hereof with the Department of

Water Resources.

ADOPTED, SIGNED AND APPROVED this 16th day of June, 2016.

President
EAST ORANGE COUNTY WATER DISTRICT
and of the Board of Directors
thereof

Secretary
EAST ORANGE COUNTY WATER DISTRICT
and of the Board of Directors
thereof

STATE OF CALIFORNIA)
) ss
COUNTY OF ORANGE)

I, JOAN C. ARNESON, Secretary of the Board of Directors of the EAST ORANGE COUNTY WATER DISTRICT, do hereby certify that the foregoing Resolution No. 767 was duly adopted by the Board of Directors of said District at a Regular Meeting of said District held on June 16, 2016, and that it was so adopted by the following vote:

AYES: BELL, DAVERT, DULEBOHN, EVERETT, SEARS

NOES: NONE

ABSENT: NONE

ABSTAIN: NONE

Secretary
EAST ORANGE COUNTY WATER DISTRICT
and of the Board of Directors
thereof

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).

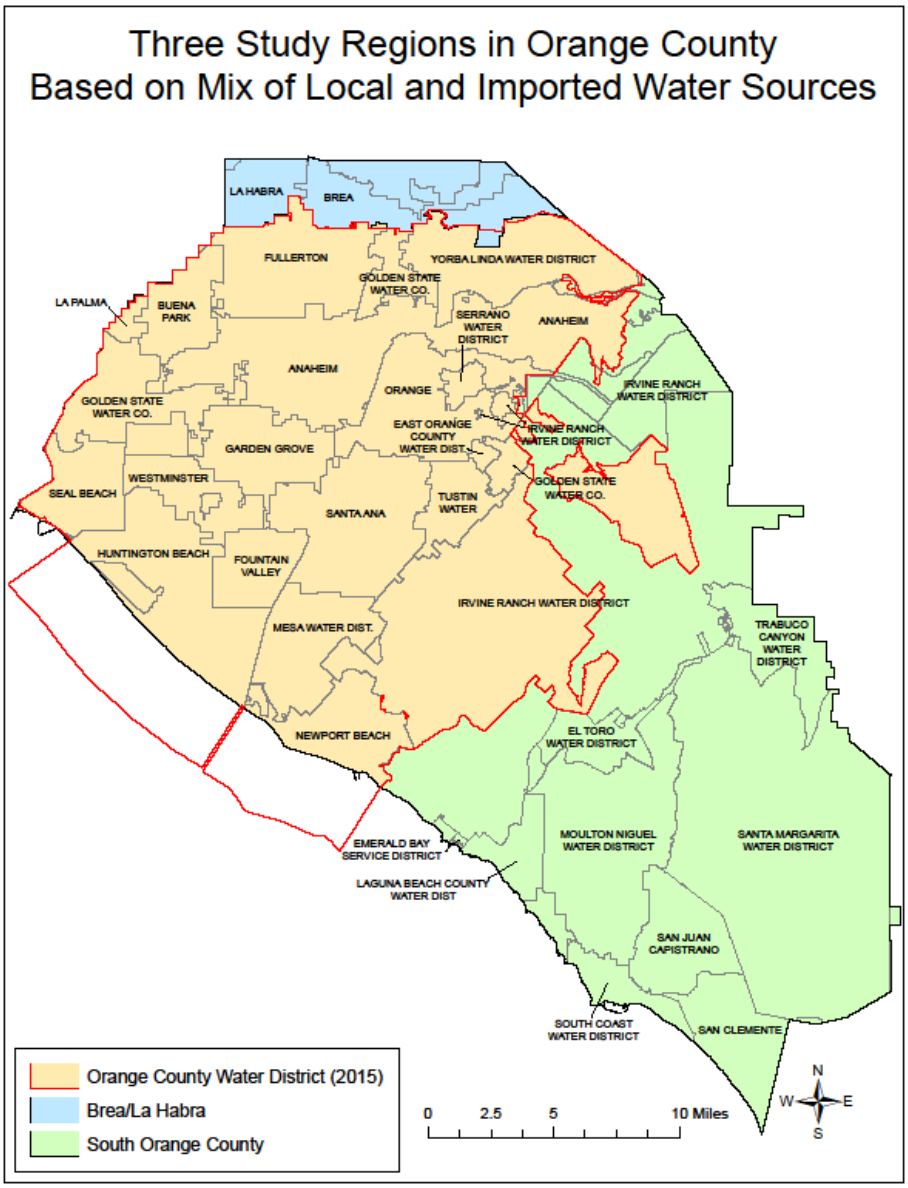

Figure 1. Geographic Areas for OC Study

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.

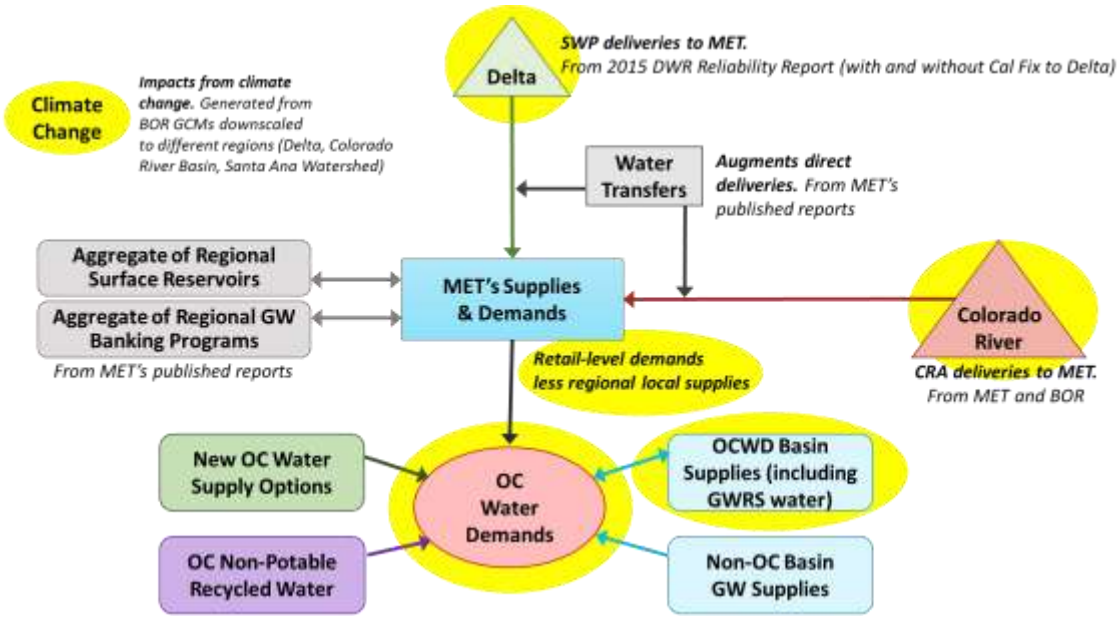

Figure 2. Overall Schematic for OC Model

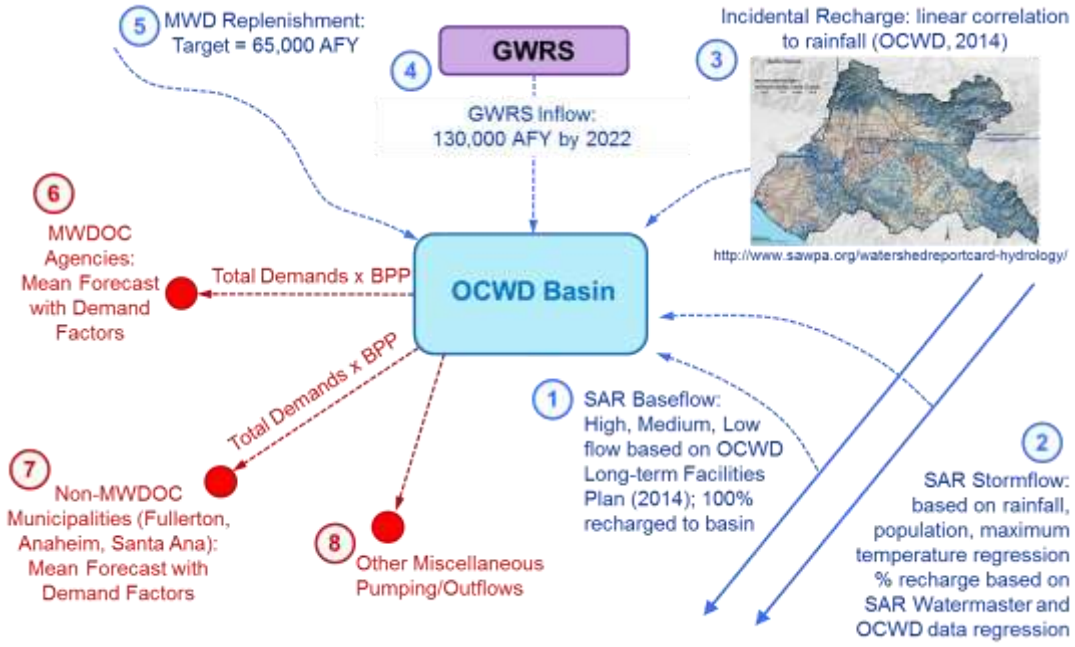

Figure 3. Inflows and Pumping Variables for OC Basin Component of OC Model

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	No data	
GSWC	38,038	383	17,218	215	58,901	122	6,857	68		
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/		No data	
SAN JUAN CAPISTRANO	7,176	502	6,146	206	16,483	158	institutional		11,277	3%
SANTA MARGARITA WATER DISTRICT	36,022	436	19,885	268	37,241	254	category		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%**

[1]Units 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).

[2]Unit 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 R^2 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

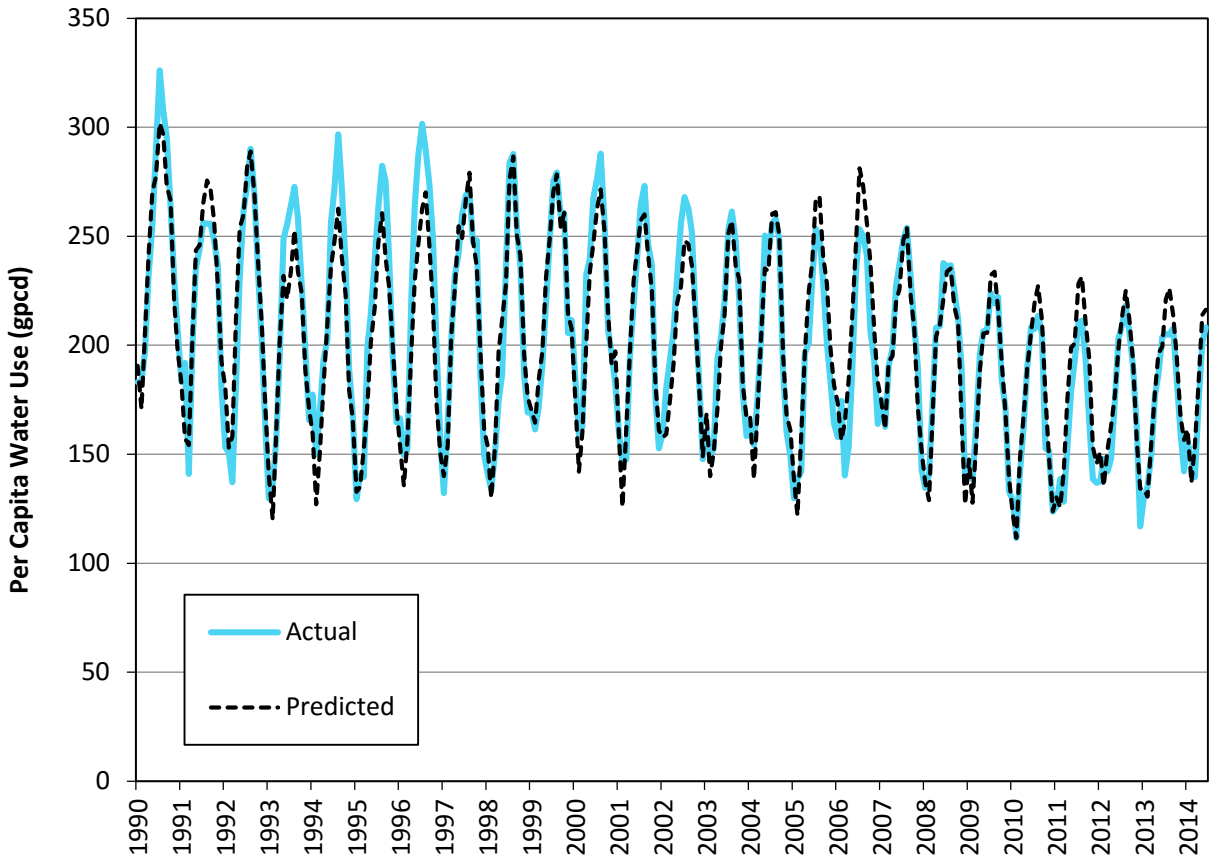

Figure 5. Verification of Statistical Water Use Model

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 Water$mart 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-curtailment 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 *(or combined commercial/ industrial for South County)*	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 *(or combined commercial/ industrial employment for South County)*	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 AFY	MF AFY	COM AFY	IND AFY	Non Rev AFY	Total 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 AFY	MF AFY	COM AFY	IND AFY	Non Rev AFY	Total 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 AFY	MF AFY	COM AFY	IND AFY	Non Rev AFY	Total 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 AFY	MF AFY	COM AFY	IND AFY	Non Rev AFY	Total 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										
#		Total	Portion of Homes with Gal/Flush Toilets						Savings	Savings
Flushes	Year	Housing	7	5	3.5	1.6	1	Av Flush	(GPD/H)	(AFY)
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										
#			Portion of Emp with Gal/Flush Toilets						Savings	Savings
Flushes	Year	Empl	7	5	3.5	1.6	1	Av Flush	(GPD/E)	(AFY)
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 washer[1]. 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 afy[1]. 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 Water$mart 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 Water$mart 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

Combing 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)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	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)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	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)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	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)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	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

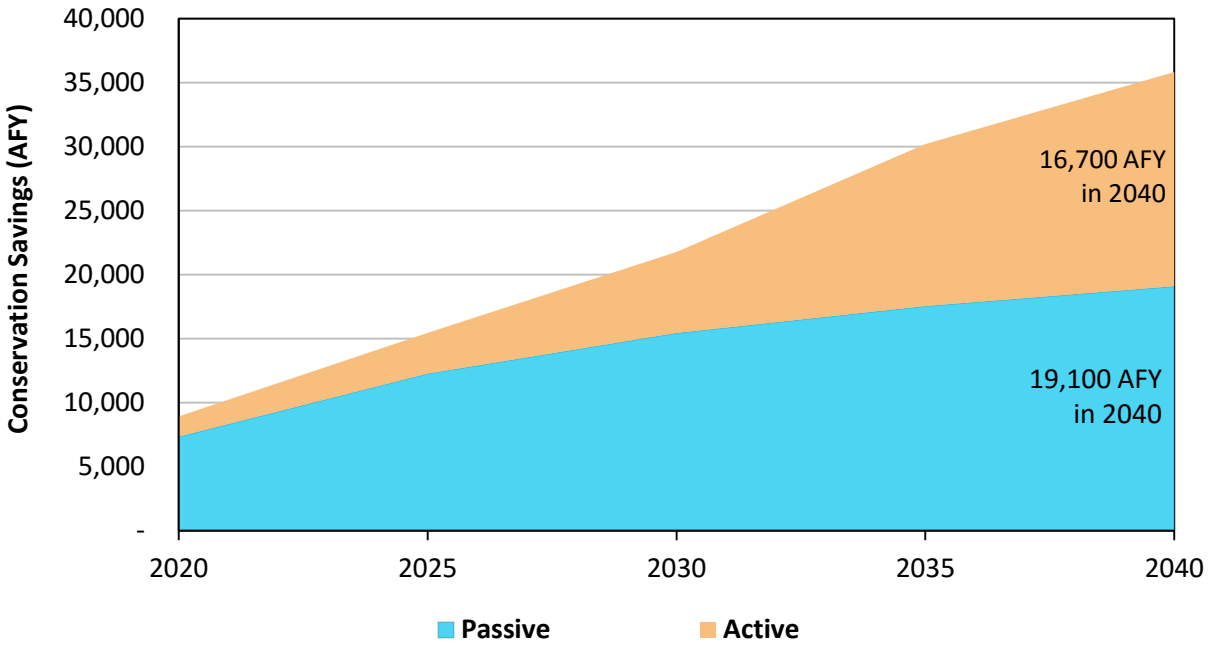

Figure 7. Total Water Conservation in Orange County

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

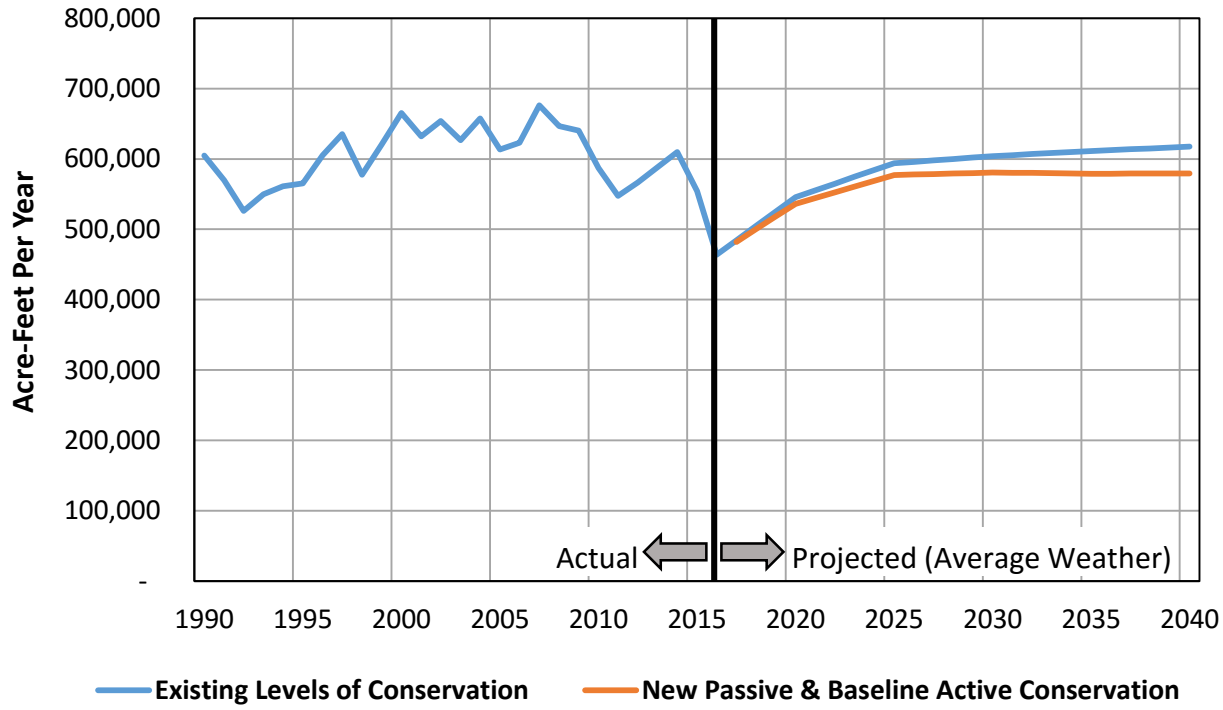

Figure 8. Water Demand Forecast for Total Orange County

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**	610,000	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.

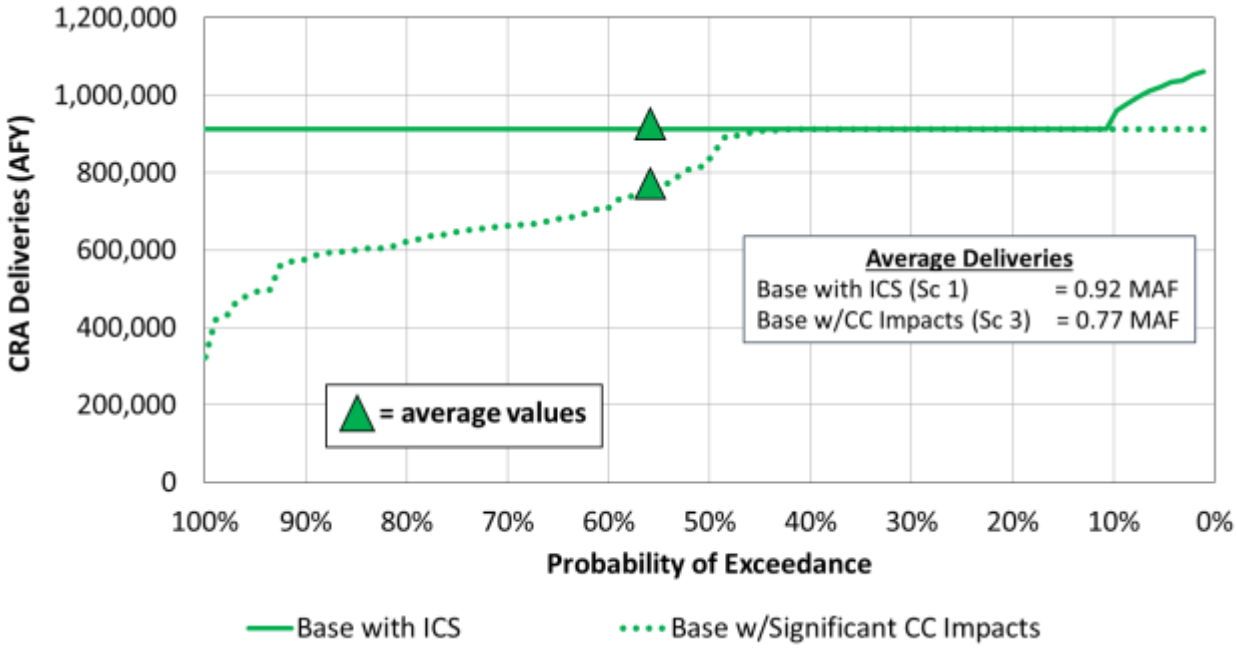

Figure 11. Colorado River Aqueduct Deliveries to MET

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.

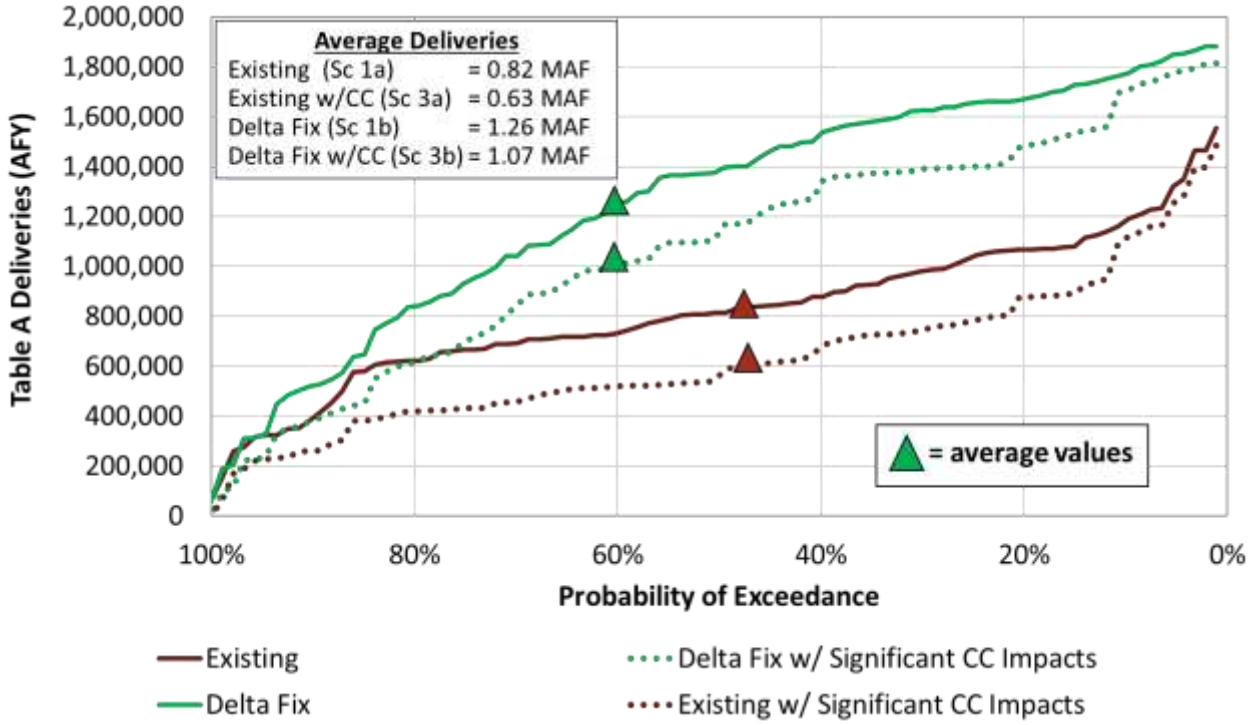

Figure 12. State Water Project Deliveries to MET

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.

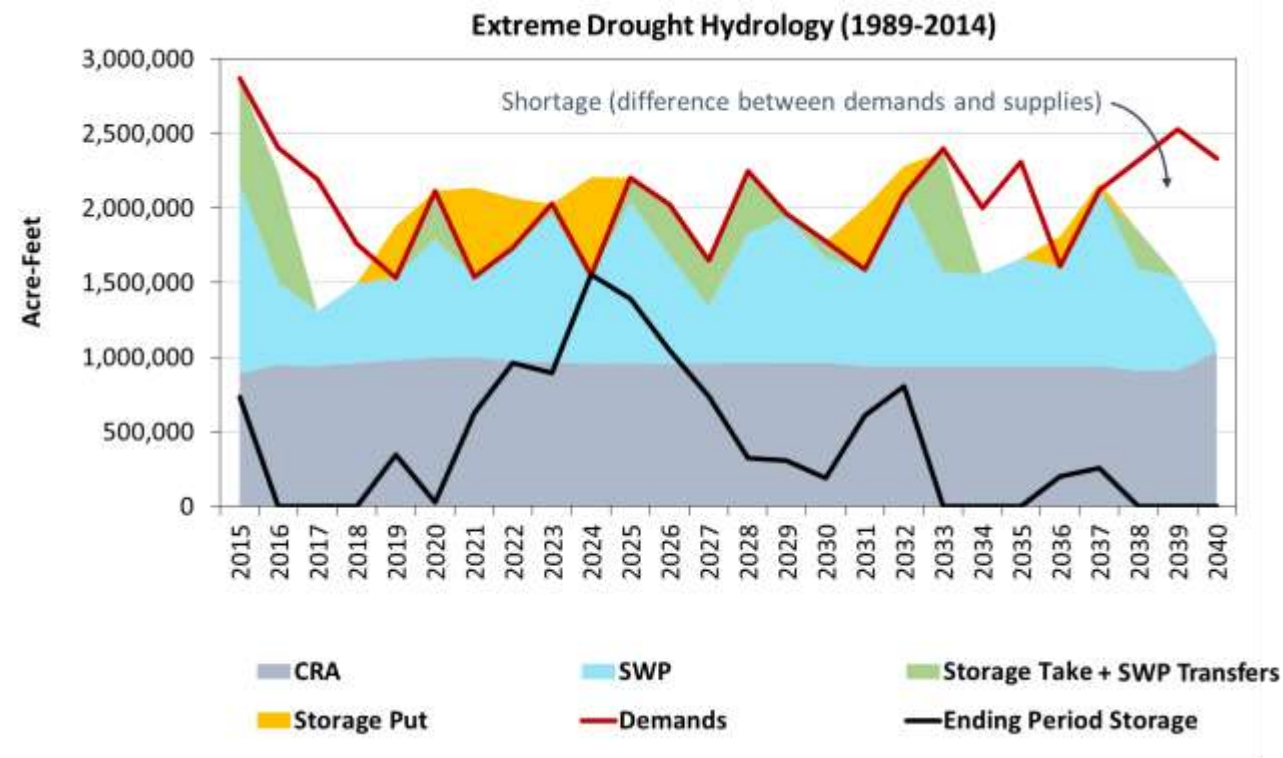

Figure 13. MET Reliability under Drought, for Scenario 1a (no Climate variability, no Cal Fix)

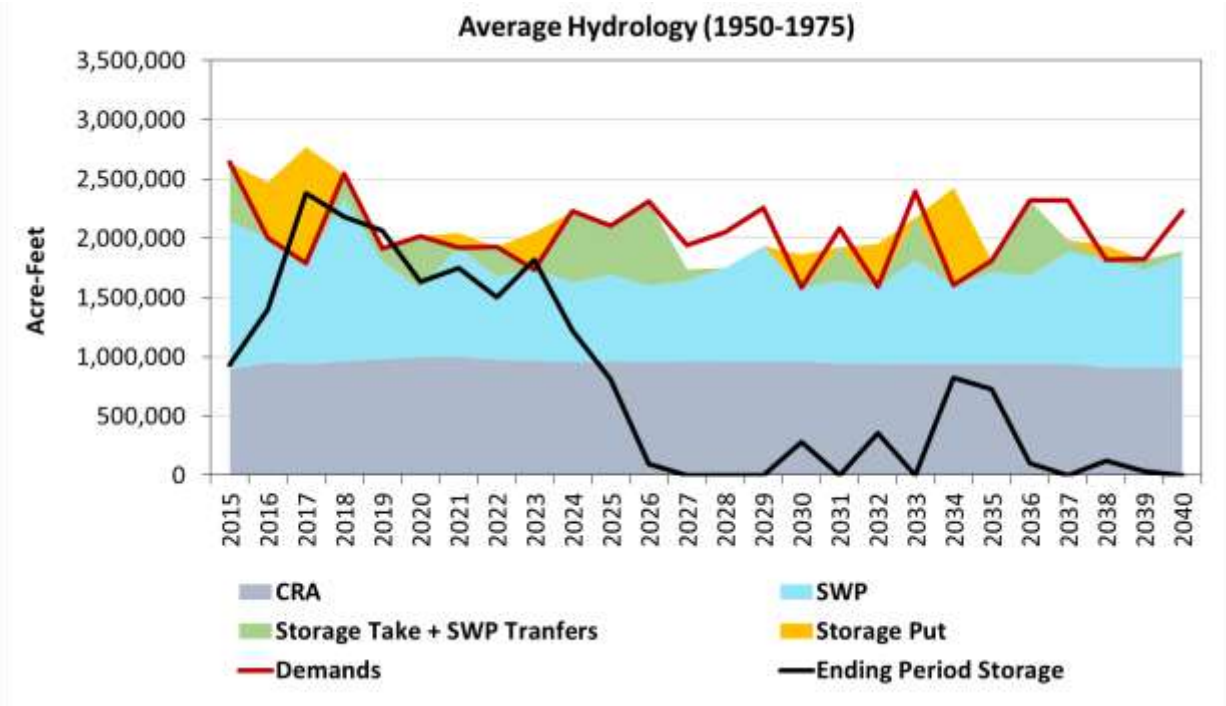

Figure 14. MET Reliability under Average Hydrology, for Scenario 1a (no Climate variability, no Cal Fix)

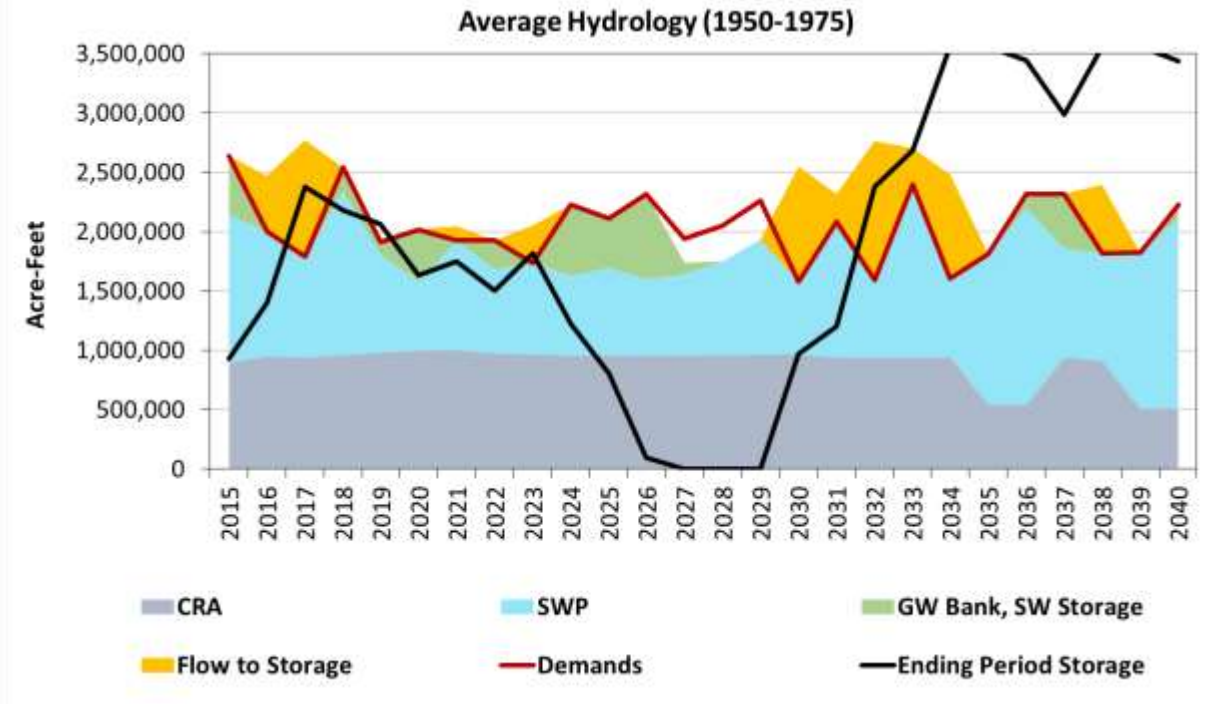

Figure 15. MET Reliability under Average Hydrology, for Scenario 1b (no Climate variability, with Cal Fix)

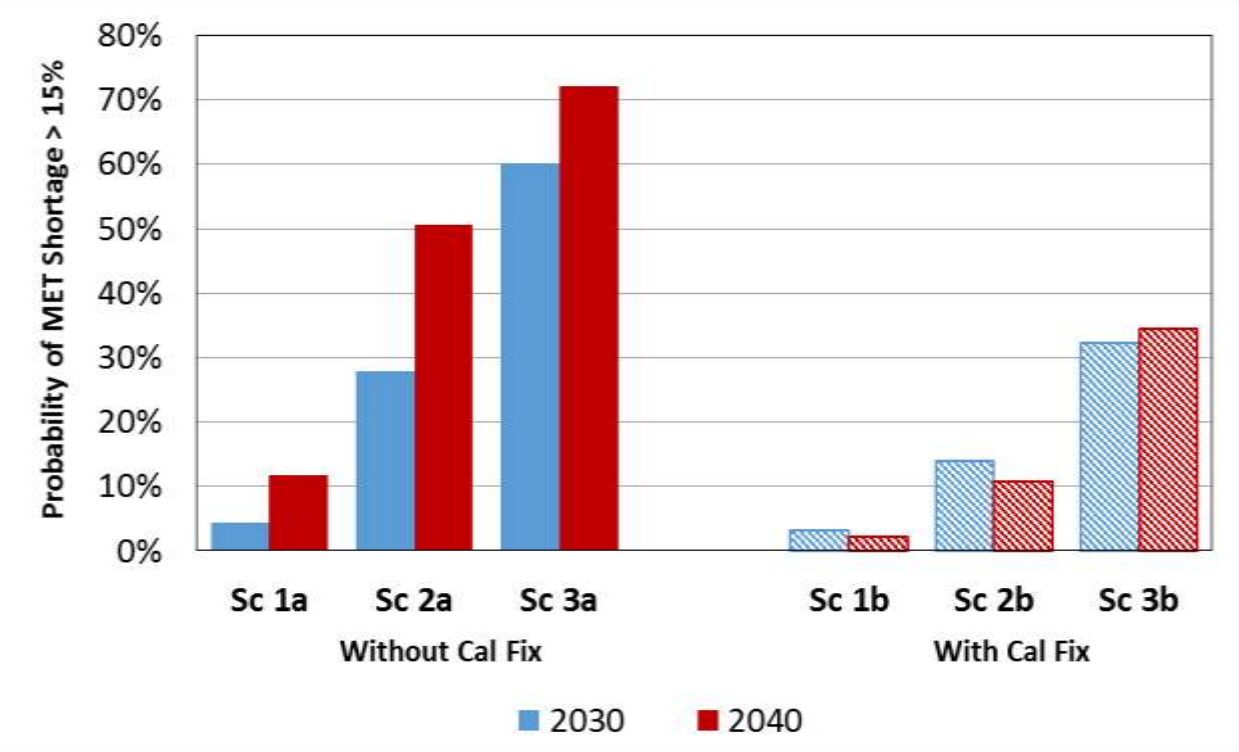

Figure 16. MET Supply Reliability (Percent of Time MET Supply Shortage Greater than 15%)

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).

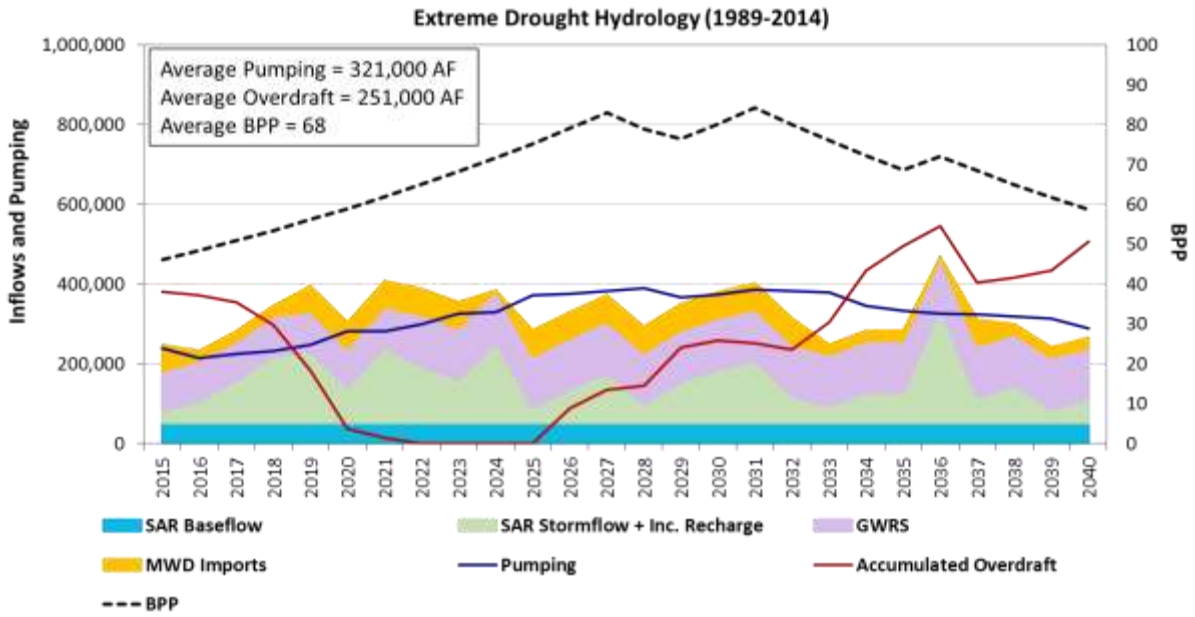

Figure 17. Simulation of OC Basin under Drought, for Scenario 1a (no Climate scenario, no Cal Fix)

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.

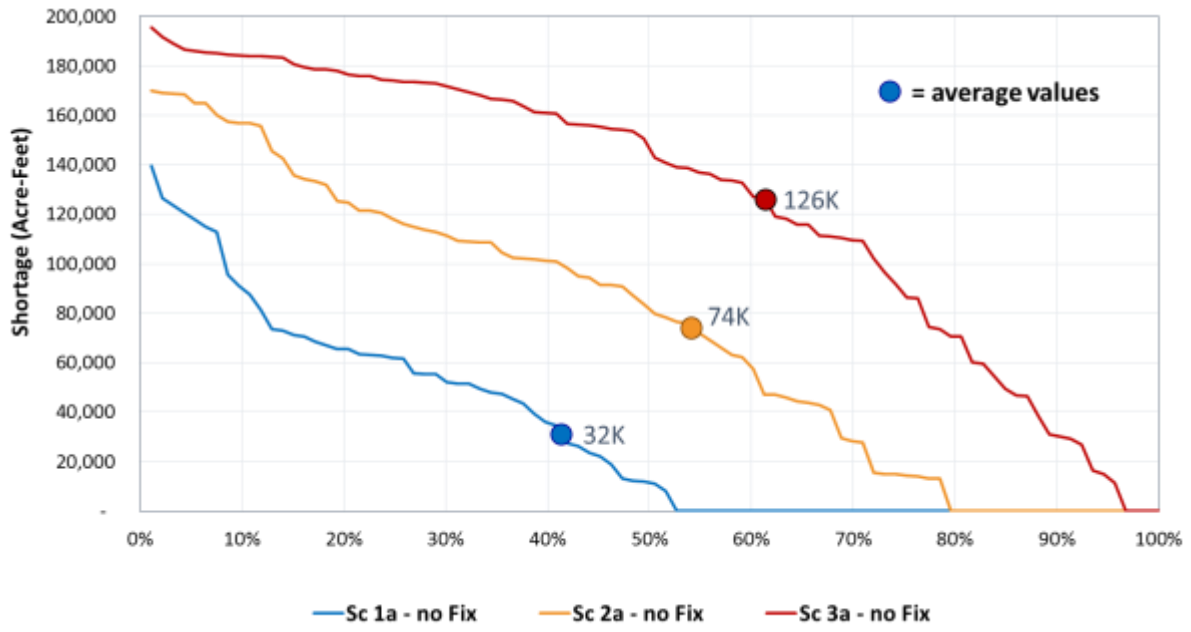

Figure 18. Probability of Water Shortages (Gap) for Orange County Total, No Cal Fix

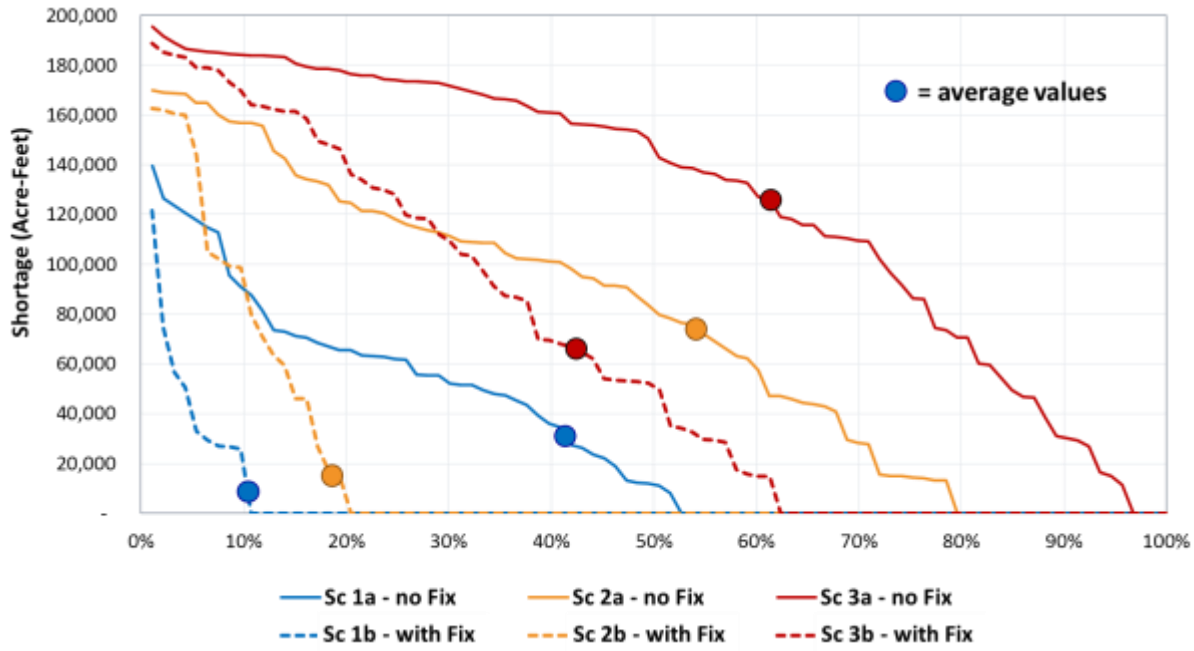

Figure 19. Probability of Water Shortages (Gap) for Orange County Total, with Cal Fix

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	
Brea / La Habra	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
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	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
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	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
2020	2,100 (2%)	2,100 (2%)	3,000 (3%)	3,000 (3%)	4,800 (4%)	4,800 (4%)
2040	12,000 (9%)	1,900 (2%)	23,000 (18%)	5,600 (4%)	38,000 (28%)	20,000 (15%)
OC Total	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
2020	6,000 (1%)	6,000 (1%)	8,500 (2%)	8,500 (2%)	14,000 (3%)	14,000 (3%)
2040	32,000 (6%)	4,800 (1%)	74,000 (13%)	17,000 (3%)	126,000 (21%)	64,000 (11%)

* 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.

6.0 References

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APPENDIX H

AWWA Water Loss Audit Worksheet

AWWA Free Water Audit Software v5.0

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

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

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

Please begin by providing the following information

Name of Contact Person:	Jerry Mendzer
Email Address:	jmendzer@eocwd.com
Telephone (incl Ext.):	714-538-5815
Name of City / Utility:	East Orange County Water District
City/Town/Municipality:	Orange
State / Province:	California (CA)
Country:	USA
Year:	2014-2015 Financial Year
Start Date:	07/2014 Enter MM/YYYY numeric format
End Date:	06/2015 Enter MM/YYYY numeric format
Audit Preparation Date:	4/13/2016
Volume Reporting Units:	Acre-feet
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: 0.25% Value:

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

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

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

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

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

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

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

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

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

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

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

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

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

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

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

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

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: East Orange County Water District
Reporting Year: 2014-2015 | 7/2014 - 6/2015

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

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

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

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

Master Meter and Supply Error Adjustments

WATER SUPPLIED

	Grading	Value		Pcnt:	Value:	
Volume from own sources:	9	844.432	acre-ft/yr			acre-ft/yr
Water imported:	7	7.300	acre-ft/yr	7		acre-ft/yr
Water exported:	n/a		acre-ft/yr			acre-ft/yr

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

WATER SUPPLIED: 851.732 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grading	Value		Pcnt:	Value:	
Billed metered:	6	829.901	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	6	2.075	acre-ft/yr		2.075	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 831.976 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 19.755 acre-ft/yr

Apparent Losses

	Grading	Value		Pcnt:	Value:	
Unauthorized consumption:		2.129	acre-ft/yr	0.25%		acre-ft/yr

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

	Grading	Value				
Customer metering inaccuracies:	2	4.170	acre-ft/yr	0.50%		acre-ft/yr
Systematic data handling errors:	5	2.075	acre-ft/yr	0.25%		acre-ft/yr

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

Apparent Losses: 8.374 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 11.381 acre-ft/yr

WATER LOSSES: 19.755 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 21.830 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grading	Value	
Length of mains:	6	23.7	miles
Number of active AND inactive service connections:	7	1,215	
Service connection density:		51	conn./mile main
Are customer meters typically located at the curbstop or property line?		No	
Average length of customer service line:	4	40.0	ft
Average operating pressure:	5	101.0	psi

(length of service line, beyond the property boundary, that is the responsibility of the utility)

COST DATA

	Grading	Value	
Total annual cost of operating water system:	8	$1,328,227	$/Year
Customer retail unit cost (applied to Apparent Losses):	10	$2.67	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	7	$719.03	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 72 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: Customer metering inaccuracies
2: Billed metered
3: Volume from own sources

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: East Orange County Water District
Reporting Year: 2014-2015 7/2014 - 6/2015

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 72 out of 100 ***

System Attributes:

	Apparent Losses:	8.374	acre-ft/yr
+	Real Losses:	11.381	acre-ft/yr
=	Water Losses:	19.755	acre-ft/yr
?	Unavoidable Annual Real Losses (UARL):	See limits in definition	acre-ft/yr
	Annual cost of Apparent Losses:	$9,740	
	Annual cost of Real Losses:	$8,183	Valued at Variable Production Cost

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	2.6%	
	Non-revenue water as percent by cost of operating system:	1.5%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	6.15	gallons/connection/day
	Real Losses per service connection per day:	8.36	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.08	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	11.38	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

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:	
Unbilled unmetered:	

Audit Item	Comment
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

Water Audit Report for:	**East Orange County Water District**	
Reporting Year:	**2014-2015**	**7/2014 - 6/2015**
Data Validity Score:	**72**	

Water Exported
0.000

Billed Water Exported

Own Sources
(Adjusted for known errors)
844.432

Water Supplied
851.732

Authorized Consumption
831.976

Billed Authorized Consumption
829.901

Billed Metered Consumption (water exported is removed)
829.901

Billed Unmetered Consumption
0.000

Revenue Water
829.901

Unbilled Authorized Consumption
2.075

Unbilled Metered Consumption
0.000

Unbilled Unmetered Consumption
2.075

Non-Revenue Water (NRW)
21.830

Water Losses
19.755

Apparent Losses
8.374

Unauthorized Consumption
2.129

Customer Metering Inaccuracies
4.170

Systematic Data Handling Errors
2.075

Real Losses
11.381

Leakage on Transmission and/or Distribution Mains
Not broken down

Leakage and Overflows at Utility's Storage Tanks
Not broken down

Leakage on Service Connections
Not broken down

Water Imported
7.300

AWWA Free Water Audit Software:
Dashboard

WAS v5.0

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

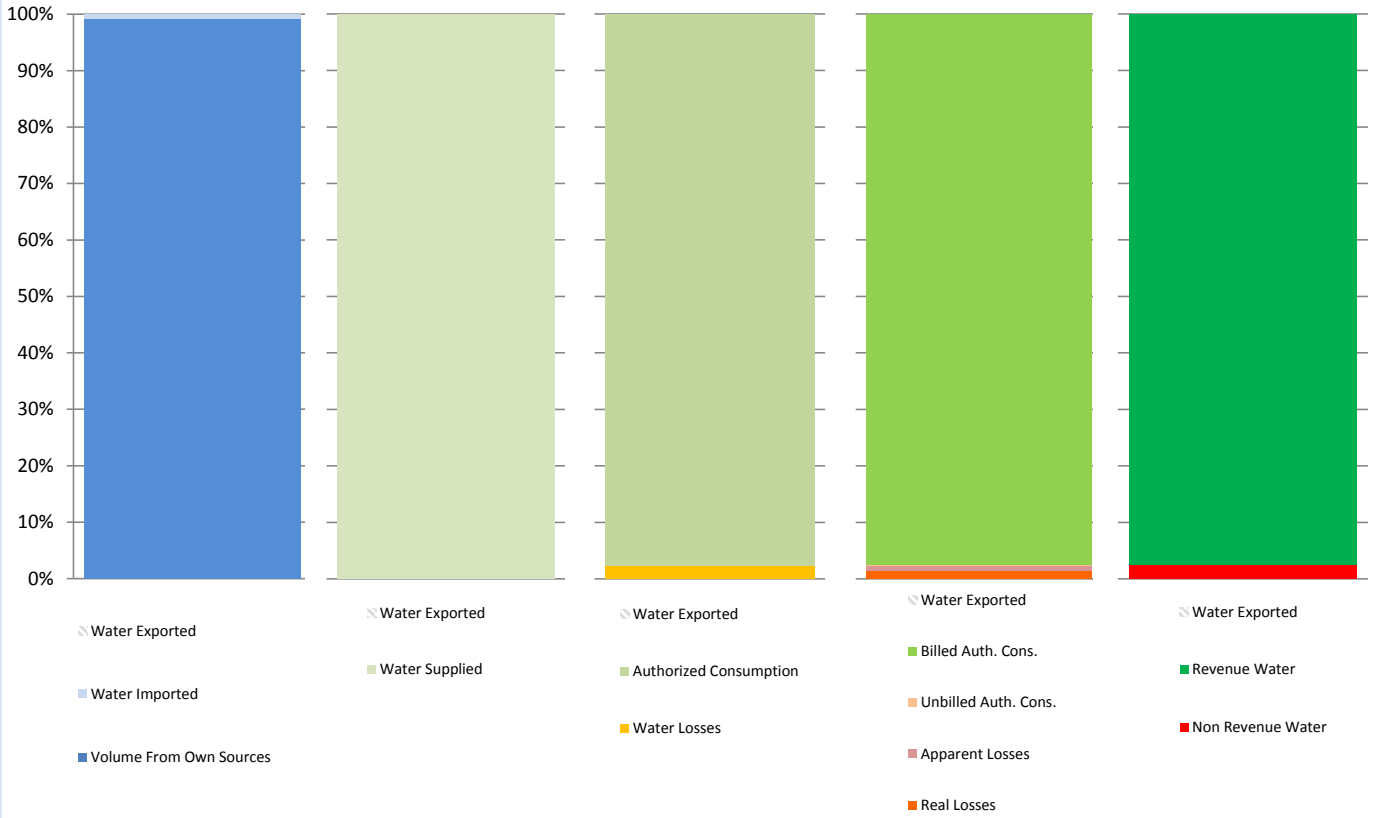
Water Audit Report for: **East Orange County Water District**

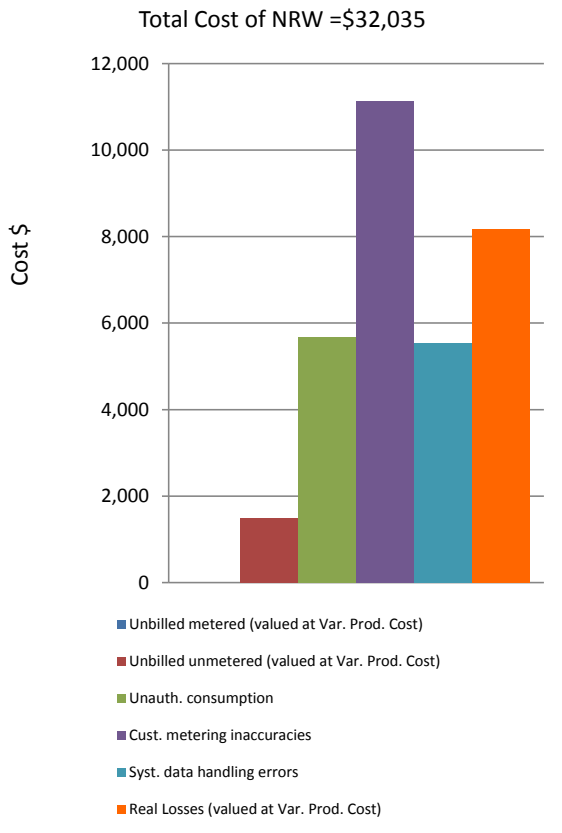
Reporting Year: **2014-2015** **7/2014 - 6/2015**

Data Validity Score: **72**

○ Show me the VOLUME of Non-Revenue Water

◉ Show me the COST of Non-Revenue Water





AWWA Free Water Audit Software v5.0

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

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

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

Please begin by providing the following information

Name of Contact Person:	Jerry Mendzer
Email Address:	
Telephone | Ext.:	
Name of City / Utility:	East Orange County Water District - WHOLESALE
City/Town/Municipality:	
State / Province:	California (CA)
Country:	USA
Year:	2014-2015 Financial Year
Start Date:	07/2014 Enter MM/YYYY numeric format
End Date:	06/2014 Enter MM/YYYY numeric format
Audit Preparation Date:	5/10/2016
Volume Reporting Units:	Acre-feet
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: 0.25% Value:

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

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

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

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

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

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

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

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

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

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

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

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

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

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

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

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

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0
American Water Works Association.

? Click to access definition
+ Click to add a comment

Water Audit Report for: East Orange County Water District - WHOLESALE
Reporting Year: 2014-2015 | 7/2014 - 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

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

To select the correct data grading for each input, determine the highest grade where

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ----------> | Pcnt: | Value:

Volume from own sources:	+ ?	n/a		acre-ft/yr	+ ?					acre-ft/yr
Water imported:	+ ?	7	4,151.000	acre-ft/yr	+ ?	7		-2.800		acre-ft/yr
Water exported:	+ ?	n/a		acre-ft/yr	+ ?					acre-ft/yr

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

WATER SUPPLIED: 4,153.800 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:	
Billed metered:	+ ?	9	4,117.832	acre-ft/yr			
Billed unmetered:	+ ?	n/a		acre-ft/yr			
Unbilled metered:	+ ?	n/a		acre-ft/yr			
Unbilled unmetered:	+ ?	10	0.000	acre-ft/yr		0.000	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ? 4,117.832 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 35.968 acre-ft/yr

Apparent Losses

					Pcnt:	Value:	
Unauthorized consumption:	+ ?	10	0.000	acre-ft/yr		0.000	acre-ft/yr
Customer metering inaccuracies:	+ ?	9	5.315	acre-ft/yr		5.315	acre-ft/yr
Systematic data handling errors:	+ ?	7	0.000	acre-ft/yr		0.000	acre-ft/yr

Apparent Losses: ? 5.315 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 30.653 acre-ft/yr

WATER LOSSES: 35.968 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 35.968 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	6	12.0	miles
Number of active AND inactive service connections:	+ ?	10	17	
Service connection density:	?		1	conn./mile main

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

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

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

Average operating pressure: + ? 5 129.1 psi

COST DATA

Total annual cost of operating water system:	+ ?	10	$6,150,711	$/Year	
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$2.16	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	+ ?	7	$942.00	$/acre-ft	☐Use Customer Retail Unit Cost to value real losses

Retail costs are less than (or equal to) production costs; please review and correct if necessary

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 81 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: Water imported
2: Variable production cost (applied to Real Losses)
3: Systematic data handling errors

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.

Water Audit Report for: East Orange County Water District - WHOLESALE

Reporting Year: 2014-2015 | 7/2014 - 6/2014

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 81 out of 100 ***

System Attributes:

	Apparent Losses:	5.315	acre-ft/yr
+	Real Losses:	30.653	acre-ft/yr
=	**Water Losses:**	**35.968**	acre-ft/yr
?	Unavoidable Annual Real Losses (UARL):	See limits in definition	acre-ft/yr
	Annual cost of Apparent Losses:	$5,007	
	Annual cost of Real Losses:	$28,875	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	0.9%	
	Non-revenue water as percent by cost of operating system:	0.6%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	279.12	gallons/connection/day
	Real Losses per service connection per day:	N/A	gallons/connection/day
	Real Losses per length of main per day*:	2,282.88	gallons/mile/day
	Real Losses per service connection per day per psi pressure:	N/A	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	30.65	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

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

American Water Works Association.

Water Audit Report for:	East Orange County Water District - WHOLESALE	
Reporting Year:	2014-2015	7/2014 - 6/2014
Data Validity Score:	81	

		Water Exported 0.000			Billed Water Exported	Revenue Water 0.000
Own Sources (Adjusted for known errors) 0.000	System Input 4,153.800	Water Supplied 4,153.800	Authorized Consumption 4,117.832	Billed Authorized Consumption 4,117.832	Billed Metered Consumption (water exported is removed) 4,117.832	Revenue Water 4,117.832
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 0.000	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 35.968
					Unbilled Unmetered Consumption 0.000	
			Water Losses 35.968	Apparent Losses 5.315	Unauthorized Consumption 0.000	
					Customer Metering Inaccuracies 5.315	
					Systematic Data Handling Errors 0.000	
Water Imported 4,153.800				Real Losses 30.653	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

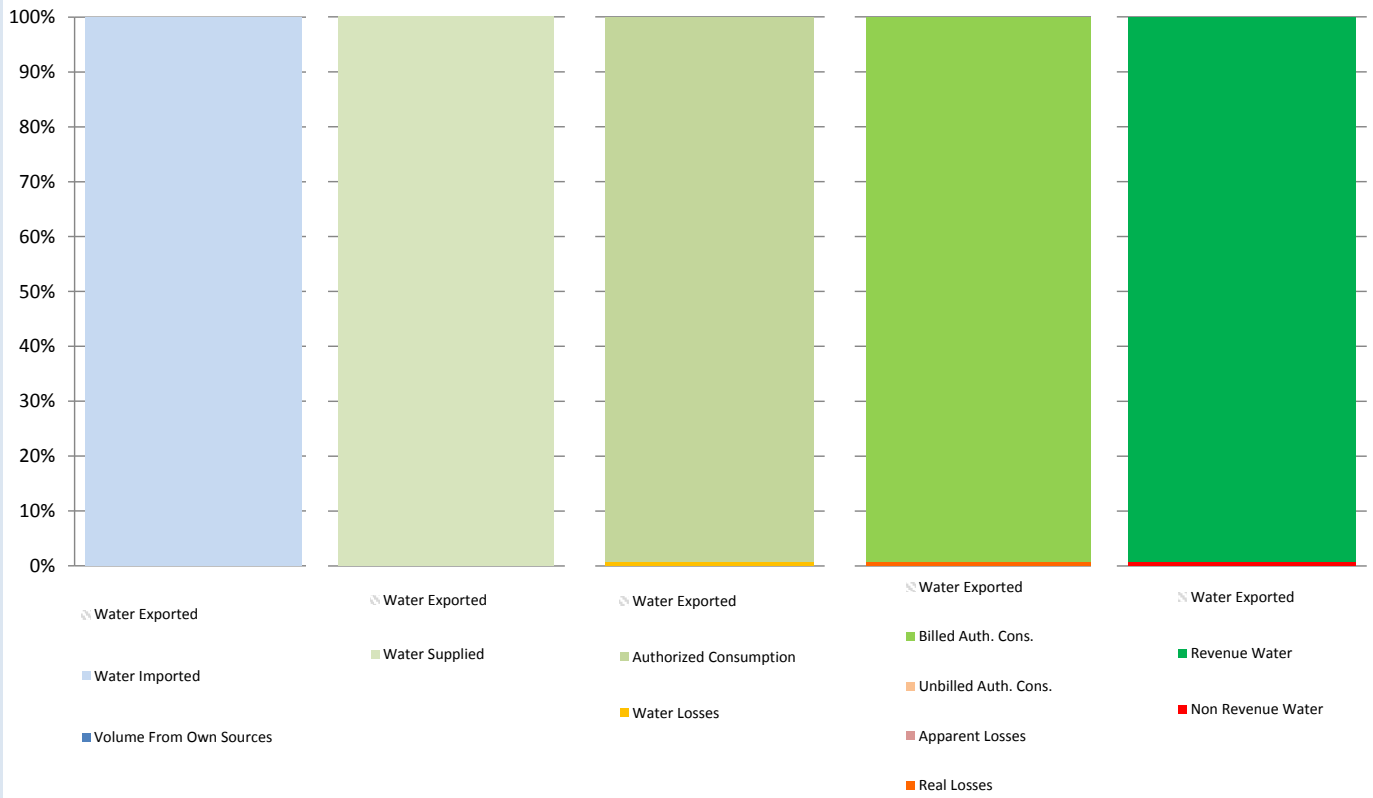
AWWA Free Water Audit Software:
Dashboard

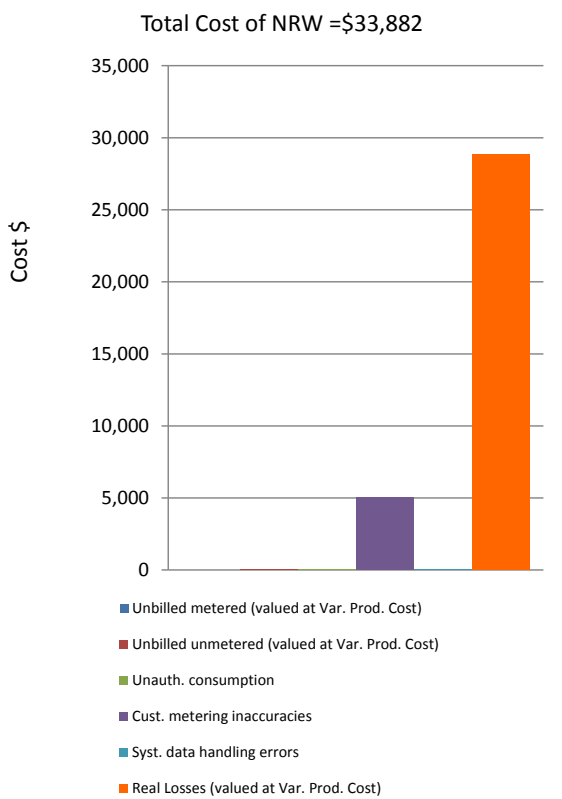
WAS v5.0
American Water Works Association.

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for: East Orange County Water District - WHOLESALE
Reporting Year: 2014-2015 | 7/2014 - 6/2014
Data Validity Score: 81

○ 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 Water$mart 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

	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
Agency	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	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	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	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	31	1	2.10
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	1	0	1	36	1	12	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	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

	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	
Agency	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**	**0**	**0**	**0**	**0**	**0**	**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**

[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
	Surveys	Cert Homes	Surveys	Cert Homes	Surveys	Cert Homes	Surveys	Cert Homes	Water Savings
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**

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

[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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