



**2015**

# **URBAN WATER MANAGEMENT PLAN**

**FINAL**

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JUNE 2016

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## 2015 URBAN WATER MANAGEMENT PLAN

City of Garden Grove

**FINAL**



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## APPENDICES

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- C Groundwater Management Plan
- D City Ordinance
- E Notification of Public and Service Area Suppliers
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- G Bump Methodology
- H AWWA Water Loss Audit Worksheet
- I Water Use Efficiency Implementation Report
- J CUWCC BMP Report



## ACRONYMS AND ABBREVIATIONS

|                               |  |
|-------------------------------|--|
| 20x2020                       | 20% water use reduction in GPCD by year 2020 |
| Act                           | Urban Water Management Planning Act          |
| AF                            | Acre-Feet                                    |
| AFY                           | Acre-Feet per Year                           |
| AMI                           | Advanced Metering Infrastructure             |
| AWWA                          | American Water Works Association             |
| BEA                           | Basin Equity Assessment                      |
| Biops                         | Biological Opinions                          |
| BMP                           | Best Management Practice                     |
| BPP                           | Basin Production Percentage                  |
| CARL                          | Current Annual Real Losses                   |
| CDR                           | Center for Demographic Research              |
| CEC                           | Constituents of Emerging Concern             |
| CFS                           | Cubic Feet per Second                        |
| CII                           | Commercial/Industrial/Institutional          |
| City                          | City of Garden Grove                         |
| CRA                           | Colorado River Aqueduct                      |
| CUP                           | Conjunctive Use Program                      |
| CUWCC                         | California Urban Water Conservation Council  |
| CVP                           | Central Valley Project                       |
| Delta                         | Sacramento-San Joaquin River Delta           |
| DMM                           | Demand Management Measure                    |
| DOF                           | Department of Finance                        |
| DVL                           | Diamond Valley Lake                          |
| DWR                           | Department of Water Resources                |
| EOC                           | Emergency Operation Center                   |
| FY                            | Fiscal Year                                  |
| GAP                           | Green Acres Project                          |
| GCM                           | General Circulation Model                    |
| GGSD                          | Garden Grove Sanitary District               |
| GPCD                          | Gallons per Capita per Day                   |
| GPM                           | Gallons per Minute                           |
| H <sub>2</sub> O <sub>2</sub> | Hydrogen Peroxide                            |
| GWRS                          | Groundwater Replenishment System             |
| HCF                           | Hundred Cubic Feet                           |
| HECW                          | High Efficiency Clothes Washers              |
| HET                           | High Efficiency Toilet                       |
| ILI                           | Infrastructure Leakage Index                 |
| IPR                           | Indirect Potable Reuse                       |

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|              |  |
|--------------|--|
| IRP          | Integrated Water Resource Plan                             |
| IWA          | International Water Association                            |
| 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                                |
| 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                               |
| PPCP         | Pharmaceuticals and Personal Care Product                  |
| RA           | Replenishment Assessment                                   |
| RHNA         | Regional Housing Needs Assessment                          |
| RO           | Reverse Osmosis  |
| SBx7-7       | Senate Bill 7 as part of the Seventh Extraordinary Session |
| SCAB         | South Coast Air Basin                                      |
| SCAG         | Southern California Association of Governments             |
| Study        | Colorado River Basin Water Supply and Demand Study         |
| SWP          | State Water Project  |
| SWRCB        | California State Water Resources Control Board             |
| TDS          | Total Dissolved Solids                                     |
| UARL         | Unavoidable Annual Real Losses                             |
| UV           | Ultraviolet  |
| UWMP         | Urban Water Management Plan                                |
| VOC          | Volatile Organic Compound                                  |
| WBIC         | Weather Based Irrigation Controller                        |
| WEROC        | Water Emergency Response Organization of Orange County     |
| WF-21        | Water Factory 21   |
| WOC          | Water Emergency Operations Center                          |
| WOCWB        | West Orange County Water Board                             |
| 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 City of Garden Grove's (City) service area and assesses the City'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 City'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

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

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

The sections in this UWMP correspond to the outline of the Act, specifically Article 2, Contents of Plans, Sections 10631, 10632, and 10633. The sequence used for the required information, however, differs slightly in order to present information in a manner reflecting the unique characteristics of the City'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 agency, as shown in Tables 1-1 and 1-2. Table 1-2 also indicates the units that will be used throughout this document.

Table 1-1: Plan Identification

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

Table 1-2: Plan Identification

| Agency Identification  |                                   |
|--|-----------------------------------|
| Type of Agency   |                                   |
| <input type="checkbox"/>   | Agency is a wholesaler            |
| <input checked="" type="checkbox"/>  | Agency is a retailer              |
| Fiscal or Calendar Year  |                                   |
| <input type="checkbox"/>   | UWMP Tables Are in Calendar Years |
| <input checked="" type="checkbox"/>  | UWMP Tables Are in Fiscal Years   |
| If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd) |                                   |
| 7/1  |                                   |
| Units of Measure Used in UWMP  |                                   |
| Unit   | AF                                |
| NOTES:   |                                   |

## 1.2 Agency Overview

The City is governed by a non-partisan five-member City Council elected at large to serve staggered four-year terms. The Mayor and the Mayor Pro Tempore are elected by the Council from among its members to serve two-year terms. The City Council appoints a City Manager who, as the City's Chief Administrative Officer, is responsible for all City Departments, including the City's Water Utility. The City Council also appoints various members of commissions, committees, and citizen advisory groups. The current City Council members include:

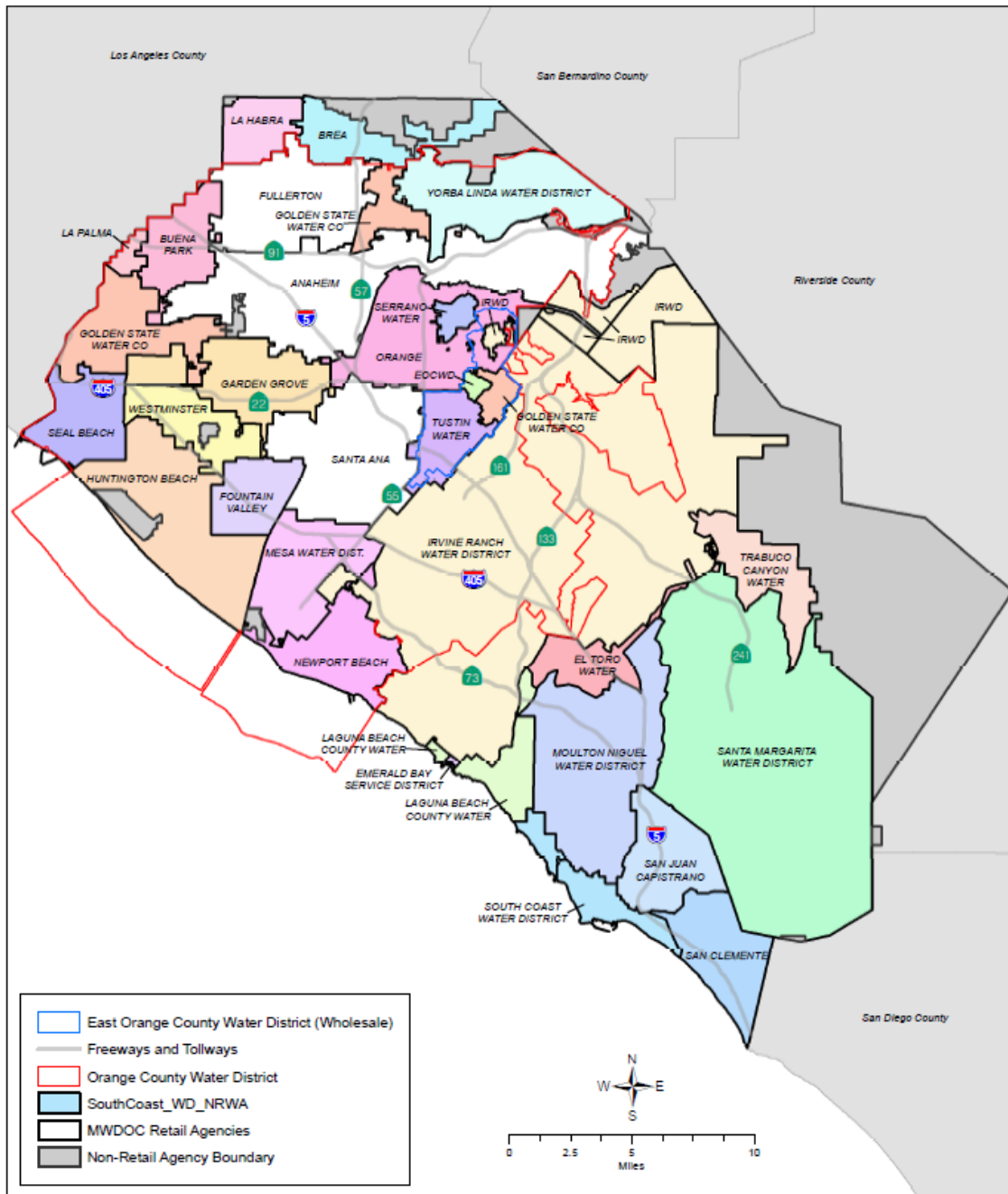
- Bao Bguyen – Mayor
- Steve Jones – Mayor Pro Tempore
- Christopher Phan – Councilmember
- Phat Bui – Councilmember
- Kris Beard – Councilmember

In 1958, the City established a Municipal Water Department, which is now recognized as the Water Services Division of the Public Works Department. The Water Services Division is the principal water retailer within the City boundaries and also provides water service for two small neighborhoods outside the City. The Water Services Division is responsible for operating and maintaining wells, reservoirs, imported water connections, distribution pipelines, fire hydrants, water meters and related infrastructure, and for meter reading, billing and accounting services. The Water Services Division also conducts

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comprehensive water quality testing and monitoring programs and develops long range operational and engineering plans designed to prepare for future needs and contingencies.

The City receives its water from two main sources, local well water from the Lower Santa Ana River Groundwater Basin, which is managed by the Orange County Water District (OCWD), and imported water from the Municipal Water District of Orange County (MWDOC). MWDOC is Orange County's wholesale supplier and is a member agency of the Metropolitan Water District of Southern California (Metropolitan).



## MWDOC Service Area and Member Agencies

Prepared by the Center for Demographic Research, 2015  
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Figure 1-1: Regional Location of Urban Water Supplier

### 1.3 Service Area and Facilities

#### 1.3.1 City of Garden Grove Service Area

The City is located in north central Orange County. The City is located south of Anaheim and north of Santa Ana, and is about 25 miles south of Los Angeles and 9 miles inland from the Pacific Ocean. The City has an area of 17.8 square miles and is generally flat, with elevations ranging from a low of about 25 feet above sea level in the southwest to 130 feet in the northeast. The City is predominately residential, although it also has five industrial parks, 19 retail centers, and nine large hotels and one conference center. The City is located along the Garden Grove Freeway (SR 22) which provides excellent access to I-5 and the Orange County Freeway (SR 57) to the east and I-405, I-605 and I-710 to the west.

The City supplies customers throughout the City's 17.8 square mile area. The City also serves water to one neighborhood that is not within the incorporated boundaries of the City. The neighborhood is in the vicinity northwest of Chapman Avenue and Dale Street and the other in the area of Lampson Avenue and Beach Street. Figure 1-2 shows the City limits and water service area.

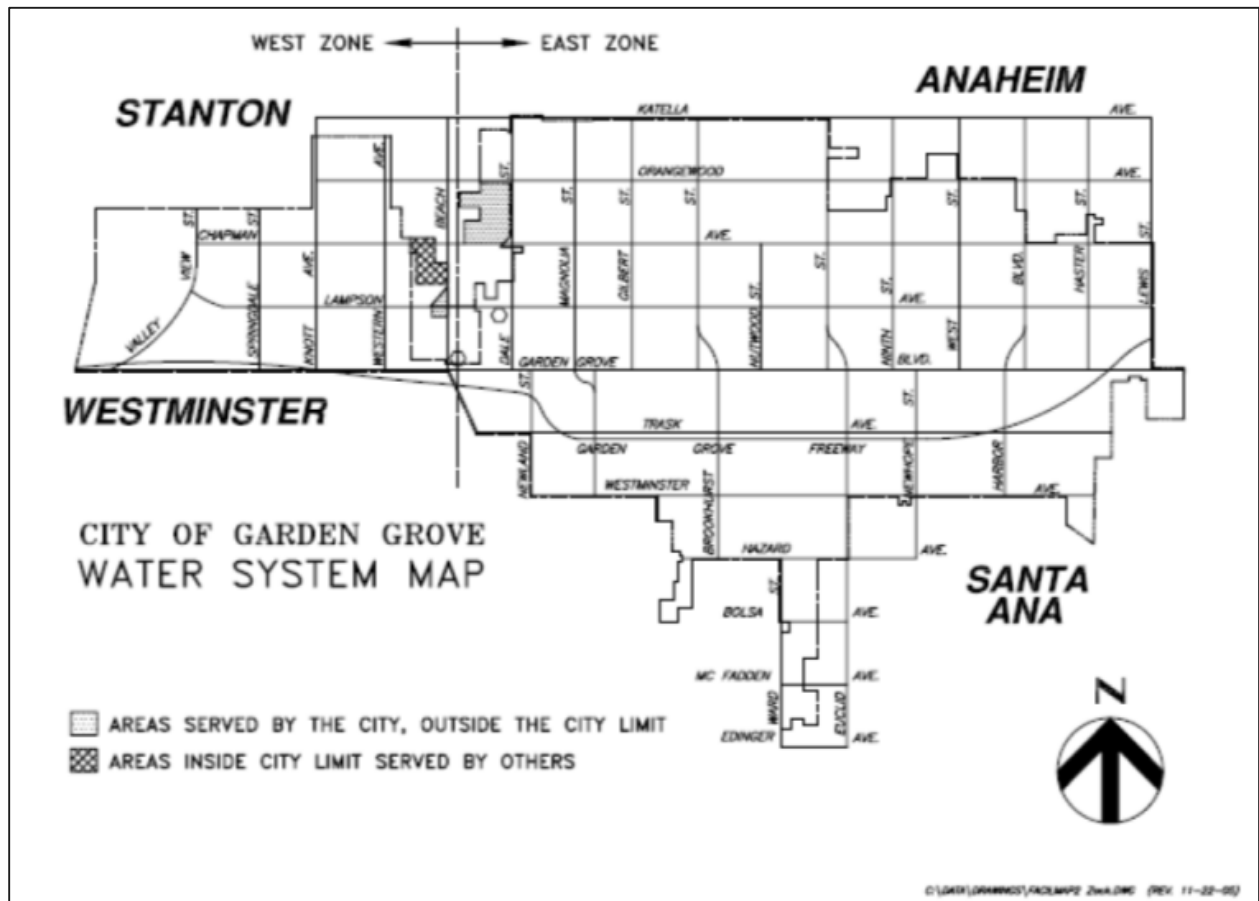


Figure 1-2: City of Garden Grove's Service Area



### 1.3.2 City of Garden Grove Water Facilities

Groundwater is pumped from 11 active wells located throughout the City. MWDOC wholesales imported water to the City from Metropolitan through four imported water connections. Metropolitan treats water supplied to the City at the Diemer Filtration Plant in northern Orange County. The City’s water distribution system is connected to Metropolitan transmission mains at four locations along the northern and eastern sides of the City.

The City also operates eight storage and distribution reservoirs at five sites with a combined capacity of 53 million gallons (MG). The storage volume is the equivalent of more than two days average use and is more than adequate for peaking demands and firefighting needs. The storage system is supported with 17 booster pumps located at the reservoir sites. The booster pumps have a total capacity of 46,600 gallons per minute (gpm), which is more than enough to keep the system pressurized under peak flow conditions. The City also maintains nine emergency interconnections with neighboring water systems.

The City’s distribution system pressures are managed to ensure that water pressure is within acceptable ranges for both domestic use and fire flow demands. Peak demands can be met with combinations of increased pressure rates and water from storage tanks.

The system connections and water volume supplied are summarized in Table 1-3, and the wholesalers informed of this water use as required are displayed in Table 1-4.

**Table 1-3: Public Water Systems**

| <b>Retail Only: Public Water Systems</b> |                          |                                      |                               |
|--|--------------------------|--------------------------------------|-------------------------------|
| Public Water System Number               | Public Water System Name | Number of Municipal Connections 2015 | Volume of Water Supplied 2015 |
| CA3010062                                | City of Garden Grove     | 33,647                               | 24,049                        |
| <b>TOTAL</b>                             |                          | <b>33,647</b>                        | <b>24,049</b>                 |
| NOTES:                                   |                          |                                      |                               |

**Table 1-4: Water Supplier Information Exchange**

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

## 2 DEMANDS

### 2.1 Overview

Since the last UWMP update, southern California's urban water demand has been largely shaped by the efforts to comply with the 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 City has been actively engaged in efforts to reduce water use in its service area to meet the 2015 interim 10 percent reduction and the 2020 final water use target. Meeting this target is critical to ensure the City's eligibility to receive future state water grants and loans.

In April 2015 Governor Brown issued an Emergency Drought Mandate as a result of one of the most severe droughts in California's 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 City 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 20 percent set for the City itself and the Regional Alliance of all participating MWDOC utility agencies (discussed later in Section 2.5).

In addition to local water conservation ordinances, the City has engaged in activities that range from being a signatory member of the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMP) Memorandum of Understanding since 2000 to ongoing water audit and leak detection programs. The City has also partnered with MWDOC on educational programs, indoor retrofits and training.

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

This section analyzes the City's current water demands by customer type, factors that influence those demands, and projections of future water demands for the next 25 years. In addition, to satisfy SBx7-7 requirements, this section provides details of the City'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 City'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 City 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 City. Water that infiltrates into the soil may enter groundwater supplies depending on the local geography. However, due to the large extent of impervious cover in southern California, rainfall runoff quickly flows to a system of concrete storm drains and channels that lead directly to the ocean. OCWD is one agency that has successfully captured stormwater along the Santa Ana River and in recharge basins for years and used it as an additional source of supply for groundwater recharge.

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

### 2.2.2 Demographics

The City has a 2015 population of 176,649 according to the California State University at Fullerton’s Center of Demographics Research (CDR). The City is almost completely built-out, and its population is projected to increase only 2.4 percent by 2040, representing an average growth rate of 0.09 percent per year.

Current and projected growth has decreased slightly since the 2010 UWMP; housing is becoming denser and new residential units are multi-storied within the service area. In the 2010 UWMP, the Brookhurst Triangle Project was slated for development of a residential community on 13.9 acres. That project schedule has changed and was approved in March 2015 by the Garden Grove Planning Commission. The development would create 674-residential units and could begin as early as May 2016. Table 2-1 shows the population projections in five-year increments out to 2040 within the City’s service area.

Table 2-1: Population – Current and Projected

| Retail: Population - Current and Projected  |         |         |         |         |         |         |
|---|---------|---------|---------|---------|---------|---------|
| Population Served   | 2015    | 2020    | 2025    | 2030    | 2035    | 2040    |
|   | 176,649 | 178,729 | 179,440 | 180,428 | 181,002 | 180,825 |
| NOTES: Center for Demographic Research, California State University, Fullerton 2015 |         |         |         |         |         |         |

### 2.2.3 Land Use

The City’s service area can best be described as a predominately single and multi-family residential community located in central Orange County. There are pockets of commercials and tourist catering use within the service area.

## 2.3 Water Use by Customer Type

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

The following sections of this UWMP provide an overview of the City's water consumption by customer account type as follows:

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

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

### 2.3.1 Overview

There are 33,647 current customer active and inactive service connections in the City's water distribution system with all existing connections metered. Approximately 68.5 percent of the City's water demand is residential; commercial, industrial, institutional and governmental accounts for the remaining 31.5 percent of the total demand.

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

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

| Retail: Demands for Potable and Raw Water - Actual   |                                   |               |
|--|-----------------------------------|---------------|
| Use Type   | 2015 Actual                       |               |
|  | Level of Treatment When Delivered | Volume        |
| Single Family  | Drinking Water                    | 11,838        |
| Multi-Family   | Drinking Water                    | 4,625         |
| Institutional/Governmental   | Drinking Water                    | 1,677         |
| Commercial   | Drinking Water                    | 3,280         |
| Industrial   | Drinking Water                    | 1,051         |
| Landscape  | Drinking Water                    | 838           |
| Other  | Drinking Water                    | 3             |
| Losses   | Drinking Water                    | 737           |
| <b>TOTAL</b>   |                                   | <b>24,049</b> |
| NOTES: Data retrieved from MWDOC Customer Class Usage Data and FY 2014-2015 Retail Tracking. |                                   |               |

### 2.3.2 Non-Residential

Non-residential use includes commercial, industrial, institutional and governmental water demands. Institutional/governmental water use accounts for 7 percent of total water demands, commercial accounts for 13.6 percent, industrial accounts for 4.4 percent and dedicated landscape accounts for 3.5 percent of total demand. The City has a mix of commercial uses (markets, restaurants, etc.), public entities (schools, fire stations and government offices), office complexes, light industrial and warehouses.

### 2.3.3 Sales to Other Agencies

The City does not sell water to other agencies although it does maintain emergency interconnections with neighboring systems.

### 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 storage tank overflows), and apparent losses (unauthorized consumption, customer metering inaccuracies and systematic data handling errors).

A water loss audit was conducted per AWWA methodology for the City to understand the relationship between water loss, operating costs 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 City to achieve regulatory standards and manage their existing resources.

### 2.3.4.1 AWWA Water Audit Methodology

There are five data categories that are part of the AWWA Water Audit: 1) Water Supplied 2) Authorized Consumption 3) Water Losses 4) System Data and 5) Cost Data. Data was compiled from questionnaires, invoices, meter test results, and discussion with the City. Each data value has a corresponding validation score that evaluates the City's internal processes associated with that data entry. The scoring scale is 1-10 with 10 representing best practice.

The Water Supplied section represents the volume of water the City delivered from its own sources, purchased imported water, or water that was either exported or sold to another agency. Validation scores for each supply source correspond to meter accuracy and how often the meters are calibrated. If the calibration results of supply meters were provided, a weighted average of errors was calculated for master meter adjustment. This adjustment factor was applied to reported supply volumes for meters that were found to register either over or under the true volume. Validity scores for meter adjustment are based on how often the meter is read and what method is used.

The Authorized Consumption section breaks down consumption of the volume of Water Supplied. Billed metered water is billed and delivered to customers and makes up the majority of an agency's consumption. Billed unmetered water is water that is delivered to a customer for a set fee but the actual quantity of water is not metered. Customer accounts for this type of use are typically determined by utility policy. Unbilled metered water is the volume used and recorded, but the customer is not charged. This volume is typically used for City facilities per City policy. Unbilled unmetered water is authorized use that is neither billed nor metered which typically includes activities such as firefighting, flushing of water mains and sewers, street cleaning, and fire flow testing. The AWWA Water Audit recommends using the default value of 1.25 percent to represent this use, as calculating an accurate volume is often tedious due to the many different components involved and it represents a small portion of the City's overall use. For each consumption type listed above the associated validation score reflects utility policy for customer accounts, frequency of meter testing and replacement, computer-based billing and transition to electronic metering systems.

Water Losses are defined as the difference between the volume of water supplied and the volume of authorized consumption. Water losses are further broken down into apparent and real losses. Apparent losses include unauthorized consumption, customer meter inaccuracies and systematic data handling errors. Default percentages were provided for the Audit by AWWA for unauthorized consumption and systematic data handling error as this data is not often available. The corresponding default validation score assigned is 5 out of 10. A discrete validation score was included for customer meter inaccuracies to represent quality of meter testing records, testing procedures for meter accuracy, meter replacement cycles, and inclusion of new meter technology.

System Data includes information about the City's physical distribution system and customer accounts. The information included is: length of mains, number of active and inactive service connections, location of customer meters in relation to the property line, and the average operating pressure of the system. The number of service connections is automatically divided by the length of mains to find the service connection density of the system. The calculated service connection density determines which

performance indicators best represent a water system's real loss performance. The validity scores in this section relate to the water system's policies and procedures for calculating and documenting the required system data, quality of records kept, integration with an electronic database including GIS and SCADA, and how often this data is verified.

The final section is Cost Data and contains three important financial values related to system operation, customer cost and water production. The total annual cost of operating the water system, customer retail unit cost and the variable production cost per AF are included. The customer retail unit value is applied to the apparent losses to determine lost revenue, while the variable production cost is typically applied to real losses. In water systems with scarce water supplies, a case can be made for real losses to be valued at the retail rate, as this volume of water could be sold to additional customers if it were not lost.] Validity scores for these items consider how often audits of the financial data and supporting documents are compiled and if third-party accounting professionals are part of the process.

Calculations based on the entered and sufficiently valid data produce a series of results that help the City quantify the volume and financial impacts of water loss and facilitate comparison of the City's water loss performance with that of other water systems who have also performed water loss audits using the AWWA methodology. The City's Data Validity Score was 72 out of 100, with a total water loss volume of 909.388 AFY. The Non-Revenue Water volume represents 5.0 percent of the total water supplied by the City. The value of non-revenue water is calculated to be \$1,069,710 per year.

The Infrastructure Leakage Index (ILI) is a performance indicator developed from the ratio of Current Annual Real Losses (CARL) to the Unavoidable Annual Real Losses (UARL). CARL was developed as part of the workbook and explained as real losses above. UARL is developed on a per system basis with an equation based on empirical data, developed by IWA that factors in the length of mains (including fire hydrant laterals), number of service connections, average distance of customer service connection piping between the curb stop and the customer meter and the total length of customer service piping, all multiplied by average system pressure. The City received an ILI score of 0.19 which taken at face value is a very high score and indicates that real losses are well managed. This value suggests that the City's real loss volume is beneath the technically achievable minimum, which is possible but unlikely. This requires further field investigation of leakage if leakage detection and control practices are not extensively implemented and/or, given the Data Validity Score for some components in the Audit, further investigation/confirmation of entries such as water supplied/accuracy of supply meters, accuracy of customer meters, systematic data handling errors, and applicability of the default percentages applied in the audit.

Real losses make up a small portion of the City's total water loss at 9.4 percent; as most of this was developed from default percentages provided by the AWWA Water Audit. Based on this information, the City can improve water loss by taking a closer look at water imported, billed meter, and customer metering inaccuracies. The overall Water Audit score can also be improved by meeting the standards AWWA has developed for each data point through clear City procedures and reliable data.

The result of the AWWA Water Audit completed for the City as required by the 2015 UWMP is summarized in Table 2-4. The water loss summary was calculated over a one-year period from available data and the methodology explained above.

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

| Retail: 12 Month Water Loss Audit Reporting |                         |
|---|-------------------------|
| Reporting Period Start Date<br>(mm/yyyy)    | Volume of Water<br>Loss |
| 01/2015                                     | 909                     |
| 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, Orange County Groundwater Basin (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 City's water demand represents a portion of the Basin region total demand. The City'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 MWDOC for the City as part of the OC Reliability Study. The future demand projections were reviewed and accepted by the City as a basis for the 2015 UWMP.

### 2.4.3 25 Year Projections

A key component of the 2015 UWMP is to provide insight into the City’s future water demand outlook. The City’s current water demand is 24,049 AFY, met through locally pumped groundwater and purchased imported water from MWDOC. Table 2-4 is a projection of the City’s water demand for the next 25 years.

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

| Retail: Demands for Potable and Raw Water - Projected   |  |               |               |               |               |
|---|--|---------------|---------------|---------------|---------------|
| Use Type  | Projected Water Use                                    |               |               |               |               |
|   | <i>Report To the Extent that Records are Available</i> |               |               |               |               |
|   | 2020   | 2025          | 2030          | 2035          | 2040          |
| Single Family   | 11,852   | 12,723        | 12,810        | 12,807        | 12,825        |
| Multi-Family  | 4,631  | 4,971         | 5,005         | 5,003         | 5,011         |
| Institutional/Governmental  | 1,679  | 1,802         | 1,815         | 1,814         | 1,817         |
| Commercial  | 3,284  | 3,525         | 3,549         | 3,548         | 3,554         |
| Industrial  | 1,052  | 1,130         | 1,137         | 1,137         | 1,139         |
| Landscape   | 839  | 901           | 907           | 907           | 908           |
| Other   | 3  | 3             | 3             | 3             | 3             |
| Losses  | 738  | 792           | 798           | 797           | 798           |
| <b>TOTAL</b>  | <b>24,078</b>  | <b>25,847</b> | <b>26,024</b> | <b>26,017</b> | <b>26,055</b> |
| NOTES: Data retrieved from MWDOC Customer Class Usage Data and Retail Water Agency Projections. |  |               |               |               |               |

The above demand values were provided by MWDOC and reviewed by the City as part of the UWMP effort. As the regional wholesale supplier for much of Orange County, MWDOC works in collaboration with each of its retail agencies as well as Metropolitan, its wholesaler, to develop demand projections for imported water. The City 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 2-5: Inclusion in Water Use Projections

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

The demand data presented in this section accounts for passive savings in the future. Passive savings are water savings as a result of codes, standards, ordinances 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 Total Water Demand Projections

Based on the information provided above, the total demand for potable water is listed below in Table 2-6. The City has no plans to provide recycled water in its service area.

Table 2-6: Total Water Demands (AF)

| Retail: Total Water Demands |        |        |        |        |        |        |
|-----------------------------|--------|--------|--------|--------|--------|--------|
|                             | 2015   | 2020   | 2025   | 2030   | 2035   | 2040   |
| Potable and Raw Water       | 24,049 | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| Recycled Water Demand       | 0      | 0      | 0      | 0      | 0      | 0      |
| <b>TOTAL WATER DEMAND</b>   | 24,049 | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| NOTES:                      |        |        |        |        |        |        |

### 2.4.5 Water Use for Lower Income Households

Since 2010, the UWMP Act has required retail water suppliers to include water use projections for single-family and multi-family residential housing for lower income and affordable households. This will assist the City 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 City'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 City 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). The report gives the household distribution for all households of various

income levels in the City which can be seen in Table 2-7. Altogether the City has 48.75 percent low income housing (SCAG, RHNA, November 2013).

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

| Number of Households by Income |               |
|--------------------------------|---------------|
| Extremely Low Income           | 7,220         |
| Very Low Income                | 6,327         |
| Lower Income                   | 8,468         |
| Moderate Income                | 9,337         |
| Above Moderate Income          | 13,805        |
| <b>Total Households</b>        | <b>45,157</b> |

Table 2-8 provides a breakdown of the projected water needs for low income single family and multifamily units. The projected water demands shown here represent 48.75 percent of the projected water demand for the single-family and multifamily categories provided in Table 2-4 above. For example, the total low income single family residential demand is projected to be 5,778 AFY in 2020 and 6,252 AFY in 2040.

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

| Low Income Water Use                        |                    |        |        |        |        |
|---|--------------------|--------|--------|--------|--------|
| Water Use Sector                            | Fiscal Year Ending |        |        |        |        |
|   | 2020               | 2025   | 2030   | 2035   | 2040   |
| Total Residential Demand                    | 16,483             | 17,694 | 17,815 | 17,810 | 17,836 |
| SF Residential Demand-Low Income Households | 5,778              | 6,203  | 6,245  | 6,243  | 6,252  |
| MF Residential Demand-Low Income Households | 2,257              | 2,423  | 2,440  | 2,439  | 2,443  |
| Total Low Income Households Demand          | 8,035              | 8,626  | 8,685  | 8,682  | 8,695  |

## 2.5 SBx7-7 Requirements

The Water Conservation Act of 2009, also known as Senate Bill (SB) x7-7, signed into law on February 3, 2010, requires the State of California to reduce urban water use by 20 percent by the year 2020. The City must determine baseline water use during their baseline period and water use targets for the years 2015 and 2020 to meet the state’s water reduction goal. The City 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 City is still required to report its individual water use targets. The City 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 City 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 City 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 City's gross water use divided by its service area population, reported in gallons per capita per day (GPCD). Gross water use is a measure of water that enters the distribution system of the supplier over a 12-month period with certain allowable exclusions. These exclusions are:

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

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

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

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

The first step to calculating the City'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. Recycled water use was less than 10 percent of the City's retail delivery in 2008; therefore, a 10-year baseline period is used.

The City's baseline water use is 163 GPCD, obtained from the 10-year period July 1, 1996 to June 30, 2005.

#### **2.5.1.2 Five-Year Baseline Period (Target Confirmation)**

Water suppliers are required to calculate water use, in GPCD, for a five-year baseline period. This number is used to confirm that the selected 2020 target meets the minimum water use reduction requirements. Regardless of the compliance option adopted by the City, 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 City's five-year baseline water use is 156 GPCD, obtained from the five-year period July 1, 2003 to June 30, 2008.

### 2.5.1.3 Service Area Population

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

## 2.5.2 SBx7-7 Water Use Targets

In the 2015 UWMP, the City 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 City is required to adopt one of the four options to comply with SBx7-7 requirements. The four options include:

- *Option 1* requires a simple 20 percent reduction from the baseline by 2020 and 10 percent by 2015.
- *Option 2* employs a budget-based approach by requiring an agency to achieve a performance standard based on three metrics
  - Residential indoor water use of 55 GPCD
  - Landscape water use commensurate with the Model Landscape Ordinance
  - 10 percent reduction in baseline commercial/industrial/institutional (CII) water use
- *Option 3* is to achieve 95 percent of the applicable state hydrologic region target as set forth in the State's 20x2020 Water Conservation Plan.
- *Option 4* requires the subtraction of Total Savings from the baseline GPCD:
  - 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 City's base daily per capita use and water use targets, the City selected to comply with Option 3 consistent with the option selected in 2010.

### 2.5.2.2 2015 and 2020 Targets

Under Compliance Option 3, to achieve 95 percent of the South Coast Hydrologic Region target as set forth in the State's 20x2020 Water Conservation Plan, the City's 2015 target is 153 GPCD and the 2020 target is 142 GPCD as summarized in Table 2-9. The 2015 target is the midway value between the 10-

year baseline and the confirmed 2020 target. In addition, the confirmed 2020 target needs to meet a minimum of 5 percent reduction from the five-year baseline water use.

**Table 2-9: Baselines and Targets Summary**

| <b>Baselines and Targets Summary</b>                 |            |          |                        |                       |                        |
|--|------------|----------|------------------------|-----------------------|------------------------|
| <i>Retail Agency</i>                                 |            |          |                        |                       |                        |
| Baseline Period                                      | Start Year | End Year | Average Baseline GPCD* | 2015 Interim Target * | Confirmed 2020 Target* |
| 10-15 year   | 1996       | 2005     | 163                    | 153                   | 142                    |
| 5 Year   | 2004       | 2008     | 156                    |                       |                        |
| *All values are in Gallons per Capita per Day (GPCD) |            |          |                        |                       |                        |
| NOTES:   |            |          |                        |                       |                        |

Table 2-10 compares the City's 2015 water use target to its actual 2015 consumption. Based on this comparison, the City is in compliance with its 2015 interim target and has already met the 2020 water use target.

**Table 2-10: 2015 Compliance**

| <b>2015 Compliance</b>                               |                          |                                    |   |
|--|--------------------------|------------------------------------|---|
| <i>Retail Agency</i>                                 |                          |                                    |   |
| Actual 2015 GPCD                                     | 2015 Interim Target GPCD | 2015 GPCD (Adjusted if applicable) | Did Supplier Achieve Targeted Reduction for 2015? Y/N |
| 102  | 153                      | 102                                | 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.

## 2015 URBAN WATER MANAGEMENT PLAN

The City 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.

### 3 WATER SOURCES AND SUPPLY RELIABILITY

#### 3.1 Overview

The City relies on a combination of imported water and local groundwater to meet its water needs. The City 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 CRA and the SWP provided by Metropolitan and delivered through MWDOC.

The City’s main source of water supply is groundwater from the Lower Santa Ana River Groundwater Basin, also known as the OC Basin. Currently, the City relies on approximately 70 percent groundwater and 30 percent imported and the water supply mix is projected to remain roughly the same by 2040. The City’s projected water supply portfolio is shown on Figure 3-1.

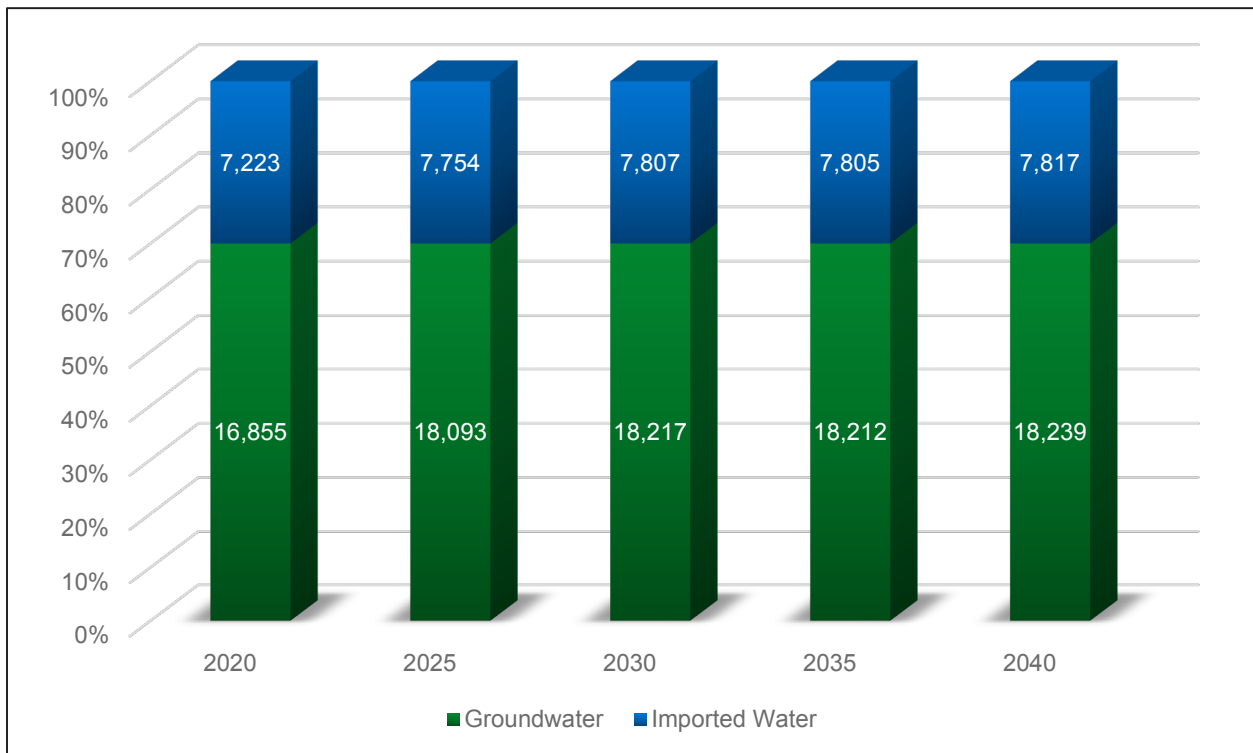


Figure 3-1: Water Supply Sources in the City (AF)

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



## 3.2 Imported Water

The City supplements its local groundwater with imported water purchased from Metropolitan through MWDOC. The City currently relies on 6,640 AFY of imported water purchased wholesale from Metropolitan. 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 City currently maintains four connections to the Metropolitan system along the Orange County Feeder with a total available capacity of 66 cubic feet per second (cfs).

The West Orange County Water Board (WOCWB), a Joint Powers Agency, manages surface water deliveries from Metropolitan to five (5) of its member agencies. These member agencies are the Cities of Garden Grove, Fountain Valley (no voting rights), Huntington Beach, Westminster, and Seal Beach. WOCWB oversees the maintenance of two (2) feeder pipelines that connect to the treated surface water supply. These pipelines have a capacity of 21 cfs and 45 cfs. Each of the member agencies has contributed to the capital cost for the capacity of the feeder pipelines and directly pays MWDOC for the use of water.

### 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 exist (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 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 essentially unused Table A water. Turnback pool water is able to 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 of 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                                    |
| <b>Percent Change</b> | <b>-11.7%</b>                      | <b>-9.4%</b>                            |

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 biological opinions 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 City. The City has four active wells that draw water from the OC Basin.

### **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's boundary extends to the Orange County-Los Angeles Line to the northwest, where groundwater flows across the county line into the Central Groundwater Basin of Los Angeles County. The total thickness of sedimentary rocks in the OC Basin is over 20,000 feet, with only the upper 2,000 to 4,000 feet containing fresh water. The Pleistocene or younger aquifers comprising this Basin are over 2,000 feet deep and form a complex series of interconnected sand and gravel deposits. The OC Basin's full volume is approximately 66 MAF.

There are three major aquifer systems that have been subdivided by OCWD, the Shallow Aquifer System, the Principal Aquifer System, and the Deep Aquifer System. These three aquifer systems are hydraulically connected as groundwater is able to flow between each other through intervening aquitards or discontinuities in the aquitards. The Shallow Aquifer system occurs from the surface to approximately 250 feet below ground surface. Most of the groundwater from this aquifer system is pumped by small water systems for industrial and agricultural use. The Principal Aquifer system occurs at depths between 200 and 1,300 feet below ground surface. Over 90 percent of groundwater production is from wells that

are screened within the Principal Aquifer system. Only a minor amount of groundwater is pumped from the Deep Aquifer system, which underlies the Principal Aquifer system and is up to 2,000 feet deep in the center of the OC Basin. The three major aquifer systems are shown on Figure 3-2.

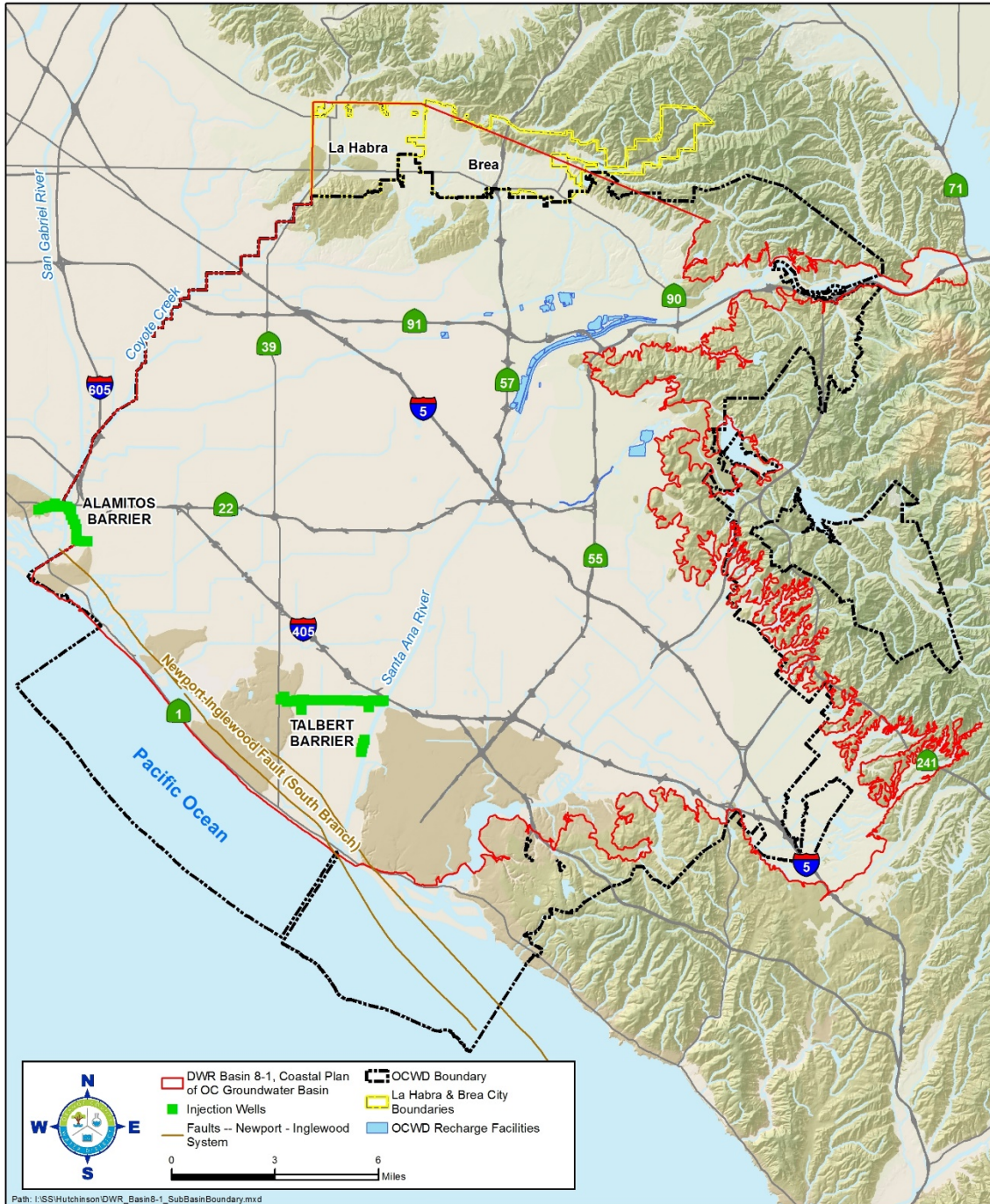


Figure 3-2: Map of the Orange County Groundwater Basin and its Major Aquifer Systems



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

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

### **3.3.2 Basin Production Percentage**

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

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

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

#### **3.3.2.1 2015 OCWD Groundwater Management Plan**

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

toward achieving and maintaining a 75 percent BPP by FY 2015-16. Although BPP is set at 75 percent, based on discussions with OCWD a conservative BPP of 70 percent is assumed through 2040. Principles of this policy include:

- OCWD's goal is to achieve a stable 75 percent BPP, while maintaining the same process of setting the BPP on an annual basis, with the BPP set in April of each year after a public hearing has been held and based upon the public hearing testimony, presented data, and reports provided at that time.
- OCWD 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 OC Basin's storage levels would be managed in accordance to the 75 percent BPP policy. It is presumed that the BPP will not decrease as long as the storage levels are between 100,000 and 300,000 AF from full capacity. If the OC Basin is less than 100,000 AF below full capacity, the BPP will be raised. If the OC Basin is over 350,000 AF below full capacity, additional supplies will be sought after to refill the OC Basin and the BPP will be lowered.

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

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

### 3.3.2.2 OCWD Engineer's Report

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

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

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

In FY 2015-16 additional production of approximately 22,000 AF above the BPP will be undertaken by the City of Tustin, City of Garden Grove, Mesa Water District, and Irvine Ranch Water District. 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 with OCWD

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 Groundwater Historical Extraction

The City pumps groundwater through its four wells. Pumping limitations set by the BPP and the pumping capacity of the wells are the only constraints affecting the groundwater supply to the City. A summary of the groundwater volume pumped by the City is shown in Table 3-2.

Table 3-2: Groundwater Volume Pumped (AF)

| Retail: Groundwater Volume Pumped |                                 |               |               |               |               |               |
|-----------------------------------|---------------------------------|---------------|---------------|---------------|---------------|---------------|
| Groundwater Type                  | Location or Basin Name          | 2011          | 2012          | 2013          | 2014          | 2015          |
| Alluvial Basin                    | Orange County Groundwater Basin | 15,005        | 15,231        | 18,911        | 21,025        | 17,408        |
| <b>TOTAL</b>                      |                                 | <b>15,005</b> | <b>15,231</b> | <b>18,911</b> | <b>21,025</b> | <b>17,408</b> |
| NOTES:                            |                                 |               |               |               |               |               |

### 3.3.7 Overdraft Conditions

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

The annual analysis of basin storage change and accumulated overdraft for water year 2013-14 has been completed. Based on the three-layer methodology, an accumulated overdraft of 342,000 AF was calculated for the water year ending June 30, 2014. The accumulated overdraft for the water year ending June 30, 2013 was 242,000 AF, which was also calculated using the three-layer storage method. Therefore, an annual decrease of 100,000 AF in stored groundwater was calculated as the difference between the June 2013 and June 2014 accumulated overdrafts (OCWD, 2013-2014 Engineer’s Report, February 2015).

## 3.4 Summary of Existing and Planned Sources of Water

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

Table 3-3: 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   | 17,408        | Drinking Water |
| Purchased or Imported Water     | MWDOC                             | 6,640         | Drinking Water |
| <b>Total</b>                    |                                   | <b>24,049</b> |                |
| NOTES:                          |                                   |               |                |

2015 URBAN WATER MANAGEMENT PLAN

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

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

| <b>Retail: Water Supplies — Projected</b> |                                   |   |                             |                             |                             |                             |
|---|-----------------------------------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Water Supply                              | Additional Detail on Water Supply | Projected Water Supply<br><i>Report To the Extent Practicable</i> |                             |                             |                             |                             |
|   |                                   | 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   | 16,855  | 18,093                      | 18,217                      | 18,212                      | 18,239                      |
| Purchased or Imported Water               | MWDOC                             | 7,223   | 7,754                       | 7,807                       | 7,805                       | 7,817                       |
| <b>Total</b>                              |                                   | <b>24,078</b>   | <b>25,847</b>               | <b>26,024</b>               | <b>26,017</b>               | <b>26,055</b>               |
| NOTES:                                    |                                   |   |                             |                             |                             |                             |

## 3.5 Recycled Water

The City does not own or operate any wastewater or recycled water facilities. More information concerning how the City handles its wastewater can be found in Section 6.

## 3.6 Supply Reliability

### 3.6.1 Overview

Every urban water supplier is required to assess the reliability of their water service to its customers under normal, dry, and multiple dry water years. The City 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 numerous local augment the reliability of the imported water system. There are various factors that may impact reliability of supplies such as legal, environmental, water quality and climatic which are discussed below. The water supplies are projected to meet full-service demands; Metropolitan's 2015 UWMP finds that Metropolitan is able to meet, full-service demands of its member agencies starting 2020 through 2040 during normal years, single dry year, and multiple dry years.

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

### 3.6.2 Factors Impacting Reliability

The Act requires a description of water supply reliability and vulnerability to seasonal or climatic shortage. 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 Cities of Irvine, Tustin, Yorba Linda, Anaheim, and Fullerton. There is also a broad area in the central portion of the OC Basin where TDS ranges from 500 to 700 mg/L. Sources of TDS include the water supplies used to recharge the OC Basin and from onsite



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

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

Although water from the Deep Aquifer System is of very high quality, it is amber-colored and contains a sulfuric odor due to buried natural organic material. These 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 emphasis on storage is needed in the State of California.

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

Legal, 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 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 City is 100 percent reliable for normal year demands from 2020 through 2040. The City 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 City from existing water transmission facilities. The demand and supplies listed below also include local

groundwater supplies that are available to the City through OCWD by a pre-determined pumping percentage.

### **3.6.4 Single-Dry Year Reliability Comparison**

A single-dry year is defined as a single year of no to minimal rainfall within a period that average precipitation is expected to occur. The water demand forecasting model developed for the 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). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the OC Basin area where the City'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.

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

### **3.6.5 Multiple-Dry Year Period Reliability Comparison**

Multiple-dry years are defined as three or more consecutive years with minimal rainfall within a period of average precipitation. The water demand forecasting model developed for the 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). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the OC Basin area where the City's service area is located (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016). It is conservatively assumed that a three-year multi dry year scenario is a repeat of the single dry year over three consecutive years (FY 2011-12 through FY 2013-14).

The City is capable of meeting all customers' demands with significant reserves held by Metropolitan, local groundwater supplies, and conservation in multiple dry years from 2020 through 2040 with a demand increase of six percent from normal demand with significant reserves held by Metropolitan, local groundwater supplies, and conservation. The basis of the water year is displayed in Table 3-5.

Table 3-5: Basis of Water Year Data

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

### 3.7 Supply and Demand Assessment

A comparison between the supply and demand for projected years between 2020 and 2040 is shown in Table 3-6. As stated above, the available supply will meet projected demand due to diversified supply and conservation measures.

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

| Retail: Normal Year Supply and Demand Comparison |        |        |        |        |        |
|--|--------|--------|--------|--------|--------|
|  | 2020   | 2025   | 2030   | 2035   | 2040   |
| Supply totals                                    | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| Demand totals                                    | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| Difference                                       | 0      | 0      | 0      | 0      | 0      |
| NOTES:   |        |        |        |        |        |

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

Table 3-7: Single Dry Year Supply and Demand Comparison (AF)

| Retail: Single Dry Year Supply and Demand Comparison |        |        |        |        |        |
|--|--------|--------|--------|--------|--------|
|  | 2020   | 2025   | 2030   | 2035   | 2040   |
| Supply totals  | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
| Demand totals  | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
| Difference   | 0      | 0      | 0      | 0      | 0      |
| NOTES: Developed by MWDOC as 2015 Bump Methodology   |        |        |        |        |        |

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

Table 3-8: 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 | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|   | Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|   | Difference    | 0      | 0      | 0      | 0      | 0      |
| Second year   | Supply totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|   | Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|   | Difference    | 0      | 0      | 0      | 0      | 0      |
| Third year  | Supply totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|   | Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|   | Difference    | 0      | 0      | 0      | 0      | 0      |
| NOTES: Developed by MWDOC as 2015 Bump Methodology      |               |        |        |        |        |        |

## 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 City the requirements changed from having 14 specific measures to six more general requirements plus an “other” category.

### 4.1 Water Waste Prevention Ordinances

City Council adopted the Ordinance No. 2858 in 2015 to amend and update the City’s Water Conservation Program provisions in Chapter 40 of title 14 of the Garden Grove Municipal Code to facilitate the implementation of 2014 and 2015 State-mandated water conservation requirements and regulations in response to the drought conditions.

Ordinance No. 2858 established a mandatory permanent water conservation requirements and prohibition against waste that are effective at all times and is not dependent upon a water shortage for implementation as follows. The 2015 amendments are shown in italics.

- Limits on watering hours
- Limit on watering duration
- No water flow or runoff
- No washing down hard or paved surfaces
- No washing of vehicles with hose
- *No watering during or within 48 hours after measureable rainfalls*
- *Irrigation of landscapes outside of newly constructed homes and buildings must comply with regulations established by the California Building Standards Commission and the Department of Housing and Community Development*
- *Commercial lodging establishments must provide customers the option of not having towels and linen laundered daily*
- Obligation to fix leaks, breaks, or malfunctions
- Recirculating water required for water fountains and decorative water features
- No installation of single pass cooling systems
- No installation of non-recirculating systems in commercial car wash and laundry operations

In an event of a water supply shortage, the ordinance established provisions for four stages of response associated with increasingly restrictive prohibitions from Stage 1 Water Watch to Stage 4 Water Emergency (severe drought and/or major failure of any supply or distribution system). The provisions and

water conservation measures to be implemented in response to each shortage level are described in Section 5 of the UWMP. The City's water conservation ordinance is included in Appendix D.

### 4.2 Metering

The City meters all service connections and bills its customers bi-monthly based on water consumption.

Testing and calibration of the supply source meters, large customer meter test and repair programs, adding meters to City facilities, and residential meter change-out programs are components of the City's water loss prevention program. The City requires meters for all new connections as well as dedicated irrigation meters. Although the City does not have a formal meter calibration program, meters are calibrated on an as-needed basis. Furthermore, the City employs an Advanced Metering Infrastructure (AMI) program within its service area.

### 4.3 Conservation Pricing

The City has an inclining tiered-rate structure for water service rates as an incentive to encourage customers to conserve water. The rate structure includes a fixed bimonthly minimum charge and capital improvements charge determined by meter size and a commodity charge comprised of four tiers applicable to each hundred cubic feet of billed water sales. The first tier captures efficient and essential water users. The last tier is termed "excess" representing the portion that the City determined to be an excessive water usage. In FY 10/11, approximately 80 percent of residents remain in the first tier, which demonstrates the effectiveness of this rate structure by successfully deterring residents from excessive consumption. Other charges may include a service connection charge when adding in new customers to the water system, temporary service charges, fire protection charges and other charges related to services provided by the City.

### 4.4 Public Education and Outreach

The City'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](http://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 Colorado River Aqueduct, 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.

### **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 City which identified areas for improvement and quantified total loss. Based on the data presented, the three priority areas identified were customer metering inaccuracies, billed metered, and water imported. Multiple criteria are a part of each validity score and a system wide approach will need to be implemented for the City's improvement. Quantified water loss for the FY 2014-15 was 909 AF which is a significant volume and presents opportunities for improvement.

The City has an ongoing leak detection, location and repair program to minimize water loss. The following measures are being implemented: testing and calibration of the supply source meters, large customer meter test and repair programs, large meter right-sizing programs, adding meters to City facilities, increases in pipe repair or replacement, residential meter change-out programs. Reported customer leaks are corrected in a timely manner. City employees frequently check for leaks while reading meters, rehabilitating streets, and in the field performing other maintenance activities.

The City does not have a formal leak detection and repair program but repairs leaks on an as-needed basis.

### **4.6 Water Conservation Program Coordination and Staffing Support**

The City has two designated water conservation coordinators that include one full time senior administrative analyst and one part time administrative intern. These staff members' duties include the following:

- Coordinating and managing all water conservation programs and BMP implementation
- Preparing and submitting the Council's BMP implementation Report
- Conveying water conservation issues to management
- Coordinating conservation programs with operations and planning staff
- Developing an annual conservation budget to implement outreach programs
- Preparing the conservation section of the City's Urban Water Management Plan

The City funds the water conservation program through their water budget.

## 4.7 Other Demand Management Measures

During the past five years, FY 2010-11 to 2014-15, the City, 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 City 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](http://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 City 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 (WBIC) or soil moisture sensor systems. WBICs adjust automatically to reflect changes in local weather and site-specific landscape needs, such as soil type, slopes, and plant material. When WBICs are programmed properly, turf and plants receive the proper amount of water throughout the year. During the fall months, when property owners and landscape professionals often overwater, Smart Timers can save significant amounts of water.

### **Rotating Nozzles Rebate Program**

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

### **Spray to Drip Rebate Program**

The Spray to Drip Pilot Rebate Program offers residential and commercial customers rebates for converting planting areas irrigated by spray heads to drip irrigation. Drip irrigation systems are very water-efficient. Rather than spraying wide areas, drip systems use point emitters to deliver water to specific

locations at or near plant root zones. Water drips slowly from the emitters either onto the soil surface or below ground. As a result, less water is lost to wind and evaporation.

**Socal Water\$mart Rebate Program for Landscape**

The City 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, MWDOC, and the City 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.

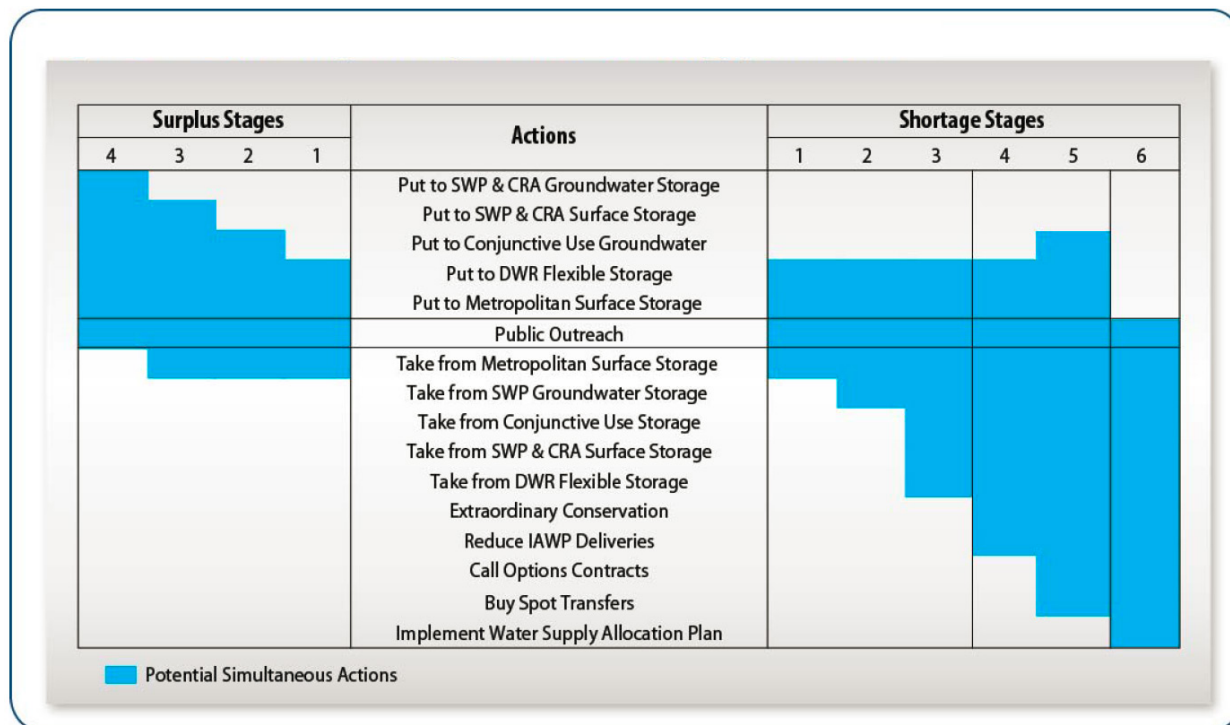


Figure 5-1: Resource Stages, Anticipated Actions, and Supply Declarations

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 and 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 FY 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 28 retail agencies to develop its own WSAP that was adopted in January 2009 and amended in 2015. The MWDOC WSAP outlines how MWDOC will determine and implement each of its retail agency's allocation during a time of shortage.

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

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

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

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

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

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

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

- **Appeal Process** – An appeals process to provide retail agencies the opportunity to request a change to their allocation based on new or corrected information. MWDOC anticipates that under most circumstances, a retail agency's appeal will be the basis for an appeal to Metropolitan by MWDOC.
- **Melded Allocation Surcharge Structure** – At the end of the allocation year, MWDOC would only charge an allocation surcharge to each retail agency that exceeded their allocation if MWDOC exceeds its total allocation and is required to pay a surcharge to Metropolitan. Metropolitan enforces allocations to retail agencies through an allocation surcharge to a retail agency that exceeds its total annual allocation at the end of the 12-month allocation period. MWDOC's surcharge would be assessed according to the retail agency's prorated share (AF over usage) of MWDOC amount with



Metropolitan. Surcharge funds collected by Metropolitan will be invested in its Water Management Fund, which is used to in part to fund expenditures in dry-year conservation and local resource development.

- Tracking and Reporting Water Usage – MWDOC will provide each retail agency with water use monthly reports that will compare each retail agency’s current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on 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 City of Garden Grove

City Council adopted Water Conservation Ordinance No. 2858 on June 23, 2015, which established a staged water conservation program that will encourage reduced water consumption within the City through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, and maximize the efficient use of water within the City. Along with permanent water conservation requirements, the City’s Water Conservation Program consists of four stages to respond to a reduction in potable water available to the City for distribution to its customers. A summary of the stages of water shortage is displayed in Table 5-1 (Garden Grove, Ordinance Number 2858, June 2015). The City does not have set percent supply reduction for each water shortage stage. The City will implement the percent supply reduction on its own discretion as it enters into a water shortage stage.

Table 5-1: Stages of Water Shortage Contingency Plan

| Retail Stages of Water Shortage Contingency Plan |                          |   |
|--|--------------------------|---|
| Stage  | Complete Both            |   |
|  | Percent Supply Reduction | Water Supply Condition  |
| 1  | -                        | Times of regional drought when the City assists in overall water conservation and water consumption reduction                     |
| 2  | -                        | Periods when the City determines water supply shortage or threatened shortage exists and a consumer demand reduction is necessary |
| 3  | -                        | Periods when there is a critical differential between supply and demand   |
| 4  | -                        | Period of severe drought and/or when a major failure of any supply or distribution facility occurs in water distribution systems  |
| NOTES: Percent supply reduction unavailable      |                          |   |

### 5.3 Three-Year Minimum Water Supply

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

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

As an alternative to invoking preferential rights, Metropolitan and its member agencies accepted the terms and conditions of Metropolitan’s shortage allocation plan, which allocated imported water under limited supply conditions. In fact, in FY 2015-2016, Metropolitan implemented its WSAP at a stage level 3 (seeking no greater than a 15 percent regional reduction of water use), which is the largest reduction Metropolitan has ever imposed on its member agencies. This WSAP level 3 reduction was determined when Metropolitan water supplies from the SWP was at its lowest levels ever delivered and water storage declined greater than 1 MAF in one year.

MWDOC has adopted a shortage allocation plan and accompanying allocation model that estimates firm demands on MWDOC. Assuming MWDOC would not be imposing mandatory restrictions if Metropolitan is not, the estimate of firm demands in MWDOC’s latest allocation model has been used to estimate the minimum imported supplies available to each of MWDOC’s retail agencies for 2015-2018. Thus, the estimate of the minimum imported supplies available to the City is 26,081 AF as shown in Table 5-2 (MWDOC, Water Shortage Allocation Model, November 2015).

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

| Retail: Minimum Supply Next Three Years |        |        |        |
|---|--------|--------|--------|
|   | 2016   | 2017   | 2018   |
| Available Water Supply                  | 26,081 | 26,081 | 26,081 |
| NOTES:                                  |        |        |        |

### 5.4 Catastrophic Supply Interruption

Given the great distances that imported supplies travel to reach Orange County, the region is vulnerable to interruptions along hundreds of miles aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, the infrastructure in place to deliver supplies are susceptible to damage from earthquakes and other disasters.

### **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 City.

### **5.4.3 City of Garden Grove**

A water shortage emergency could be the result of a catastrophic event such as result of drought, failures of transmission facilities, a regional power outage, earthquake, flooding, supply contamination from chemical spills, or other adverse conditions. The City maintains and exercises a comprehensive Emergency Management Program for such emergencies including Water Shortage Emergency Response. The Water Services Division of the Public Works Department is responsible for water operations and maintenance of the Water & Wastewater section of the City Emergency Management Plan.

The Water Services Division will operate under normal operating procedures until a situation is beyond its control. This includes implementation of any allocation plan passed through by MWDOC for Metropolitan and OCWD water shortage contingency plans.

If the situation is beyond the Water Services Division's control, the Water Emergency Operations Center (WOC) may be activated to better manage the situation. If the situation warrants, the City Emergency Operations Center (EOC) may be activated, at which time a water representative will be sent to the EOC to coordinate water emergency response with all other City department's emergency response.

In the event the EOC is activated, the City Management Policy Group will set priorities. When the EOC is activated, the WOC will take its direction from the EOC. An EOC Action Plan will be developed in the EOC that will carry out the policies dictated by the Policy Group. The WOC will use the EOC Action Plan in determining its course of action. Coordination between the WOC and the EOC will be done by the Water Services Manager in the WOC and the Operations Section Chief located in the EOC.

If the situation is beyond the Water Division's and the City's control, additional assistance will be sought through coordination with WEROC.

## 5.5 Prohibitions, Penalties and Consumption Reduction Methods

### 5.5.1 Prohibitions

The Water Conservation Ordinance No. 1586 lists water conservation requirements which shall take effect upon implementation by the City Council. These prohibitions shall promote the efficient use of water, reduce or eliminate water waste, complement the City's Water Quality regulations and urban runoff reduction efforts, and enable implementation of the City's Water Shortage Contingency Measures.

Water conservation measures become more restrictive per each progressive stage in order to address the increasing differential between the water supply and demand.

A list of restrictions and prohibitions that are applicable to each stage is displayed in Table 5-3.

Table 5-3: Restrictions and Prohibitions on End Uses

| Retail Only: Restrictions and Prohibitions on End Uses |   |   |  |
|--|---|---|--|
| Stage  | Restrictions and Prohibitions on End Users  | Additional Explanation or Reference   | Penalty, Charge, or Other Enforcement? |
| Permanent Year-Round                                   | Landscape - Limit landscape irrigation to specific times                                    | Irrigation limited to once every other day and prohibited between 10:00 a.m. and 5:00 p.m. on any day   | No                                     |
| Permanent Year-Round                                   | Landscape - Other landscape restriction or prohibition                                      | Irrigation with a watering device not continuously attended limited to no more than fifteen minutes watering per day per station. This does not apply to very low-flow drip type irrigation systems | No                                     |
| Permanent Year-Round                                   | Other - Prohibit use of potable water for washing hard surfaces                             | -   | No                                     |
| Permanent Year-Round                                   | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | -   | No                                     |

| Retail Only: Restrictions and Prohibitions on End Uses |   |  |  |
|--|---|--|--|
| Stage  | Restrictions and Prohibitions on End Users  | Additional Explanation or Reference  | Penalty, Charge, or Other Enforcement? |
| Permanent Year-Round                                   | Other   | No watering during or within 48 hours after measurable rainfall  | No                                     |
| Permanent Year-Round                                   | Landscape - Prohibit certain types of landscape irrigation                                  | Irrigation of landscapes outside of newly constructed homes and buildings must comply with regulations established by the California Building Standards Commission and the Department of Housing and Community Development | No                                     |
| Permanent Year-Round                                   | CII - Lodging establishment must offer opt out of linen service                             | -  | No                                     |
| Permanent Year-Round                                   | Other - Customers must repair leaks, breaks, and malfunctions in a timely manner            | Leaks, breaks, and other malfunctions must be corrected within seven days of receiving notice from the City  | No                                     |
| Permanent Year-Round                                   | Water Features - Restrict water use for decorative water features, such as fountains        | Operating a water fountain or other decorative water feature that does not use recirculated water is prohibited  | No                                     |
| Permanent Year-Round                                   | Other   | Installation of single pass cooling systems is prohibited in buildings requesting new water service  | No                                     |
| Permanent Year-Round                                   | Other   | Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry operations.  | No                                     |
| 1  | Landscape - Limit landscape irrigation to specific times                                    | Irrigation limited to once every other day and prohibited between 10:00 a.m. and 5:00 p.m. on any day  | No                                     |
| 1  | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Washing automobiles limited to once every other day except at commercial car wash establishments   | No                                     |
| 1  | Pools and Spas - Require covers for pools and spas  | -  | No                                     |

| Retail Only: Restrictions and Prohibitions on End Uses |   |  |  |
|--|---|--|--|
| Stage  | Restrictions and Prohibitions on End Users  | Additional Explanation or Reference  | Penalty, Charge, or Other Enforcement? |
| 1  | CII - Restaurants may only serve water upon request   | -  | No                                     |
| 2  | Other   | Fire hydrant use limited to fire-fighting, system testing, and other construction activities or for other activities necessary to maintain public health, safety, and welfare                        | Yes                                    |
| 2  | Landscape - Limit landscape irrigation to specific days                                     | Irrigation permitted only on Tuesdays and Saturdays and prohibited between 10:00 a.m. and 5:00 p.m. on any day   | Yes                                    |
| 2  | Landscape - Prohibit certain types of landscape irrigation                                  | Agricultural users and commercial nurseries are exempt from Stage 2 water restrictions but required to curtail all non-essential water use.  | Yes                                    |
| 2  | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Washing automobiles permitted with use of hand-held bucket or similar container or at commercial car washes.   | Yes                                    |
| 2  | Landscape - Limit landscape irrigation to specific days                                     | Watering of golf course and recreational fields permitted only on Tuesdays and Saturday before the hours of 10:00 a.m. and after the hours of 6:00 p.m. Golf course greens may be watered on any day | Yes                                    |
| 2  | Other   | Use of fire hydrants limited to fire-fighting, system testing, and related activities for construction activities or for other activities necessary to maintain public health, safety, and welfare   | Yes                                    |
| 2  | CII - Restaurants may only serve water upon request   | Irrigation permitted only on Tuesdays and Saturdays during the hours before 10:00 a.m. and after the hours of 5:00 p.m.  | Yes                                    |
| 3  | Landscape - Limit landscape irrigation to specific days                                     | Agricultural users and commercial nurseries shall use water before the 10:00 a.m. and after 6:00 p.m. Watering livestock and irrigating propagation beds permitted any time                          | 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  | Landscape - Limit landscape irrigation to specific times                                    | Washing of automobiles is prohibited. at commercial car washes and where public health, safety, and welfare reasons   | Yes                                    |
| 3  | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Water use at commercial car washes not from reclaimed or recycled water shall be reduced in volume by 20%   | Yes                                    |
| 3  | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Use of water-softening devices is prohibited  | Yes                                    |
| 3  | Other   | Watering golf courses and recreational fields permitted only on Tuesdays and Saturdays before the hours of 10:00 a.m. and after 6:00 p.m. except for golf course greens | Yes                                    |
| 3  | Landscape - Limit landscape irrigation to specific days                                     | -   | Yes                                    |
| 3  | Other - Customers must repair leaks, breaks, and malfunctions in a timely manner            | -   | Yes                                    |
| 3  | Other   | New construction meters or permits for unmetered services prohibited. Construction water prohibited for earth work or road construction purposes.                       | Yes                                    |
| 4  | Landscape - Prohibit all landscape irrigation   | -   | Yes                                    |
| 4  | Landscape - Prohibit certain types of landscape irrigation                                  | Water for agricultural or commercial nursery purposes, except for livestock watering, is prohibited.  | Yes                                    |
| 4  | Other water feature or swimming pool restriction  | Filling or refilling swimming pools, spas, ponds, and artificial lakes is prohibited  | Yes                                    |
| 4  | Landscape - Other landscape restriction   | Watering of all golf course areas is prohibited   | Yes                                    |

| Retail Only: Restrictions and Prohibitions on End Uses |  |   |  |
|--|--|---|--|
| Stage  | Restrictions and Prohibitions on End Users             | Additional Explanation or Reference   | Penalty, Charge, or Other Enforcement? |
|  | or prohibition   |   |  |
| 4  | Landscape - Other landscape restriction or prohibition | Watering of parks, school grounds, and recreation fields is prohibited, except for rare plant or animal species | Yes                                    |
| 4  | Other  | Water for commercial, manufacturing, or processing purposes shall be reduced in volume by 50%                   | Yes                                    |
| 4  | Other  | Water for air conditioning is prohibited  | Yes                                    |
| NOTES:   |  |   |  |

### 5.5.2 Penalties

The City may immediately install a flow restricting device in the customer in violation of any of the restrictions listed in the previous section. The customer shall pay fifty dollars (\$50) for the installation and removal of the flow restricting device.

### 5.5.3 Consumption Reduction Methods

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

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

| Retail Only: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods |   |                                     |
|--|---|-------------------------------------|
| Stage  | Consumption Reduction Methods by Water Supplier | Additional Explanation or Reference |
| 1  | Other   | Stage 1 Water Conservation Measures |
| 2  | Other   | Stage 2 Water Conservation Measures |
| 3  | Other   | Stage 3 Water Conservation Measures |
| 4  | Other   | Stage 4 Water Conservation Measures |
| NOTES:   |   |                                     |

## 5.6 Impacts to Revenue

The actions described above to address a range of water shortage conditions have the potential to impact the City’s revenues and expenditures. To assess these impacts, the City calculated the revenue impacts resulting from a 10, 25, and 50 percent reduction in sales as compared to a base year that was based on an estimate of normal year baseline. Other factors incorporated into the analysis included water losses, pricing structure and avoided costs. The results of this analysis are shown below in Table 5-5.



## 2015 URBAN WATER MANAGEMENT PLAN

Table 5-5: Revenue Impacts Analysis

| Demand                                 | Baseline     | 10%                  | 25%                  | 50%                   |
|--|--------------|----------------------|----------------------|-----------------------|
| Water Purchased/Produced (HCF)         | 10,481,407   | 9,433,266            | 7,861,055            | 5,240,704             |
| Groundwater (AF)                       | 7,899,170    |                      |                      |                       |
| Imported Water (AF)                    | 2,582,237    |                      |                      |                       |
| Water Losses (HCF)                     | 532,260      | 479,073              | 399,227              | 266,152               |
| Water Sales (HCF)                      | 9,949,104    | 8,954,194            | 7,461,828            | 4,974,552             |
|  |              |                      |                      |                       |
| Tier 4 (>500) (%)                      | 25.0%        | 25.0%                | 25.0%                | 25.0%                 |
| Tier 3 (251 - 500) (%)                 | 7.0%         | 7.0%                 | 7.0%                 | 7.0%                  |
| Tier 2 (37 - 250) (%)                  | 21.0%        | 21.0%                | 21.0%                | 21.0%                 |
| Tier 1 (0 - 36) (%)                    | 47.0%        | 47.0%                | 47.0%                | 47.0%                 |
|  |              |                      |                      |                       |
| Tier 4 (HCF)                           | 2,487,276    | 2,238,548            | 1,865,457            | 1,243,638             |
| Tier 3 (HCF)                           | 696,437      | 626,794              | 522,328              | 348,219               |
| Tier 2 (HCF)                           | 2,089,312    | 1,880,381            | 1,566,984            | 1,044,656             |
| Tier 1 (HCF)                           | 4,676,079    | 4,208,471            | 3,507,059            | 2,338,039             |
| Total                                  | 9,949,104    | 8,954,194            | 7,461,828            | 4,974,552             |
|  |              |                      |                      |                       |
| <b>Commodity Rates</b>                 |              |                      |                      |                       |
|  |              |                      |                      |                       |
| Tier 4 (>500) (\$)                     | 3.08         | 3.08                 | 3.08                 | 3.08                  |
| Tier 3 (251 - 500) (\$)                | 3.00         | 3.00                 | 3.00                 | 3.00                  |
| Tier 2 (37 - 250) (\$)                 | 2.91         | 2.91                 | 2.91                 | 2.91                  |
| Tier 1 (0 - 36) (\$)                   | 2.83         | 2.83                 | 2.83                 | 2.83                  |
| <b>Revenue</b>                         |              |                      |                      |                       |
| Tier 4 Revenue                         | \$7,660,810  | \$6,894,729          | \$5,745,608          | \$3,830,405           |
| Tier 3 Revenue                         | \$2,089,312  | \$1,880,381          | \$1,566,984          | \$1,044,656           |
| Tier 2 Revenue                         | \$6,079,897  | \$5,471,908          | \$4,559,923          | \$3,039,949           |
| Tier 1 Revenue                         | \$13,233,303 | \$11,909,973         | \$9,924,977          | \$6,616,652           |
| Total                                  | \$29,063,323 | \$26,156,990         | \$21,797,492         | \$14,531,661          |
|  |              |                      |                      |                       |
| Fixed Monthly/Bimonthly Charge Revenue | \$2,936,677  | \$2,936,677          | \$2,936,677          | \$2,936,677           |
|  |              |                      |                      |                       |
| Total Rate Revenue                     | \$32,000,000 | \$29,093,668         | \$24,734,169         | \$17,468,339          |
|  |              |                      |                      |                       |
| <b>Revenue Lost</b>                    |              | <b>(\$2,906,332)</b> | <b>(\$7,265,831)</b> | <b>(\$14,531,661)</b> |
|  |              |                      |                      |                       |
| <b>Variable Costs</b>                  |              |                      |                      |                       |
|  |              |                      |                      |                       |
| Sources of Supply, Pumping             | \$14,822,000 | \$13,339,800         | \$11,116,500         | \$7,411,000           |
|  |              |                      |                      |                       |

| Demand                                | Baseline | 10%                  | 25%                  | 50%                  |
|---------------------------------------|----------|----------------------|----------------------|----------------------|
| Unit Costs (\$/HCF)                   |          |                      |                      |                      |
| Sources of Supply, Pumping            | \$1.41   | \$1.41               | \$1.41               | \$1.41               |
|                                       |          |                      |                      |                      |
| <b>Avoided Costs</b>                  |          | <b>\$1,482,200</b>   | <b>\$3,705,500</b>   | <b>\$7,411,000</b>   |
|                                       |          |                      |                      |                      |
| <b>Net Revenue Change</b>             |          | <b>(\$1,424,132)</b> | <b>(\$3,560,331)</b> | <b>(\$7,120,661)</b> |
|                                       |          |                      |                      |                      |
| <b>Rate Revenue Increase Required</b> |          | <b>4.66%</b>         | <b>12.52%</b>        | <b>28.62%</b>        |

The City receives water revenue from a commodity charge, a fixed customer minimum charge and a capital recovery charge. The rates have been designed to recover the full cost of water service in the commodity charge. Therefore, the cost of purchasing water and producing groundwater would decrease as the usage or sale of water decreases. Should an extreme shortage be declared and a large reduction in water sales occurs for an extended period of time, the Water Services Division would reexamine its water rate structure and monitor projected expenditures. In most cases, the City would first use water reserve funds to meet the adjusted revenues. If needed, the City would additionally increase rates to overcome revenue lost.

The City will also follow the allocation plan guidelines of MWDOC as adopted by Metropolitan once an extreme shortage is declared. This allocation plan will be enforced by Metropolitan using rate surcharges. MWDOC will follow the guidelines of the allocation plan and impose the surcharge that Metropolitan applies to its member agencies that exceed their water allocation. The City would correspondingly impose surcharges or penalties in accordance with its ordinance on excessive use of water.

## 5.7 Reduction Measuring Mechanism

Under normal water supply conditions, potable water production figures are recorded daily. Daily production figures will be reported to the Public Works Director, who will then compare the weekly production to the target weekly production to verify that the reduction goal is being met. If reduction goals are not being met, monthly reports will be sent to the City Council. Totals are reported weekly to the Chief Water Operator. Totals are reported monthly to the Public Works Director and incorporated into the water supply report.

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

## 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 City does not own or operate wastewater treatment facilities and sends all collected wastewater to Orange County Sanitation District (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 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 City 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 (H<sub>2</sub>O<sub>2</sub>). 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 Water Factory 21 (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 H<sub>2</sub>O<sub>2</sub> 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<sub>2</sub>O<sub>2</sub> is an effective disinfection/advanced oxidation process that keeps these compounds from reaching drinking water supplies.

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

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

## 6.2 Wastewater Description and Disposal

The Garden Grove Sanitary District (GGSD) was formed in 1924 for the purpose of providing sanitary sewer service to portions of Orange County including the city of Garden Grove, which was unincorporated Orange County at that time. GGSD provided sewer service to most areas within the corporate boundaries of the City, as well as portions of the Cities of Stanton, Anaheim, Orange, Santa Ana, and Westminster. In 1997, the Orange County Local Agency Formation Commission revised the boundaries of the GGSD and reorganized it as a subsidiary district of the City.

The City sewer system includes 312 miles of sewer lines, 9,700 manholes and four lift stations that connect to OCSD's trunk 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.

Table 6-1 summarizes the City's wastewater collected by GGSD and transported to OCSD's system in 2015. No wastewater is treated or disposed in the City's service area as OCSD treats and disposes all of the City's wastewater.

2015 URBAN WATER MANAGEMENT PLAN

Table 6-1: Wastewater Collected Within Service Area in 2015 (AF)

| <b>Retail: Wastewater Collected Within Service Area in 2015</b> |   |  |  |                           |                                   |
|---|---|--|--|---------------------------|-----------------------------------|
| <b>Wastewater Collection</b>                                    |   |  | <b>Recipient of Collected Wastewater</b>                           |                           |                                   |
| Name of Wastewater Collection Agency                            | Wastewater Volume Metered or Estimated? | Volume of Wastewater Collected in 2015 | Name of Wastewater Treatment Agency Receiving Collected Wastewater | Treatment Plant Name      | Is WWTP Located Within UWMP Area? |
| Garden Grove Sanitary District                                  | Estimated                               | 15,632                                 | OCSD   | Plant No. 1 / Plant No. 2 | No                                |
| <b>Total Wastewater Collected from Service Area in 2015:</b>    |   | 15,632                                 |  |                           |                                   |
| NOTES:  |   |  |  |                           |                                   |

### **6.3 Current Recycled Water Uses**

There are currently no recycled water uses within the City's service area.

### **6.4 Potential Recycled Water Uses**

While the City recognizes the potential for beneficial reuse in their service area, there is no source of recycled water supply in proximity to the City. The City's wastewater is conveyed to OCSD's regional treatment facilities where the wastewater is treated, recycled, or discharged to the ocean. Recycled water analyses performed over the years have shown that local treatment and reuse facilities are not feasible. The City 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 City 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 City benefits from OCWD's GWRS system that provides indirect potable reuse through replenishment of Orange County's Groundwater Basin with water that meets state and federal drinking water standards.

### **6.5 Optimization Plan**

The City 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 City are not cost effective as compared to purchasing imported water from MWDOC, or using groundwater. The City 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 City'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 City maintains four connections to the Metropolitan system and nine emergency interconnections with surrounding agencies. These interconnections have the ability to transfer a total of approximately 22,500 GPM into the City's distribution system. Emergency interconnections result in approximately 13,200 GPM of flow.

MWDOC continues to help its retail agencies develop transfer and exchange opportunities that promote reliability within their systems. Therefore, MWDOC will look to help its retail agencies navigate the operational and administrative issues of transfers within the Metropolitan distribution system. Currently, there are no transfer or exchange opportunities.

### 7.3 Planned Water Supply Projects and Programs

The City has identified the following planned design and construction projects.

**Rehabilitate Well 19** - construct new wellhead and perform SCADA improvements.

### 7.4 Desalination Opportunities

The City 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

Between the years of 1990 and 2005, the City participated in a blending agreement with OCWD where they were allowed to pump above the BPP, but would pay an adjusted BEA. The adjusted BEA allowed the City to deduct the additional expenses that were incurred from the blending project. The Lampson Well Nitrate Blending Project is not only beneficial to the City, but benefits the OC Basin by cleaning the Talbert Aquifer of nitrates. Under the agreement, the City was allowed to extract 4,000 AFY from wells containing high nitrate concentrations. Currently, OCWD considers the City's BEA-exempt agreement to be expired.

The Garden Grove Nitrate Blending Project is located at the City's Lampson Reservoir site. Groundwater pumped from two wells, No. 28 and No. 23 (intermittently) are blended in order to meet the MCL for nitrate.

#### **7.4.2 Ocean Water**

The City has not investigated ocean desalination as a result of economic and physical impediments.



## 8 UWMP ADOPTION PROCESS

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, the City worked closely with entities such as MWDOC to develop and update this planning document. The City 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 City and their corresponding dates. The UWMP checklist to confirm compliance with the Water Code is provided in Appendix A.

**Table 8-1: External Coordination and Outreach**

| External Coordination and Outreach   | Date              | Reference  |
|--|-------------------|------------|
| Encouraged public involvement (Public Hearing)   | 5/18/16 & 5/25/16 | Appendix F |
| 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) | 3/21/16           | Appendix E |
| Held public hearing  | 6/14/16           | Appendix E |
| Adopted UWMP   | 6/14/16           | Appendix F |
| Submitted UWMP to DWR  | 7/1/16            | -          |
| Submitted UWMP to the California State Library and city or county within the supplier’s service area   | 8/1/16            | -          |
| Made UWMP available for public review  | 8/1/16            | -          |

This UWMP was adopted by the City Council on June 14, 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 City 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 City sent a Letter of Notification to the County of Orange on March 21, 2016 to state that it was in the process of preparing an updated UWMP (Appendix E).

Table 8-2: Notification to Cities and Counties

| Retail: Notification to Cities and Counties |                                     |                                     |
|---|-------------------------------------|-------------------------------------|
| County Name                                 | 60 Day Notice                       | Notice of Public Hearing            |
| Orange County                               | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| NOTES:                                      |                                     |                                     |

### 8.1 Public Participation

The City encourages community participation in developing its urban water management planning efforts. For this UWMP update, a public meeting was held on June 14, 2016 to review and receive comments on the draft plan before City Council approval.

Notices of public meetings were posted in the City Hall. Legal public notices for the meeting were published in the local newspaper and posted at City facilities. Copies of the draft plan were available at the City Clerk and Utility Department offices. A copy of the published Notice of Public Hearing is included in Appendix E.

### 8.2 Agency Coordination

The City's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. The City is dependent on imported water from Metropolitan through MWDOC, its regional wholesaler. The City is also dependent on groundwater from OCWD, the agency that manages the Santa Ana River Groundwater Basin. As such, the City involved these water providers in this 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 City summarized Water Conservation Programs implemented to date, and compared them to those planned in its 2010 UWMP.

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

As a signatory to the memorandum of understanding (MOU) regarding urban water use efficiency, the City's commitment to implement BMP-based water use efficiency program continues today. For the City's specific achievements in the area of conservation, please see Section 4 of the UWMP.

### **8.3.3 Filing of 2015 UWMP**

The City Council reviewed the Final Draft Plan on June 14, 2016. The five-member City Council approved the 2015 UWMP on June 14, 2016. See Appendix F for the resolution approving the Plan.

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

## REFERENCES

- California Department of Water Resources, 2015. Urban Water Management Plans, Guidebook for Urban Water Suppliers.
- CDM Smith, 2016. Final Technical Memorandum #1 of Orange County Reliability Study.
- City of Garden Grove, California, Municipal Code Ordinance No. 2858, (2009).
- Department of Water Resources, 2015. State Water Project Final Delivery Capability Report 2015.
- Metropolitan Water District of Southern California, 2016. Metropolitan Urban Water Management Plan 2015.
- Municipal Water District of Orange County, 2015. Orange County Reliability Study.
- Municipal Water District of Orange County, 2015. Water Shortage Allocation Model.
- Orange County Water District, 2014. OCWD Engineer's Report.
- Orange County Water District, 2015. OCWD Groundwater Management Plan 2015 Update.
- Orange County Water District. (2015). Groundwater Replenishment Study [Brochure].
- San Diego County Water Authority, 2003. Quantification Settlement Agreement.
- Southern California Association of Governments, 2012. 5<sup>th</sup> Cycle Regional Housing Needs Assessment Final Allocation Plan.
- U.S. Department of the Interior Bureau of Reclamation, 2012. Colorado River Basin Study.
- Urban Water Management Planning Act, California Water Code § 10610-10656 (2010).
- Water Conservation Act of 2009, California Senate SB x7-7, 7<sup>th</sup> California Congress (2009).
- Water Systems Optimization, 2016. California Department of Water Resources: Water Audit Manual.

# APPENDIX A

## UWMP Checklist



# UWMP Checklist

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

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

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

## Checklist Arranged by Subject

| CWC Section    | UWMP Requirement   | Subject                                      | Guidebook Location    | UWMP Location<br><i>(Optional Column for Agency Use)</i> |
|----------------|--|--|-----------------------|--|
| 10620(b)       | Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.  | Plan Preparation                             | Section 2.1           | <b>Section 1.1</b>                                       |
| 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         | <b>Section 8.2</b>                                       |
| 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         | <b>Section 8.1 and Appendix E</b>                        |
| 10631(a)       | Describe the water supplier service area.  | System Description                           | Section 3.1           | <b>Section 1.3.1</b>                                     |
| 10631(a)       | Describe the climate of the service area of the supplier.  | System Description                           | Section 3.3           | <b>Section 2.2.1</b>                                     |
| 10631(a)       | Provide population projections for 2020, 2025, 2030, and 2035.   | System Description                           | Section 3.4           | <b>Section 2.2.2</b>                                     |
| 10631(a)       | Describe other demographic factors affecting the supplier's water management planning.   | System Description                           | Section 3.4           | <b>Section 2.3</b>                                       |
| 10631(a)       | Indicate the current population of the service area.   | System Description and Baselines and Targets | Sections 3.4 and 5.4  | <b>Section 2.2.2</b>                                     |
| 10631(e)(1)    | Quantify past, current, and projected water use, identifying the uses among water use sectors.   | System Water Use                             | Section 4.2           | <b>Section 2.3.1 and 2.4.3</b>                           |
| 10631(e)(3)(A) | Report the distribution system water loss for the most recent 12-month period available.   | System Water Use                             | Section 4.3           | <b>Section 2.3.4 and Appendix H</b>                      |
| 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           | <b>Section 2.4.5</b>                                     |
| 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 | <b>Section 2.5.2.1</b>                                   |
| 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   | <b>Section 2.5.2.2</b>                                   |

|                       |  |                       |                       |                        |
|-----------------------|--|-----------------------|-----------------------|------------------------|
|                       | compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.  |                       |                       |                        |
| <b>10608.22</b>       | 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         | <b>Section 2.5.2.2</b> |
| <b>10608.24(a)</b>    | Retail suppliers shall meet their interim target by December 31, 2015.   | Baselines and Targets | Section 5.8 and App E | <b>Section 2.5.2.2</b> |
| <b>10608.24(d)(2)</b> | 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         | <b>Section 2.5.2.2</b> |
| <b>10608.36</b>       | 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           | <b>N/A</b>             |
| <b>10608.40</b>       | 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 | <b>Section 2.5.2.2</b> |
| <b>10631(b)</b>       | Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.  | System Supplies       | Chapter 6             | <b>Section 3.4</b>     |
| <b>10631(b)</b>       | Indicate whether groundwater is an existing or planned source of water available to the supplier.  | System Supplies       | Section 6.2           | <b>Section 3.3</b>     |
| <b>10631(b)(1)</b>    | 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         | <b>Section 3.3.2.1</b> |
| <b>10631(b)(2)</b>    | Describe the groundwater basin.  | System Supplies       | Section 6.2.1         | <b>Section 3.3.1</b>   |
| <b>10631(b)(2)</b>    | 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         | <b>Section 3.3.2</b>   |
| <b>10631(b)(2)</b>    | 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         | <b>Section 3.3.7</b>   |
| <b>10631(b)(3)</b>    | Provide a detailed description and analysis of the location, amount, and sufficiency of  | System Supplies       | Section 6.2.4         | <b>Section 3.3.6</b>   |



|                    |  |                                  |                         |                            |
|--------------------|--|----------------------------------|-------------------------|----------------------------|
|                    | groundwater pumped by the urban water supplier for the past five years   |                                  |                         |                            |
| <b>10631(b)(4)</b> | 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    | <b>Section 3.3 and 3.4</b> |
| <b>10631(d)</b>    | Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.   | System Supplies                  | Section 6.7             | <b>Section 7.2</b>         |
| <b>10631(g)</b>    | 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             | <b>Section 7</b>           |
| <b>10631(h)</b>    | Describe desalinated water project opportunities for long-term supply.   | System Supplies                  | Section 6.6             | <b>Section 7.4</b>         |
| <b>10631(j)</b>    | 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           | <b>Section 3.4</b>         |
| <b>10631(j)</b>    | 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           | <b>N/A</b>                 |
| <b>10633</b>       | 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           | <b>Section 6.1</b>         |
| <b>10633(a)</b>    | 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           | <b>Section 6.2</b>         |
| <b>10633(b)</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         | <b>Section 6.2</b>         |
| <b>10633(c)</b>    | 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 | <b>Section 6.3</b>         |
| <b>10633(d)</b>    | 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           | <b>Section 6.4</b>         |
| <b>10633(e)</b>    | 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           | <b>Section 6.3 and 6.4</b> |

|                                 |   |                                     |               |                                   |
|---------------------------------|---|-------------------------------------|---------------|-----------------------------------|
|                                 | comparison to uses previously projected.  |                                     |               |                                   |
| <b>10633(f)</b>                 | 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 | <b>Section 6.4</b>                |
| <b>10633(g)</b>                 | Provide a plan for optimizing the use of recycled water in the supplier's service area.   | System Supplies (Recycled Water)    | Section 6.5.5 | <b>Section 6.5</b>                |
| <b>10620(f)</b>                 | 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   | <b>Section 3.3, 4.5, 4.6, 6.4</b> |
| <b>10631(c)(1)</b>              | Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.  | Water Supply Reliability Assessment | Section 7.1   | <b>Section 3.6</b>                |
| <b>10631(c)(1)</b>              | Provide data for an average water year, a single dry water year, and multiple dry water years   | Water Supply Reliability Assessment | Section 7.2   | <b>Section 3.6.5</b>              |
| <b>10631(c)(2)</b>              | 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   | <b>Section 3.2.3, 3.3, 3.6, 4</b> |
| <b>10634</b>                    | 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   | <b>Section 3.6.2.3</b>            |
| <b>10635(a)</b>                 | 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   | <b>Section 3.7</b>                |
| <b>10632(a) and 10632(a)(1)</b> | 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   | <b>Section 5.2</b>                |
| <b>10632(a)(2)</b>              | 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   | <b>Section 5.3</b>                |
| <b>10632(a)(3)</b>              | 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   | <b>Section 5.4</b>                |
| <b>10632(a)(4)</b>              | Identify mandatory prohibitions against specific water use practices during water shortages.  | Water Shortage Contingency Planning | Section 8.2   | <b>Section 5.5.1</b>              |
| <b>10632(a)(5)</b>              | Specify consumption reduction methods in the most restrictive stages.   | Water Shortage Contingency Planning | Section 8.4   | <b>Section 5.5.3</b>              |
| <b>10632(a)(6)</b>              | Indicated penalties or charges for excessive  | Water Shortage Contingency          | Section 8.3   | <b>Section</b>                    |

|                    |  |  |                                 |                                 |
|--------------------|--|--|---------------------------------|---------------------------------|
|                    | use, where applicable.   | Planning                                     |                                 | <b>5.5.2</b>                    |
| <b>10632(a)(7)</b> | 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                     | <b>Section 5.6</b>              |
| <b>10632(a)(8)</b> | Provide a draft water shortage contingency resolution or ordinance.  | Water Shortage Contingency Planning          | Section 8.7                     | <b>Appendix D</b>               |
| <b>10632(a)(9)</b> | Indicate a mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.   | Water Shortage Contingency Planning          | Section 8.5                     | <b>Section 5.7</b>              |
| <b>10631(f)(1)</b> | 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            | <b>Section 4</b>                |
| <b>10631(f)(2)</b> | 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            | <b>N/A</b>                      |
| <b>10631(i)</b>    | 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                     | <b>Section 4 and Appendix J</b> |
| <b>10608.26(a)</b> | 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                    | <b>Section 8.1</b>              |
| <b>10621(b)</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                  | <b>Appendix E</b>               |
| <b>10621(d)</b>    | 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        | <b>Section 8.3.3</b>            |
| <b>10635(b)</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                  | <b>Section 8.3.3</b>            |
| <b>10642</b>       | 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 | <b>Section 8.1</b>              |

|                    |  |   |                            |                      |
|--------------------|--|---|----------------------------|----------------------|
|                    | public hearing, and held a public hearing about the plan.  |   |                            |                      |
| <b>10642</b>       | 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            | <b>Appendix E</b>    |
| <b>10642</b>       | Provide supporting documentation that the plan has been adopted as prepared or modified.   | Plan Adoption, Submittal, and Implementation        | Section 10.3.1             | <b>Appendix F</b>    |
| <b>10644(a)</b>    | 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             | <b>Section 8.3.3</b> |
| <b>10644(a)(1)</b> | 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             | <b>Section 8.2</b>   |
| <b>10644(a)(2)</b> | 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 | <b>Section 8.3.3</b> |
| <b>10645</b>       | <b>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.</b> | <b>Plan Adoption, Submittal, and Implementation</b> | <b>Section 10.5</b>        | <b>Section 8</b>     |

# 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 |
|----------------------------|--------------------------|--------------------------------------|-------------------------------|
| CA3010062                  | City of Garden Grove     | 33,647                               | 24,049                        |
| <b>TOTAL</b>               |                          | <b>33,647</b>                        | <b>24,049</b>                 |
| NOTES:                     |                          |                                      |                               |

**Table 2-2: Plan Identification**

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

NOTES:

| Table 2-3: Agency Identification  |                                   |
|---|-----------------------------------|
| Type of Agency (select one or both)   |                                   |
| <input type="checkbox"/>  | Agency is a wholesaler            |
| <input checked="" type="checkbox"/>   | Agency is a retailer              |
| Fiscal or Calendar Year (select one)  |                                   |
| <input type="checkbox"/>  | UWMP Tables Are in Calendar Years |
| <input checked="" type="checkbox"/>   | UWMP Tables Are in Fiscal Years   |
| If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins<br>(mm/dd) |                                   |
| 7/1   |                                   |
| Units of Measure Used in UWMP (select from Drop down)                               |                                   |
| Unit  | AF                                |
| NOTES:  |                                   |



|  |
|--|
| <b>Table 2-4 Retail: Water Supplier Information Exchange</b> |
|--|

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

|       |
|-------|
| MWDOC |
|-------|

|        |
|--------|
| NOTES: |
|--------|

**Table 3-1 Retail: Population - Current and Projected**

| Population Served | 2015    | 2020    | 2025    | 2030    | 2035    | 2040    |
|-------------------|---------|---------|---------|---------|---------|---------|
|                   | 176,649 | 178,729 | 179,440 | 180,428 | 181,002 | 180,825 |

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

**Table 4-1 Retail: Demands for Potable and Raw Water - Actual**

| Use Type<br><i>(Add additional rows as needed)</i>   | 2015 Actual  |               |
|--|--|---------------|
| <p><b><i>Use Drop down list</i></b><br/> <i>May select each use multiple times</i><br/> <i>These are the only Use Types that will be recognized by the WUEdata online submittal tool</i></p> | <p>Level of Treatment<br/>When Delivered<br/><i>Drop down list</i></p> | <p>Volume</p> |
| Single Family  | Drinking Water   | 11,838        |
| Multi-Family   | Drinking Water   | 4,625         |
| Institutional/Governmental   | Drinking Water   | 1,677         |
| Commercial   | Drinking Water   | 3,280         |
| Industrial   | Drinking Water   | 1,051         |
| Landscape  | Drinking Water   | 838           |
| Other  | Drinking Water   | 3             |
| Losses   | Drinking Water   | 737           |
| <b>TOTAL</b>   |  | 24,049        |
| <p>NOTES: Data retrieved from MWD OC Customer Class Usage Data and FY 2014-</p>  |  |               |

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

| Use Type <i>(Add additional rows as needed)</i>  | Projected Water Use<br><i>Report To the Extent that Records are Available</i> |        |        |        |        |
|--|---|--------|--------|--------|--------|
| <b><i>Use Drop down list</i></b><br><i>May select each use multiple times</i><br><i>These are the only Use Types that will be recognized by the WUEdata online submittal</i> | 2020  | 2025   | 2030   | 2035   | 2040   |
| Single Family  | 11,852  | 12,723 | 12,810 | 12,807 | 12,825 |
| Multi-Family   | 4,631   | 4,971  | 5,005  | 5,003  | 5,011  |
| Institutional/Governmental   | 1,679   | 1,802  | 1,815  | 1,814  | 1,817  |
| Commercial   | 3,284   | 3,525  | 3,549  | 3,548  | 3,554  |
| Industrial   | 1,052   | 1,130  | 1,137  | 1,137  | 1,139  |
| Landscape  | 839   | 901    | 907    | 907    | 908    |
| Other  | 3   | 3      | 3      | 3      | 3      |
| Losses   | 738   | 792    | 798    | 797    | 798    |
| <b>TOTAL</b>   | 24,078  | 25,847 | 26,024 | 26,017 | 26,055 |
| NOTES: Data retrieved from MWDOC Customer Class Usage Data and Retail Water  |   |        |        |        |        |

**Table 4-3 Retail: Total Water Demands**

|  | 2015   | 2020   | 2025   | 2030   | 2035   | 2040   |
|--|--------|--------|--------|--------|--------|--------|
| Potable and Raw Water <i>From</i><br><i>Tables 4-1 and 4-2</i> | 24,049 | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| Recycled Water Demand <i>From</i><br><i>Table 6-4</i>          | 0      | 0      | 0      | 0      | 0      | 0      |
| <b>TOTAL WATER DEMAND</b>                                      | 24,049 | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |

NOTES:

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

| Reporting Period Start Date<br>(mm/yyyy) | Volume of Water Loss |
|--|----------------------|
| 01/2015                                  | 909                  |

NOTES:

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

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

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      | 1996       | 2005     | 163                    | 153                   | 142                    |
| 5 Year          | 2004       | 2008     | 156                    |                       |                        |

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

NOTES:



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

| Actual<br>2015 GPCD | 2015<br>Interim<br>Target<br>GPCD | 2015 GPCD<br><i>(Adjusted if<br/>applicable)</i> | Did Supplier<br>Achieve<br>Targeted<br>Reduction for<br>2015? Y/N |
|---------------------|-----------------------------------|--|---|
| 102                 | 153                               | 102  | Yes   |

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

NOTES:

**Table 6-1 Retail: Groundwater Volume Pumped**

| Groundwater Type<br><i>Drop Down List</i><br><i>May use each category multiple times</i> | Location or Basin Name          | 2011   | 2012   | 2013   | 2014   | 2015   |
|--|---------------------------------|--------|--------|--------|--------|--------|
| Alluvial Basin   | Orange County Groundwater Basin | 15,005 | 15,231 | 18,911 | 21,025 | 17,408 |
| <b>TOTAL</b>   |                                 | 15,005 | 15,231 | 18,911 | 21,025 | 17,408 |

NOTES:

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

| Wastewater Collection  |  |  | Recipient of Collected Wastewater                                  |                           |  |
|--|--|--|--|---------------------------|--|
| Name of Wastewater Collection Agency                         | Wastewater Volume Metered or Estimated?<br><i>Drop Down List</i> | Volume of Wastewater Collected in 2015 | Name of Wastewater Treatment Agency Receiving Collected Wastewater | Treatment Plant Name      | Is WWTP Located Within UWMP Area?<br><i>Drop Down List</i> |
| Garden Grove Sanitary District                               | Estimated  | 15,632                                 | OCSD   | Plant No. 1 / Plant No. 2 | No   |
| <b>Total Wastewater Collected from Service Area in 2015:</b> |  | 15,632                                 |  |                           |  |

NOTES:

**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 6-4 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 6-5 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 6-6 Retail: Methods to Expand Future Recycled Water Use**

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

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

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



**Table 6-8 Retail: Water Supplies — Actual**

| Table 6-8 Retail: Water Supplies — Actual   |                                   |               |  |
|---|-----------------------------------|---------------|--|
| Water Supply  | Additional Detail on Water Supply | 2015          |  |
| <i>Drop down list</i><br><i>May use each category multiple times.</i><br><i>These are the only water supply categories that will be recognized by the WUEdata online submittal tool</i> |                                   | Actual Volume | Water Quality<br><i>Drop Down List</i> |
| Groundwater   | Orange County Groundwater Basin   | 17,408        | Drinking Water                         |
| Purchased or Imported Water   | MWDOC                             | 6,640         | Drinking Water                         |
| <b>Total</b>  |                                   | 24,049        |  |
| NOTES:  |                                   |               |  |

**Table 6-9 Retail: Water Supplies — Projected**

| Table 6-9 Retail: Water Supplies — Projected  |                                   |   |                             |                             |                             |                             |
|---|-----------------------------------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Water Supply  | Additional Detail on Water Supply | Projected Water Supply<br><i>Report To the Extent Practicable</i> |                             |                             |                             |                             |
| <i>Drop down list</i><br><i>May use each category multiple times.</i><br><i>These are the only water supply categories that will be recognized by the WUEdata online submittal tool</i> |                                   | 2020  | 2025                        | 2030                        | 2035                        | 2040                        |
|   |                                   | Reasonably Available Volume                                       | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume | Reasonably Available Volume |
| Groundwater   | Orange County Groundwater Basin   | 16,855  | 18,093                      | 18,217                      | 18,212                      | 18,239                      |
| Purchased or Imported Water   | MWDOC                             | 7,223   | 7,754                       | 7,807                       | 7,805                       | 7,817                       |
| <b>Total</b>  |                                   | 24,078  | 25,847                      | 26,024                      | 26,017                      | 26,055                      |
| NOTES:  |                                   |   |                             |                             |                             |                             |

**Table 7-1 Retail: Basis of Water Year Data**

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

NOTES:

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

|   | 2020   | 2025   | 2030   | 2035   | 2040   |
|---|--------|--------|--------|--------|--------|
| Supply totals<br><i>(autofill from Table 6-9)</i> | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| Demand totals<br><i>(autofill from Table 4-3)</i> | 24,078 | 25,847 | 26,024 | 26,017 | 26,055 |
| 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 | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
| Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
| Difference    | 0      | 0      | 0      | 0      | 0      |

NOTES: Developed by MWDOC as 2015 Bump Methodology

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

|             |               | 2020   | 2025   | 2030   | 2035   | 2040   |
|-------------|---------------|--------|--------|--------|--------|--------|
| First year  | Supply totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|             | Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|             | Difference    | 0      | 0      | 0      | 0      | 0      |
| Second year | Supply totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|             | Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|             | Difference    | 0      | 0      | 0      | 0      | 0      |
| Third year  | Supply totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|             | Demand totals | 25,523 | 27,398 | 27,585 | 27,578 | 27,618 |
|             | Difference    | 0      | 0      | 0      | 0      | 0      |

NOTES: Developed by MWDOC as 2015 Bump Methodology

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

| Stage | Complete Both  |   |
|-------|--|---|
|       | Percent Supply Reduction <sup>1</sup><br><i>Numerical value as a percent</i> | Water Supply Condition<br><i>(Narrative description)</i>  |
| 1     |  | Times of regional drought when the City assists in overall water conservation and water consumption reduction                     |
| 2     |  | Periods when the City determines water supply shortage or threatened shortage exists and a consumer demand reduction is necessary |
| 3     |  | Periods when there is a critical differential between supply and demand   |
| 4     |  | Period of severe drought and/or when a major failure of any supply or distribution facility occurs in water distribution systems  |

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

NOTES: Percent supply reduction unavailable

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

| Stage                | Restrictions and Prohibitions on End Users<br><i>Drop down list</i><br><i>These are the only categories that will be accepted by the WUEdata online submittal tool</i> | Additional Explanation or Reference<br><i>(optional)</i>   | Penalty, Charge, or Other Enforcement?<br><i>Drop Down List</i> |
|----------------------|--|--|---|
| Permanent Year-Round | Landscape - Limit landscape irrigation to specific times   | Irrigation limited to once every other day and prohibited between 10:00 a.m. and 5:00 p.m. on any day  | No  |
| Permanent Year-Round | Landscape - Other landscape restriction or prohibition   | Irrigation with a watering device not continuously attended limited to no more than fifteen minutes watering per day per station. This does not apply to very low-flow drip type irrigation systems                        | No  |
| Permanent Year-Round | Other - Prohibit use of potable water for washing hard surfaces  | -  | No  |
| Permanent Year-Round | Other - Prohibit vehicle washing except at facilities using recycled or  | -  | No  |
| Permanent Year-Round | Other  | No watering during or within 48 hours after measurable rainfall  | No  |
| Permanent Year-Round | Landscape - Prohibit certain types of landscape irrigation   | Irrigation of landscapes outside of newly constructed homes and buildings must comply with regulations established by the California Building Standards Commission and the Department of Housing and Community Development | No  |
| Permanent Year-Round | CII - Lodging establishment must offer opt out of linen service  | -  | No  |



|                      |   |   |     |
|----------------------|---|---|-----|
| Permanent Year-Round | Other - Customers must repair leaks, breaks, and malfunctions in a timely manner            | Leaks, breaks, and other malfunctions must be corrected within seven days of receiving notice from the City   | No  |
| Permanent Year-Round | Water Features - Restrict water use for decorative water features, such as fountains        | Operating a water fountain or other decorative water feature that does not use recirculated water is prohibited   | No  |
| Permanent Year-Round | Other   | Installation of single pass cooling systems is prohibited in buildings requesting new water service   | No  |
| Permanent Year-Round | Other   | Installation of non-recirculating water systems is prohibited in new commercial conveyor car wash and new commercial laundry operations.                                      | No  |
| 1                    | Landscape - Limit landscape irrigation to specific times                                    | Irrigation limited to once every other day and prohibited between 10:00 a.m. and 5:00 p.m. on any day   | No  |
| 1                    | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Washing automobiles limited to once every other day except at commercial car wash establishments  | No  |
| 1                    | Pools and Spas - Require covers for   | -   | No  |
| 1                    | CII - Restaurants may only serve  | -   | No  |
| 2                    | Other   | Fire hydrant use limited to fire-fighting, system testing, and other construction activities or for other activities necessary to maintain public health, safety, and welfare | Yes |

|   |   |  |     |
|---|---|--|-----|
| 2 | Landscape - Limit landscape irrigation to specific days                                     | Irrigation permitted only on Tuesdays and Saturdays and prohibited between 10:00 a.m. and 5:00 p.m. on any day   | Yes |
| 2 | Landscape - Prohibit certain types of landscape irrigation                                  | Agricultural users and commercial nurseries are exempt from Stage 2 water restrictions but required to curtail all non-essential water use.  | Yes |
| 2 | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Washing automobiles permitted with use of hand-held bucket or similar container or at commercial car washes.   | Yes |
| 2 | Landscape - Limit landscape irrigation to specific days                                     | Watering of golf course and recreational fields permitted only on Tuesdays and Saturday before the hours of 10:00 a.m. and after the hours of 6:00 p.m. Golf course greens may be watered on any day | Yes |
| 2 | Other   | Use of fire hydrants limited to fire-fighting, system testing, and related activities for construction activities or for other activities necessary to maintain public health, safety, and welfare   | Yes |
| 2 | CII - Restaurants may only serve water upon request   | Irrigation permitted only on Tuesdays and Saturdays during the hours before 10:00 a.m. and after the hours of 5:00 p.m.  | Yes |

|   |   |   |     |
|---|---|---|-----|
| 3 | Landscape - Limit landscape irrigation to specific days                                     | Agricultural users and commercial nurseries shall use water before the 10:00 a.m. and after 6:00 p.m. Watering livestock and irrigating propagation beds permitted any time | Yes |
| 3 | Landscape - Limit landscape irrigation to specific times                                    | Washing of automobiles is prohibited. at commercial car washes and where public health, safety, and welfare reasons   | Yes |
| 3 | Other - Prohibit vehicle washing except at facilities using recycled or recirculating water | Water use at commercial car washes not from reclaimed or recycled water shall be reduced in volume by 20%   | Yes |
| 3 | Other - Prohibit vehicle washing except at facilities using recycled or                     | Use of water-softening devices is prohibited  | Yes |
| 3 | Other   | Watering golf courses and recreational fields permitted only on Tuesdays and Saturdays before the hours of 10:00 a.m. and after 6:00 p.m. except for golf course greens     | Yes |
| 3 | Landscape - Limit landscape irrigation  | -   | Yes |
| 3 | Other - Customers must repair leaks, breaks, and malfunctions in a timely                   | -   | Yes |
| 3 | Other   | New construction meters or permits for unmetered services prohibited. Construction water prohibited for earth work or road construction purposes.                           | Yes |
| 4 | Landscape - Prohibit all landscape  | -   | Yes |

|   |  |   |     |
|---|--|---|-----|
| 4 | Landscape - Prohibit certain types of landscape irrigation | Water for agricultural or commercial nursery purposes, except for livestock watering, is prohibited.            | Yes |
| 4 | Other water feature or swimming pool restriction           | Filling or refilling swimming pools, spas, ponds, and artificial lakes is prohibited                            | Yes |
| 4 | Landscape - Other landscape restriction or prohibition     | Watering of all golf course areas is prohibited   | Yes |
| 4 | Landscape - Other landscape restriction or prohibition     | Watering of parks, school grounds, and recreation fields is prohibited, except for rare plant or animal species | Yes |
| 4 | Other  | Water for commercial, manufacturing, or processing purposes shall be reduced in volume by 50%                   | Yes |
| 4 | Other  | Water for air conditioning is prohibited  | Yes |

NOTES:

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

| Stage  | Consumption Reduction Methods by Water Supplier<br><i>Drop down list</i><br><i>These are the only categories that will be accepted by the WUEdata online submittal tool</i> | Additional Explanation or Reference<br><i>(optional)</i> |
|--------|---|--|
| 1      | Other   | Stage 1 Water Conservation Measures                      |
| 2      | Other   | Stage 2 Water Conservation Measures                      |
| 3      | Other   | Stage 3 Water Conservation Measures                      |
| 4      | Other   | Stage 4 Water Conservation Measures                      |
| NOTES: |   |  |

| Table 8-4 Retail: Minimum Supply Next Three Years |        |        |        |
|---|--------|--------|--------|
|   | 2016   | 2017   | 2018   |
| Available Water Supply                            | 26,081 | 26,081 | 26,081 |
| NOTES:  |        |        |        |

**Table 10-1 Retail: Notification to Cities and Counties**

| County Name<br><i>Drop Down List</i> | 60 Day Notice                       | Notice of Public Hearing            |
|--------------------------------------|-------------------------------------|-------------------------------------|
| Orange County                        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| NOTES:                               |                                     |                                     |

# APPENDIX C

## Groundwater Management Plan





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

# APPENDIX D

City Ordinance



ORDINANCE NO. 2858

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF GARDEN GROVE AMENDING CHAPTER 40 OF TITLE 14 OF THE GARDEN GROVE MUNICIPAL CODE TO REFLECT RECENT CHANGES IN STATE LAW REGARDING WATER CONSERVATION

**City Attorney Summary**

***This Ordinance amends and updates the City's current Water Conservation Program provisions in Chapter 40 of Title 14 of the Garden Grove Municipal Code to facilitate the implementation of new State-mandated water conservation requirements and regulations.***

THE CITY COUNCIL OF THE CITY OF GARDEN GROVE FINDS AND DETERMINES AS FOLLOWS:

WHEREAS, this Ordinance is enacted pursuant to Section 375 of the California Water Code, and Sections 37100 and 38742 of the California Government Code;

WHEREAS, Article X, Section 2 of the California Constitution and Section 100 of the California Water Code provide that, because of the conditions prevailing in this State, the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare;

WHEREAS, the protection, conservation and management of local and imported water supplies is one of the main functions of the City as a domestic water purveyor, and the City has the power to perform all acts necessary to carry out fully the provisions of California Water Code Section 375, to establish rules and regulations for the distribution and use of water, and undertake a water conservation program to promote efficient water use and reduce water waste;

WHEREAS, wasteful water use practices constitute a potential threat to, and an unacceptable diminution of, the City's water supplies;

WHEREAS, the prevention of water waste is an economically and environmentally feasible way to protect, conserve and prevent unacceptable diminution of the City's water supplies;

WHEREAS, outdoor water use is a primary source of urban runoff, which flows onto the streets, then through storm drains to the beaches and contaminates seawater; it is therefore in the public interest to promote practices that increase water use efficiency, reduce or eliminate runoff;

WHEREAS, contamination, drought or failure of the water system infrastructure may lead to a potable water shortage emergency in the City's water supplies;

WHEREAS, on January 17, 2014, the Governor has declared a state of emergency in response to the State of California's severe drought conditions;

WHEREAS, on July 15, 2014, the State Water Resources Control Board (SWRCB) adopted emergency regulations imposing requirements on urban water suppliers to prohibit certain types of water use;

WHEREAS, on December 9, 2014, the City Council adopted Ordinance No. 2849 amending the City's Water Conservation Program;

WHEREAS, on March 17, 2015, the SWRCB considered and readopted the existing emergency regulation originally adopted on July 15, 2014, with some updates, for an additional 270 days beyond the original April 25, 2015, expiration date. The updated emergency regulation consists of four main types of requirements: a prohibition on certain irrigation practices, restrictions on certain commercial activities, an order for all urban water suppliers to implement mandatory restrictions on outdoor irrigation, and an order for water suppliers with 3,000 or more service connections to provide monthly data on water production, compliance actions, and outdoor water conservation measures being implemented. Concurrently, the SWRCB made a finding that an emergency exists due to severe drought conditions and that adoption of the updated emergency regulation was necessary to address the emergency and that non-emergency regulations cannot timely address the current severe drought emergency;

WHEREAS, on April, 1 2015, the Governor of California issued an Executive Order which requires the State of California to reduce its water consumption by 25% and on June 9, 2015, the SWRCB clarified the reductions and requires the City of Garden Grove to reduce its water consumption by 20% by February of 2016;

WHEREAS, the drought conditions that formed the basis of the Governor's emergency proclamations continue to exist. The present year is critically dry and has been immediately preceded by multiple consecutive below normal, dry, or critically dry years. The drought conditions will likely continue for the foreseeable future;

WHEREAS, the City serves more than 3,000 customers, is an "urban water supplier" as defined in Water Code Section 10617;

WHEREAS, it is necessary and appropriate to update the City's current Water Conservation Program provisions to be consistent with the updated emergency regulations adopted by the SWRCB;

WHEREAS, as required by Water Code Section 375(a), a duly noticed Public Hearing regarding this Ordinance was held on June 23, 2015, and all interested persons were given an opportunity to be heard; and

WHEREAS, it is the intent of the City Council, in enacting this Ordinance, to implement the recently enacted emergency regulations mandated by the State and to provide for the public health, safety, and welfare by discouraging the wasteful use of water in this time of drought.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF GARDEN GROVE DOES ORDAIN AS FOLLOWS:

SECTION 1: The above recitals are true and correct and hereby incorporated herein by reference.

SECTION 2: The City Council hereby determines that this Ordinance is categorically exempt from the California Environmental Quality Act ("CEQA"; Cal. Pub. Resources Code Section 21000 et seq.) pursuant to Sections 15301 and 15307 of the State CEQA Guidelines (Cal. Code of Regs., Title 14, Section 15000 et seq.).

SECTION 3: Section 14.40.025 of Chapter 40 of Title 14 of the Garden Grove Municipal Code is hereby amended as follows (deletions shown in ~~strikethrough~~, additions shown in ***bold-italics***):

**14.40.025: Permanent Water Conservation Requirements—  
Prohibition Against Waste**

The following water conservation ***measures apply on a mandatory basis to the use of potable water supplied by the City, except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a state or federal agency. These*** requirements shall be effective at all times, including, but not limited to, during the water conservation stages set forth in this Chapter, and are permanent. Violations of this Section will be considered waste and an unreasonable use of water.

- A. LIMITS ON WATERING HOURS: Watering or irrigating of lawn, landscape or other vegetated area with potable water is prohibited between the hours of 10:00 a.m. and ~~6:00 p.m.~~ ***5:00 p.m.*** Pacific Time on any day, except by use of a hand-water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

- B. **LIMIT ON WATERING DURATION:** 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 fifteen (15) minutes watering per day per station. This subsection does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems when no emitter produces more than two (2) gallons of water per hour and weather-based controllers or stream rotor sprinklers that meet a seventy percent (70%) efficiency standard.
- C. **NO WATER FLOW OR RUNOFF:** Watering or irrigating of any lawn, landscape, or other vegetated area in a manner that causes or allows water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter, or ditch is prohibited.
- D. **NO WASHING DOWN HARD OR PAVED SURFACES:** Washing down hard or paved surfaces, including, but not limited to, sidewalks, walkways, driveways, parking areas, tennis courts, patios, or alleys, is prohibited, except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container; a hand-held hose equipped with a positive self-closing water shut-off device; a low-volume, high- pressure cleaning machine equipped to recycle any water used; or a low-volume high- pressure water broom.
- E. **NO WASHING VEHICLES WITH HOSE.** Washing autos, trucks, trailers, boats, airplanes, and other types of mobile equipment with a hose is prohibited, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device, or a low-volume, high- pressure cleaning machine equipped to recycle any water used.
- F. ***NO WATERING DURING OR WITHIN 48 HOURS AFTER MEASURABLE RAINFALL. Watering or irrigation of lawn, landscape or other vegetated areas during or within 48 hours of rain is prohibited.***
- G. ***IRRIGATION OF LANDSCAPES OUTSIDE OF NEWLY CONSTRUCTED HOMES AND BUILDINGS MUST COMPLY WITH REGULATIONS ESTABLISHED BY THE CALIFORNIA BUILDING STANDARDS COMMISSION AND THE DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT. The irrigation with potable water of***

***landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development is prohibited.***

- H. COMMERCIAL LODGING ESTABLISHMENTS MUST PROVIDE CUSTOMERS THE OPTION OF NOT HAVING TOWELS AND LINEN LAUNDERED DAILY.** *Hotels, motels, and other commercial lodging establishments must provide customers the option of not having towels and linens laundered daily.*
- FI. OBLIGATION TO FIX LEAKS, BREAKS, OR MALFUNCTIONS:** Excessive use, loss, or escape of water through breaks, leaks, or other malfunctions in the water users plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected, and in no event more than seven (7) days of receiving notice from the City, is prohibited.
- GJ. RE-CIRCULATING WATER REQUIRED FOR WATER FOUNTAINS AND DECORATIVE WATER FEATURES:** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.
- HK. NO INSTALLATION OF SINGLE PASS COOLING SYSTEMS:** Installation of single pass cooling systems is prohibited in buildings requesting new water service.
- IL. NO INSTALLATION OF NON-RE-CIRCULATING SYSTEMS IN COMMERCIAL CAR WASH AND LAUNDRY OPERATIONS:** Installation of non-re-circulating water systems is prohibited in new commercial conveyor car wash and new commercial laundry operations.

**SECTION 4:** Section 14.40.041 of Chapter 40 of Title 14 the Municipal Code is hereby amended as follows (deletions shown in ~~strikethrough~~, additions shown in ***bold-italics***):

**14.40.041: Stage 1 – Voluntary Conservation – Water Watch**

Stage 1 applies during times of regional drought when, in the spirit of cooperation, the City desires to assist in overall water conservation and water consumption reduction. During Stage 1, the following water

conservation measures shall apply on a voluntary basis **to the use of potable water supplied by the City, except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a state or federal agency:**

- A. Lawn watering and landscape irrigation should be limited to once every other day, ~~within the hours authorized in Section 14.40.025(A),~~ **All such irrigation is prohibited between the hours of 10:00 a.m. and 5:00 p.m. Pacific Time on any day,** except by use of a hand-water shut-off nozzle or device or a drip irrigation system, as described in Section 14.40.025(B), or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.
- B. The washing of autos, trucks, trailers, boats, airplanes, and other types of mobile equipment should be limited to once every other day unless done at a commercial car wash. Such washing, when allowed by this Chapter, shall be done only by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device, or a low-volume, high-pressure cleaning machine equipped to recycle any water used.
- C. ~~The filling or refilling of swimming pools, spas, ponds, and artificial lakes should be limited to once every other day.~~ **The use of a pool/spa cover is encouraged to prevent evaporation water loss.**
- D. Restaurants should avoid serving water to their customers unless the customers specifically request it.
- E. ~~It is recommended that ornamental fountains or similar structures not be operated.~~
- FE. The use of water from fire hydrants should be limited to fire fighting, system testing, and related activities for construction activities, or for other activities necessary to maintain the public health, safety, and welfare.

SECTION 5: Section 14.40.042 of Chapter 40 of Title 14 of the Municipal Code is hereby amended as follows (deletions shown in ~~strikethrough~~, additions shown in **bold-italics**):

**14.40.042: Stage 2 – Mandatory Conservation – Water Alert**



Stage 2 applies during periods when the ~~probability exists that the City will not be able to meet all of the water demands of its customers~~ **City determines, in its sole discretion, that due to drought or other water supply conditions, a water supply shortage or threatened shortage exists and a consumer demand reduction is necessary to make more efficient use of water and appropriately respond to existing water conditions.** During Stage 2, the following water conservation measures shall apply on a mandatory basis, except when reclaimed or recycled water is used **to the use of potable water supplied by the City, except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a state or federal agency:**

A. Lawn watering and landscape irrigation, including construction meter irrigation, is permitted only on designated irrigation days ~~Tuesdays and Saturdays.~~ within the hours authorized in Section 14.40.025(A) ~~For purposes of Stage 2 regulations, a "designated irrigation day" is determined by the last digit in the street address. Properties with addresses ending in an even number may use water for lawns and landscaping on even numbered days, and properties with addresses ending in an odd number may use water for lawns and landscaping on odd numbered days.~~ **All such irrigation is prohibited between the hours of 10:00 a.m. and 5:00 p.m. Pacific Time on any day, except by use of a hand-water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.**

~~EXCEPTION: Watering is permitted on any day if a hand water shut off nozzle or device, or a drip irrigation system, as described in Section 14.40.025(B), is used or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.~~

B. Agricultural users and commercial nurseries as defined by the Metropolitan Water District Code are exempt from Stage 2 irrigation restrictions, but are required to curtail all non-essential water use. The watering of livestock and irrigation of propagation beds are permitted at any time.

C. Washing of autos, trucks, trailers, boats, airplanes, and other types of mobile equipment is ~~permitted only on designated irrigation days between the hours of 6:00 p.m. and 6:00 a.m. the following morning.~~ Such washing, when allowed, shall be done only by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device, or a low-

volume, high-pressure cleaning machine equipped to recycle any water used.

EXCEPTIONS: Washing is permitted at any time on the immediate premises of a commercial car wash. Washing also is permitted at any time where the health, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables.

D. ~~Filling or refilling of swimming pools, spas, ponds, and artificial lakes is permitted only on designated irrigation days between the hours of 6:00 p.m. and 6:00 a.m. the following morning.~~ **The use of a pool/spa cover is encouraged to prevent evaporation water loss.**

E. Watering of golf course, parks, schools, grounds, and recreational fields is permitted only **on Tuesdays and Saturdays** between ~~before~~ the hours of 6:00 p.m. **10:00 a.m.** and **after** 6:00 a.m. ~~p.m. the following morning.~~

EXCEPTION: Golf course greens may be watered on any day.

F. The use of water from fire hydrants shall be limited to fire fighting, system testing, and related activities, for construction activities, or for other activities necessary to maintain the public health, safety, and welfare.

G. Restaurants shall not serve water to their customers except when specifically requested.

H. ~~The operation of any ornamental fountain or similar structure is prohibited.~~

SECTION 6: Section 14.40.043 of Chapter 40 of Title 14 of the Garden Grove Municipal Code is hereby amended as follows (deletions shown in strikethrough, additions shown in ***bold-italics***):

**14.40.043: Stage 3 - Mandatory Conservation—Water Warning**

A. Stage 3 applies during periods when the ~~City will not be able to meet all of the water demands of its customers~~ ***there is a critical differential between supply and demand and it is determined that demand cannot be reduced sufficiently through Stage 1 and 2 measures to remain within the available supply.*** During Stage 3, the following water conservation measures shall apply except when reclaimed water is used: ***to the use of potable water***

***supplied by the City, except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a state or federal agency:***

1. Lawn watering and landscape irrigation, including construction meter irrigation, is permitted only on ~~designated irrigation days and only between the hours of 6:00 p.m. and 6:00 a.m. the following morning.~~ For purposes of Stage 3 regulations, the "designated irrigation day" is determined by the last digit in the street address. Properties with addresses ending in an even number may use water on Tuesdays and Saturdays. Properties with addresses ending in an odd number may use water on Wednesdays and Sundays. ***Tuesdays and Saturdays. All such irrigation is prohibited between the hours of 10:00 a.m. and 5:00 p.m. Pacific Time on any day, except by use of a hand-water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.***

2. Agricultural users and commercial nurseries shall use water only between the hours of ~~6:00 p.m. and 6:00 a.m. the following morning~~ ***before the hours of 10:00 a.m. and after 6:00 p.m.*** The watering of livestock and the irrigation of propagation beds are permitted at any time.

3. Washing of autos, trucks, trailers, boats, airplanes, and other types of mobile equipment is prohibited.

EXCEPTIONS:

a. Washing is permitted at any time on the immediate premises of a commercial car wash.

b. Washing also is permitted where the public health, safety, and welfare is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables. In each such case, washing shall only be permitted by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off device, or a low-volume, high-pressure cleaning machine equipped to recycle any water used.

4. The use of water by all types of commercial car washes not using partially reclaimed or recycled water shall be reduced in volume by 20%.

5. ~~Filling or refilling of swimming pools, spas, ponds, and artificial lakes is permitted only on designated irrigation days between the hours of 10:00 p.m. and 6:00 a.m. the following morning.~~ ***The use of a pool/spa cover is encouraged to prevent evaporation water loss.***

6. The use of water-softening devices is prohibited.

7. Watering golf courses, parks, school grounds, and recreational fields is permitted only ~~between the hours of 6:00 p.m. and 6:00 a.m. the following morning~~ ***on Tuesdays and Saturdays before the hours of 10:00 a.m. and after 6:00 p.m.***

EXCEPTION: Golf course greens may be watered on any day.

8. The use of water from fire hydrants shall be limited to fire fighting, system testing, and related activities, or to other activities necessary to maintain the public health, safety, and welfare.

9. Restaurants shall not serve water to their customers except when specifically requested.

~~10. The operation of any ornamental fountain or similar structure is prohibited.~~

~~11~~**10.** All water leaks shall be repaired immediately.

~~12~~ **11.** New construction meters or permits for unmetered services will not be issued. Construction water shall not be used for earth work or road construction purposes.

B. The prohibited uses of water as described above are not applicable to that use of water necessary for public health, safety, and welfare or for essential governmental services such as police, fire, and other similar emergency services.

SECTION 7: Section 14.40.044 of Chapter 40 of Title 14 of the Garden Grove Municipal Code is hereby amended as follows (deletions shown in ~~strikethrough~~, additions shown in ***bold-italics***):

**14.40.044: Stage 4 - Mandatory Conservation—Water  
Emergency**

A. Stage 4 applies during periods of severe drought and/or when a major failure of any supply or distribution facility, whether temporary

or permanent, occurs in the water distribution system of the State Water Project, the Metropolitan Water District, the Municipal Water District of Orange County, or City facilities. During Stage 4, the following water conservation measures shall apply ***to the use of potable water supplied by the City, except where necessary to address an immediate health and safety need or to comply with a term or condition in a permit issued by a state or federal agency,*** ~~except when reclaimed or recycled water is used:~~

1. All outdoor irrigation of vegetation is prohibited.
2. The use of water for agricultural or commercial nursery purposes, except for livestock watering, is prohibited.
3. Washing of autos, trucks, trailers, boats, airplanes, and other types of mobile equipment is prohibited.

EXCEPTION: Such washings are exempted from the above regulation where the health, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as with refuse trucks and vehicles used to transport food and perishables. In each such case, washing shall only be permitted by use of a hand-held bucket or similar container; a hand-held hose equipped with a positive self-closing water shut-off device; or a low-volume, high-pressure cleaning machine equipped to recycle any water used.

4. The filling, refilling or adding of water to swimming pools, spas, ponds, and artificial lakes is prohibited.
5. The use of water-softening devices is prohibited.
6. Watering of all golf course areas is prohibited. Watering of parks, school grounds, and recreation fields is prohibited, with the exception of plant materials classified as being rare, exceptionally valuable, or essential to the well being of rare or endangered animals, subject to the requirements of Section 14.40.025.
7. The use of water from fire hydrants shall be limited to fire fighting, system testing, or related activities necessary to maintain the public health, safety, and welfare.
8. Restaurants shall not serve water to their customers except when specifically requested.

~~9.~~ The operation of any ornamental fountain or similar structure is prohibited.

~~10-9.~~ New construction meters or permits for unmetered service will not be issued. Construction water shall not be used for earth work or road construction purposes.

~~11-10.~~ The use of water for commercial, manufacturing, or processing purposes shall be reduced in volume by 50%.

~~12-11.~~ No water shall be used for air conditioning purposes.

~~13-12.~~ All water leaks shall be repaired immediately.

B. The prohibited uses of water as described above are not applicable to that use of water necessary for public health, safety, and welfare, or for essential governmental services such as police, fire, and other similar emergency services.

SECTION 8: If any section, subsection, subdivision, sentence, clause, phrase, word, or portion of this Ordinance is, for any reason, held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council hereby declares that it would have adopted this Ordinance and each section, subsection, subdivision, sentence, clause, phrase, word, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, words or portions thereof be declared invalid or unconstitutional.

SECTION 9: The Mayor shall sign and the City Clerk shall certify to the passage and adoption of this Ordinance and shall cause the same, or the summary thereof, to be published and posted pursuant to the provisions of law and this Ordinance shall take effect thirty (30) days after adoption.

The foregoing Ordinance was passed by the City Council of the City of Garden Grove on the \_\_\_\_ day of \_\_\_\_\_.

ATTEST:

\_\_\_\_\_  
MAYOR

\_\_\_\_\_  
CITY CLERK

STATE OF CALIFORNIA )  
COUNTY OF ORANGE ) SS:  
CITY OF GARDEN GROVE)

I, KATHLEEN BAILOR, City Clerk of the City of Garden Grove, do hereby certify that the foregoing Ordinance was introduced for first reading and passed to second reading on June 23, 2015, with a vote as follows:

AYES: COUNCIL MEMBERS: (4) BEARD, BUI, PHAN, NGUYEN  
NOES: COUNCIL MEMBERS: (0) NONE  
ABSENT: COUNCIL MEMBERS: (1) JONES

# APPENDIX E

Notification of Public and Service Area Suppliers







## CITY OF GARDEN GROVE

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March 21, 2016

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

Re: Notice of Preparation of Garden Grove's 2015 Urban Water Management Plan

Dear Mr. Nguyen,

The City of Garden Grove (City) 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 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify the County that the City is in the process of preparing the 2015 UWMP. Based on the City's current schedule, a draft will be available for review prior to the public hearing, which is tentatively scheduled for June 14, 2016.

If the County would like more information or have any questions, please direct any inquiries to:

Cel Pasillas  
Water Quality Supervisor  
714-741-5276  
celp@ci.garden-grove.ca.us

Bao Nguyen  
Mayor

Steven R. Jones  
Mayor Pro Tem

Christopher V. Phan  
Council Member

Phat Bui  
Council Member

Kris Beard  
Council Member



## CITY OF GARDEN GROVE

---

March 21, 2016

Mr. Rob Hunter  
Municipal Water District of Orange County  
General Manager  
P.O. Box 20895  
Fountain Valley, CA 92708

Re: Notice of Preparation of Garden Grove's 2015 Urban Water Management Plan

Dear Mr. Hunter,

The City of Garden Grove (City) 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 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify MWDOC that the City is in the process of preparing the 2015 UWMP. Based on the City's current schedule, a draft will be available for review prior to the public hearing, which is tentatively scheduled for June 14, 2016.

If MWDOC would like more information or have any questions, please direct any inquiries to:

Cel Pasillas  
Water Quality Supervisor  
714-741-5276  
celp@ci.garden-grove.ca.us

Bao Nguyen  
Mayor

Steven R. Jones  
Mayor Pro Tem

Christopher V. Phan  
Council Member

Phat Bui  
Council Member

Kris Beard  
Council Member



## CITY OF GARDEN GROVE

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March 21, 2016

Mr. Jim Herberg  
Orange County Sanitation District  
General Manager  
10844 Ellis Avenue  
Fountain Valley, CA 92708

Re: Notice of Preparation of Garden Grove's 2015 Urban Water Management Plan

Dear Mr. Herberg,

The City of Garden Grove (City) 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 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify OCSD that the City is in the process of preparing the 2015 UWMP. Based on the City's current schedule, a draft will be available for review prior to the public hearing, which is tentatively scheduled for June 14, 2016.

If OCSD would like more information or have any questions, please direct any inquiries to:

Cel Pasillas  
Water Quality Supervisor  
714-741-5276  
celp@ci.garden-grove.ca.us

Bao Nguyen  
Mayor

Steven R. Jones  
Mayor Pro Tem

Christopher V. Phan  
Council Member

Phat Bui  
Council Member

Kris Beard  
Council Member



## CITY OF GARDEN GROVE

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March 21, 2016

Mr. Mike Markus  
Orange County Water District  
General Manager  
P.O. Box 8300  
Fountain Valley, CA 92728

Re: Notice of Preparation of Garden Grove's 2015 Urban Water Management Plan

Dear Mr. Markus,

The City of Garden Grove (City) 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 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify OCWD that the City is in the process of preparing the 2015 UWMP. Based on the City's current schedule, a draft will be available for review prior to the public hearing, which is tentatively scheduled for June 14, 2016.

If OCWD would like more information or have any questions, please direct any inquiries to:

Cel Pasillas  
Water Quality Supervisor  
714-741-5276  
celp@ci.garden-grove.ca.us

Bao Nguyen  
Mayor

Steven R. Jones  
Mayor Pro Tem

Christopher V. Phan  
Council Member

Phat Bui  
Council Member

Kris Beard  
Council Member

# DECLARATION OF PUBLICATION

(2015.5 C.C.P.)

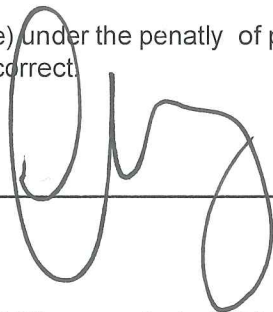
STATE OF CALIFORNIA, )  
COUNTY OF ORANGE )

I AM A CITIZEN OF THE UNITED STATES AND A RESIDENT OF THE AFORESAID COUNTY; I AM OVER THE AGE OF EIGHTEEN YEARS AND NOT A PARTY TO OR INTERESTED IN THE ABOVE ENTITLED MATTER. I AM THE PRINCIPLE CLERK OF THE ORANGE COUNTY NEWS, A NEWSPAPER OF GENERAL CIRCULATION PRINTED AND PUBLISHED TWICE WEEKLY IN THE CITY OF GARDEN GROVE, COUNTY OF ORANGE, WEST JUDICIAL DISTRICT, AND WHICH NEWSPAPER HAS BEEN ADJUDGED A NEWSPAPER OF GENERAL CIRCULATION BY THE SUPERIOR COURT OF THE COUNTY OF ORANGE, STATE OF CALIFORNIA, UNDER THE DATE OF 3/20/64 CASE #A31502 THAT THE NOTICE, OF WHICH THE ANNEXED IS A PRINTED COPY, HAS BEEN PUBLISHED BY DISTRIBUTION IN EACH REGULAR AND ENTIRE ISSUE OF SAID NEWSPAPER AND NOT IN ANY SUPPLEMENT THEREOF ON THE FOLLOWING DATES, TO WIT:

May 18, 25,

all in the year  
2016

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



signature

Date: May 25, 2016, executed at GARDEN GROVE, California

THIS SPACE IS FOR THE COUNTY CLERK'S STAMP

## PUBLIC HEARING THE CITY OF GARDEN GROVE

Notice is hereby given that the City of Garden Grove City Council will conduct a Public Hearing on Tuesday, June 14, 2016 at 6:30 p.m., in the Council Chamber of the Community Meeting Center, 11300 Stanford Avenue, Garden Grove, to receive and consider all evidence and reports relative to the City of Garden Grove's 2015 Urban Water Management Plan.

ALL INTERESTED PARTIES are invited to attend the City Council Public Hearing, or by writing a letter, to express opinions or submit evidence for or against the proposal as outlined above. If you challenge the City Council decision in Court, you may be limited to raising only those issues you or someone else raised at the Public Hearing described in this Notice, or in written correspondence delivered to the City Council at, or prior to, the Public Hearing. Written correspondence received before 3:00 p.m. on the Wednesday before the hearing will be given to the City Council prior to the meeting. Information received after that time will be given to the City Council at the time of the meeting.

Further information on the above may be obtained at the Public Works Department, Water Services Division, located at 13802 Newhope Street, Garden Grove, or by calling the Interim Water Services Manager, Cel Pasillas at (714) 741-5349.

/s/ KATHLEEN BAILOR, CMC  
City Clerk

Date: May 16, 2016  
Publish: May 18, 2016 and May 25, 2016  
*Orange County News*  
16-51246  
Publish May 18, 25, 2016

# APPENDIX F

Adopted UWMP Resolution



GARDEN GROVE CITY COUNCIL

RESOLUTION NO. 9376-16

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF GARDEN GROVE  
SUPERSEDING RESOLUTION NOS. 9046-11, 8681-05, 8857-08 AND ADOPTING  
THE 2015 URBAN WATER MANAGEMENT PLAN PURSUANT TO CALIFORNIA WATER  
CODE SECTIONS 10608 TO 10657

WHEREAS, pursuant to Water Code Section 10620 et seq., the City of Garden Grove ("City") prepared and adopted the 2005 Urban Water Management Plan for the City on December 13, 2005, amended on September 23, 2008 and as prepared and adopted the 2010 Urban Water Management Plan for the City on June 14, 2011;

WHEREAS, pursuant to Water Code Sections 10620 and 10621, the City is required to prepare, adopt, and update its Urban Water Management Plan at least once every five years on or before December 31, in years ending in five and zero;

WHEREAS, the 2015 Urban Water Management Plan complies with the requirements set forth in Water Code Section 10608 et seq. and Water Code Section 10610 et seq.;

WHEREAS, pursuant to Water Code Section 10621(b), the City has provided the requisite notice to any city or county within which the City provides water supplies at least sixty days prior to the June 14, 2016, Public Hearing;

WHEREAS, pursuant to Water Code Section 10642, the City has published successive notices of the June 14, 2016, Public Hearing on May 18, 2016 and May 25, 2016; and

WHEREAS, a duly noticed Public Hearing was held on June 14, 2016, and all interested persons were given an opportunity to be heard concerning any matter set forth in the 2015 Urban Water Management Plan.

NOW THEREFORE, the City Council of the City of Garden Grove hereby resolves, determines, and orders as follows:

Section 1. Resolution Nos. 8681-05 (adopting the 2005 Urban Water Management Plan), 8857-08 (amending the 2005 Urban Water Management Plan), and 9046-11 (adopting the 2010 Urban Water Management Plan) are hereby superseded in their entirety.

Section 2. The 2015 Urban Water Management Plan of the City of Garden Grove, dated May 2016, is hereby adopted pursuant to Water Code Section 10642.

Section 3. The City Clerk is directed to file a copy of the 2015 Urban Water Management Plan of the City of Garden Grove with the Department of Water Resources of the State of California, pursuant to Water Code Section 10644.

Adopted this 14<sup>th</sup> day of June 2016.

ATTEST:

/s/ BAO NGUYEN  
MAYOR

/s/ KATHLEEN BAILOR, CMC  
CITY CLERK

STATE OF CALIFORNIA    )  
COUNTY OF ORANGE    ) SS:  
CITY OF GARDEN GROVE )

I, KATHLEEN BAILOR, City Clerk of the City of Garden Grove, do hereby certify that the foregoing Resolution was duly adopted by the City Council of the City of Garden Grove, California, at a meeting held on the 14<sup>th</sup> day of June 2016, by the following vote:

AYES:       COUNCIL MEMBERS:   (5) BEARD, BUI, JONES, PHAN, NGUYEN  
NOES:       COUNCIL MEMBERS:   (0) NONE  
ABSENT:     COUNCIL MEMBERS:   (0) NONE

/s/ KATHLEEN BAILOR, CMC  
CITY CLERK



# 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*

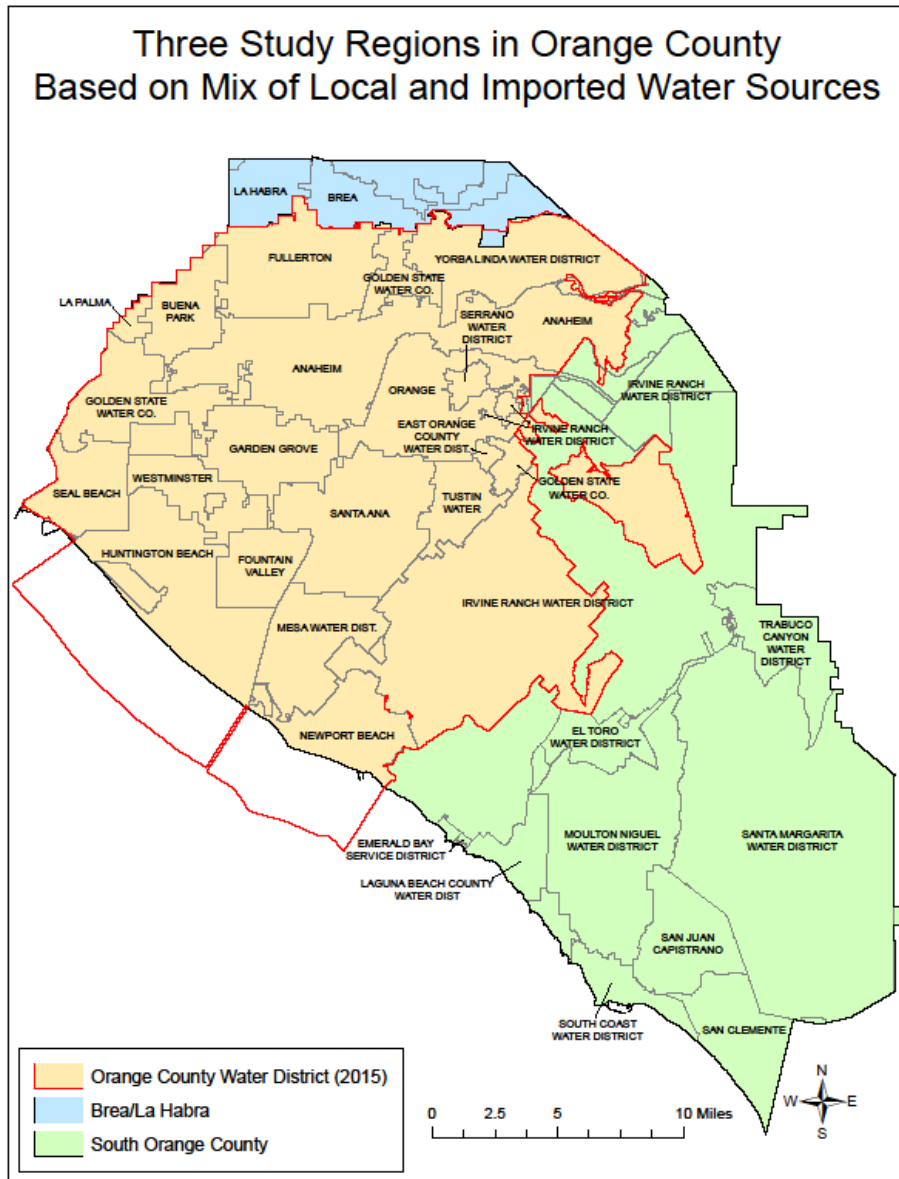
*Subject: Orange County Reliability Study, Water Demand Forecast and Supply Gap Analysis*

### **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.

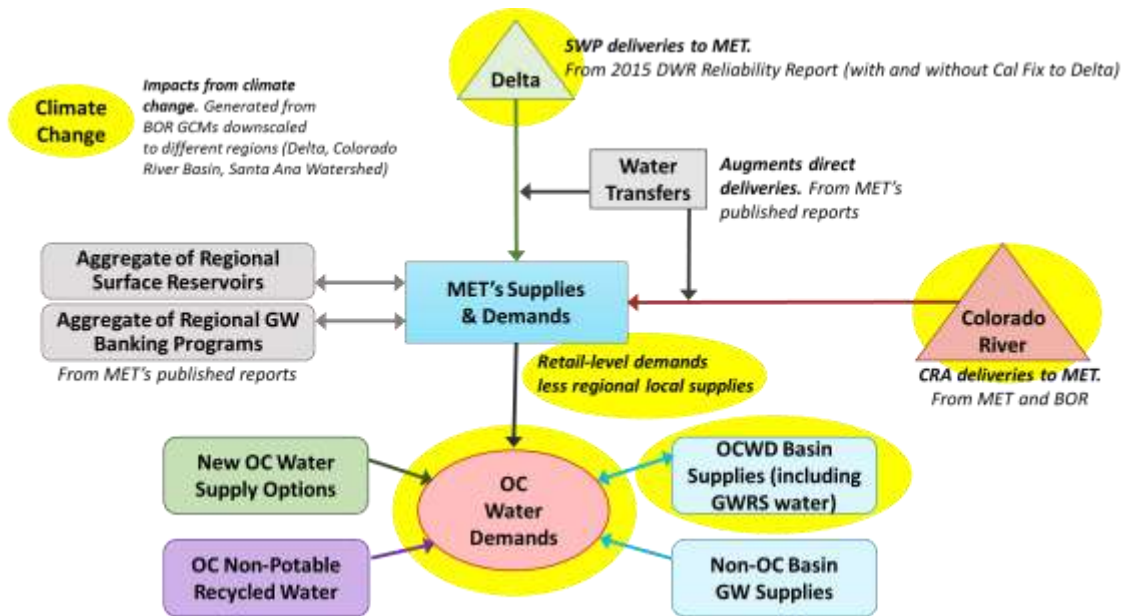


Figure 2. Overall Schematic for OC Model

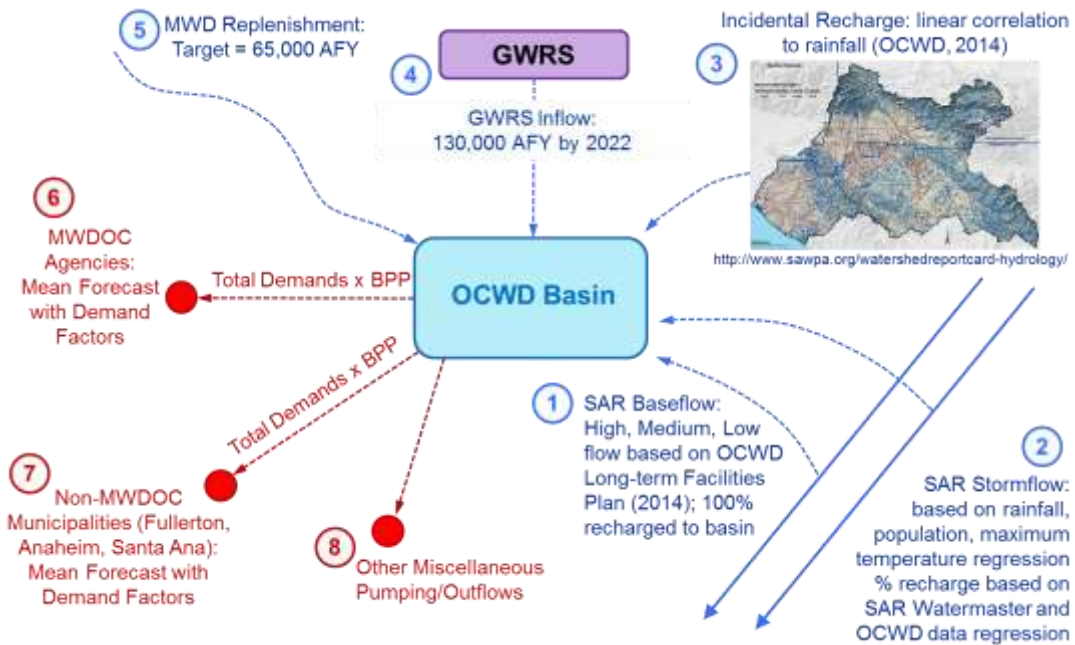


Figure 3. Inflows and Pumping Variables for OC Basin Component of OC Model

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 <sup>1</sup> | Unit Use <sup>2</sup> | Units  | Unit Use      | Units       | Unit Use     | Units         | Unit Use      | total acc   | %           |
| <b>Basin Area</b>              |                    |                       |        |               |             |              |               |               |             |             |
| ANAHEIM                        | 50,030             | 441                   | 58,618 | 193           | 169,902     | 90           | 19,260        | 160           | 63,004      | 7%          |
| BUENA PARK                     | 16,455             | 346                   | 8,600  | 224           | 31,566      | 137          | 4,837         | 39            | 19,004      | 11%         |
| FOUNTAIN VALLEY                | 12,713             | 336                   | 6,964  | 141           | 30,282      | 124          | 2,093         | 134           | 17,149      | 13%         |
| FULLERTON                      | 26,274             | 454                   | 22,575 | 176           | 60,839      | 115          | 6,251         | 398           | 31,557      | 5%          |
| GARDEN GROVE                   | 31,400             | 422                   | 17,580 | 295           | 48,394      | 134          | 7,221         | 163           |             |             |
| GSWC                           | 38,038             | 383                   | 17,218 | 215           | 58,901      | 122          | 6,857         | 68            | No data     |             |
| HUNTINGTON BEACH               | 44,605             | 297                   | 35,964 | 154           | 69,266      | 99           | 10,355        | 58            | 52,855      | 6%          |
| IRVINE RANCH WATER DISTRICT    | 39,182             | 444                   | 80,854 | 196           | 263,393     | 80           | 39,484        | 207           | 85,508      | 9%          |
| MESA WATER DISTRICT            | 16,585             | 320                   | 23,173 | 215           | 80,999      | 97           | 4,832         | 87            | No data     |             |
| NEWPORT BEACH                  | 19,455             | 329                   | 15,517 | 177           | 59,754      | 86           |               |               | 26,517      | 5%          |
| ORANGE                         | 28,545             | 470                   | 15,483 | 246           | 96,606      | 97           | No data       |               | 35,363      | 9%          |
| SANTA ANA                      | 35,547             | 461                   | 42,027 | 288           | 151,008     | 96           |               |               | No data     |             |
| TUSTIN                         | 11,788             | 505                   | 9,435  | 253           | 25,265      | 79           | 1,293         | 92            | 14,178      | 3%          |
| WESTMINSTER                    | 17,648             | 318                   | 10,973 | 215           | 24,148      | 109          | 976           | 84            | 20,379      | 5%          |
| YORBA LINDA WATER DISTRICT     | 22,046             | 586                   | 3,746  | 249           | 22,164      | 120          | 2,745         | 230           | No data     |             |
| <b>Weighted Average</b>        |                    | <b>411</b>            |        | <b>211</b>    |             | <b>97</b>    |               | <b>167</b>    |             | <b>7.3%</b> |
| <b>South County</b>            |                    |                       |        |               |             |              |               |               |             |             |
| 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%          |
| <b>Weighted Average</b>        |                    | <b>397</b>            |        | <b>216</b>    |             | <b>158</b>   |               |               |             | <b>65%</b>  |
| <b>Brea/La Habra</b>           |                    |                       |        |               |             |              |               |               |             |             |
| 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%          |
| <b>Weighted Average</b>        |                    | <b>431.06</b>         |        | <b>169.31</b> |             | <b>92.13</b> |               | <b>139.49</b> |             | <b>6%</b>   |

<sup>1</sup>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).

<sup>2</sup>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 <sup>2</sup> *            | 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<sup>2</sup> 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

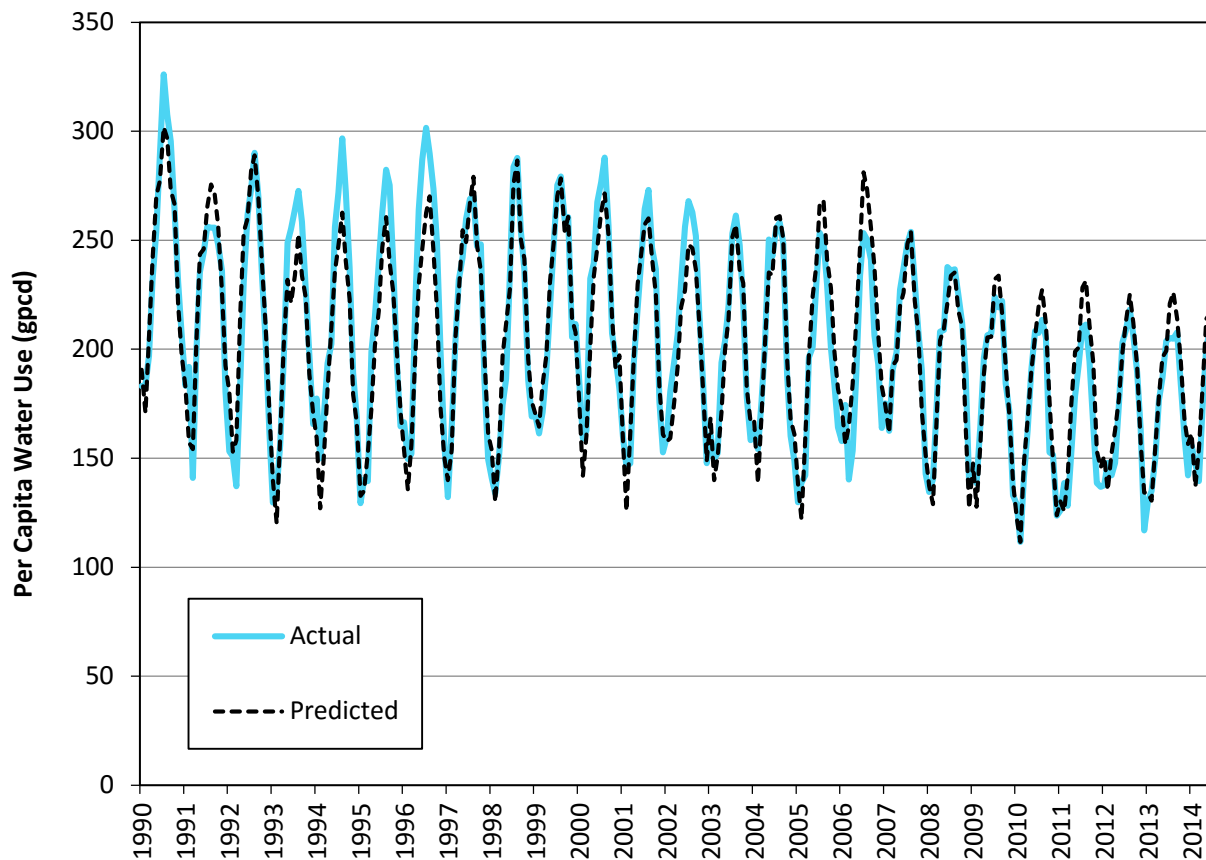


Figure 5. Verification of Statistical Water Use Model



| Impacts<br>(% impact on<br>per capita use) | Basin<br>Area | South<br>Orange<br>County | Brea /<br>La Habra | OC<br>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.<br>(Since 1990)       | -20%          | -17%                      | -7%                | -19%        |

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

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

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

**Figure 6. Impacts of Key Variables on Water Use**

## 2.1 Base Demand Forecast (No Additional Conservation post 2014)

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

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



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

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

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

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

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

**Table 3. Demographic Projections**

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

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

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

**Brea / La Habra**

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

**South County**

|      | Baseline Demand Forecast (no new conservation) |        |        |     |         |         |
|------|--|--------|--------|-----|---------|---------|
|      | SF   | MF     | COM    | IND | Non Rev | Total   |
|      | AFY  | AFY    | AFY    | AFY | AFY     | AFY     |
| 2015 | 56,181   | 26,940 | 41,990 |     | 7,507   | 132,616 |
| 2020 | 50,644   | 24,300 | 38,355 |     | 6,798   | 120,097 |
| 2025 | 55,512   | 27,191 | 42,443 |     | 7,509   | 132,655 |
| 2030 | 56,832   | 27,562 | 43,280 |     | 7,660   | 135,335 |
| 2035 | 57,350   | 27,884 | 43,970 |     | 7,752   | 136,956 |
| 2040 | 57,635   | 28,047 | 44,459 |     | 7,809   | 137,950 |

**OC Basin**

|      | Baseline Demand Forecast (no new conservation) |         |         |        |         |         |
|------|--|---------|---------|--------|---------|---------|
|      | SF   | MF      | COM     | IND    | Non Rev | Total   |
|      | AFY  | AFY     | AFY     | AFY    | AFY     | AFY     |
| 2015 | 175,544  | 100,997 | 127,252 | 26,027 | 30,087  | 459,907 |
| 2020 | 150,978  | 91,182  | 116,082 | 22,015 | 26,618  | 406,874 |
| 2025 | 161,270  | 99,782  | 127,803 | 23,190 | 28,843  | 440,889 |
| 2030 | 162,368  | 101,780 | 131,640 | 23,073 | 29,320  | 448,181 |
| 2035 | 162,772  | 103,766 | 134,543 | 22,958 | 29,683  | 453,722 |
| 2040 | 162,969  | 105,890 | 137,083 | 22,840 | 30,015  | 458,797 |

**Total Orange County**

|      | Baseline Demand Forecast (no new conservation) |         |         |        |         |         |
|------|--|---------|---------|--------|---------|---------|
|      | SF   | MF      | COM     | IND    | Non Rev | Total   |
|      | AFY  | AFY     | AFY     | AFY    | AFY     | AFY     |
| 2015 | 241,129  | 131,076 | 175,431 | 27,059 | 38,780  | 613,476 |
| 2020 | 210,019  | 118,473 | 160,042 | 22,889 | 34,488  | 545,911 |
| 2025 | 225,676  | 130,236 | 176,279 | 24,111 | 37,499  | 593,801 |
| 2030 | 228,113  | 132,685 | 181,025 | 23,990 | 38,137  | 603,950 |
| 2035 | 229,034  | 135,151 | 184,676 | 23,871 | 38,604  | 611,338 |
| 2040 | 229,524  | 137,450 | 187,747 | 23,750 | 38,996  | 617,466 |

## 2.2 Future Passive and Baseline Active Water Conservation

### 2.2.1 Future Passive Water Conservation

The following future passive water conservation estimates were made:

- High efficiency toilets – affecting new homes and businesses (post 2015) and remodels
- High efficiency clothes washers – affecting new homes (post 2015)
- Model Water Efficient Landscape Ordinance – affecting new homes and businesses (post 2015)

**High Efficiency Toilets**

A toilet stock model was built tracking different flush rates over time. All new homes (post 2015) are assumed to have one gallon per flush toilets. This model also assumes a certain amount of turn-over of older toilets due to life of toilet and remodeling rates. This analyses was done for single-family, multifamily and non-residential sectors. The following assumptions were made:

- Number of toilet flushes is 5.5 per person per day for single-family and multifamily homes.
- Household size is calculated from CDR data on persons per home. In single-family, household size decreases over time.
- Number of toilet flushes is 2.5 per employee per day for non-residential.
- Replacement/remodeling rates are 7% per year for 5 gal/flush toilet; 6% per year for 3.5 gal/flush toilets; and 5% per year for 1.6 gal/flush toilets.

Table 5 shows this toilet stock model for the OC Basin for single-family and non-residential sectors as an example.

**Table 5. Toilet Stock Model for OC Basin (example)**

| OC Basin Single-Family |      |               |   |        |         |         |         |          |                 |               |
|------------------------|------|---------------|---|--------|---------|---------|---------|----------|-----------------|---------------|
| # Flushes              | Year | Total Housing | Portion of Homes with Gal/Flush Toilets |        |         |         |         |          | Savings (GPD/H) | Savings (AFY) |
|                        |      |               | 7                                       | 5      | 3.5     | 1.6     | 1       | Av Flush |                 |               |
| 17.40                  | 2000 | 348,114       | 3,133                                   | 53,261 | 123,232 | 168,487 | -       | 2.84     |                 |               |
| 17.40                  | 2013 | 379,999       | -                                       | 4,794  | 27,111  | 348,094 | -       | 1.78     |                 |               |
| 17.40                  | 2015 | 381,806       | -                                       | 4,122  | 23,858  | 313,285 | 40,541  | 1.69     |                 |               |
| 17.37                  | 2020 | 386,324       | -                                       | 2,680  | 16,700  | 234,964 | 131,980 | 1.50     | 3.32            | 1,435         |
| 17.31                  | 2025 | 389,734       | -                                       | -      | 11,690  | 176,223 | 201,821 | 1.35     | 5.98            | 2,610         |
| 17.23                  | 2030 | 392,387       | -                                       | -      | 8,183   | 132,167 | 252,037 | 1.25     | 7.54            | 3,312         |
| 17.14                  | 2035 | 393,363       | -                                       | -      | 5,728   | 99,125  | 288,509 | 1.19     | 8.64            | 3,806         |
| 17.05                  | 2040 | 393,840       | -                                       | -      | 4,010   | 74,344  | 315,486 | 1.14     | 9.43            | 4,159         |

| OC Basin Non-Residential |      |           |                                       |        |         |         |           |          |                 |               |
|--------------------------|------|-----------|---------------------------------------|--------|---------|---------|-----------|----------|-----------------|---------------|
| # Flushes                | Year | Empl      | Portion of Emp with Gal/Flush Toilets |        |         |         |           |          | Savings (GPD/E) | Savings (AFY) |
|                          |      |           | 7                                     | 5      | 3.5     | 1.6     | 1         | Av Flush |                 |               |
|                          |      |           |                                       |        |         |         |           |          |                 |               |
| 3,298,440                | 2015 | 1,319,376 | -                                     | 13,194 | 131,938 | 461,782 | 712,463   | 1.50     |                 |               |
| 3,510,508                | 2020 | 1,404,203 | -                                     | 8,576  | 92,356  | 346,336 | 956,935   | 1.34     | 0.41            | 641           |
| 3,633,438                | 2025 | 1,453,375 | -                                     | 5,574  | 64,649  | 259,752 | 1,123,399 | 1.23     | 0.67            | 1,083         |
| 3,729,448                | 2030 | 1,491,779 | -                                     | 3,623  | 45,255  | 194,814 | 1,248,087 | 1.16     | 0.84            | 1,404         |
| 3,801,693                | 2035 | 1,520,677 | -                                     | 2,355  | 31,678  | 146,111 | 1,340,533 | 1.12     | 0.96            | 1,635         |
| 3,864,600                | 2040 | 1,545,840 | -                                     | 1,531  | 22,175  | 109,583 | 1,412,551 | 1.08     | 1.04            | 1,808         |

### **High Efficiency Clothes Washers**

It was assumed that all new clothes washers sold after 2015 would be high efficiency and roughly save 0.033 afy per washer<sup>1</sup>. 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<sup>1</sup>. Table 6 summarizes the per parcel savings for the total county using this method.

**Table 6. Estimated Parcel Savings from MWELO for Total Orange County**

| Parcel Type                  | Number of Parcels | Total Irrigable Area (sq. feet) | Current Turf Area (sq. feet) | Turf Conversion (sq. feet)* | Turf Conversion (sq. ft / parcel) | Conservation Savings (afy/parcel) |
|------------------------------|-------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| Single-Family Residential    | 527,627           | 2,114,679,368                   | 897,177,779                  | 368,507,937                 | 698                               | 0.091                             |
| Multifamily Residential      | 555,255           | 155,315,983                     | 51,697,361                   | 12,868,365                  | 23                                | 0.003                             |
| Businesses (Non-Residential) | 1,623,307         | 499,127,269                     | 212,043,667                  | 212,043,667                 | 131                               | 0.017                             |

\* Assumes 25% turf conversion for single-family and multifamily, and 100% for businesses.

The conservation savings in afy/parcel where then multiplied by new homes and businesses (post 2015), assuming a 75 percent compliance rate.

### **2.2.2 Future Baseline Active Water Conservation**

To estimate a baseline water savings from future active water conservation measures, the actual average annual water savings for the last seven years for the SoCal WaterSmart program within Orange County were analyzed. A continuation of this program through 2040 at similar annual implementation rates was assumed to be representative of a baseline estimate for active water conservation into the future.

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<sup>1</sup> Per MET's SoCal WaterSmart conservation estimates, table provided by MWDOC (2015).

New active conservation measures or more aggressive implementation of existing active conservation will be evaluated as part of a portfolio analysis of water demand and supply options in Phase 2 of the OC Study.

### 2.2.3 Total Future Water Conservation Savings

Combining future passive and active water conservation results in a total estimated water savings, which is summarized in Table 7. The total passive and active conservation for the total Orange County is shown in Figure 7.

**Table 7. Future Passive and Baseline Active Water Conservation Savings**

**Brea/La Habra Area**

|      | Single-Family Savings (AFY) |          |         |        |       | Multifamily Savings (AFY) |         |        |       | Non-Residential Savings (AFY) |         |        |       |
|------|-----------------------------|----------|---------|--------|-------|---------------------------|---------|--------|-------|-------------------------------|---------|--------|-------|
|      | 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 |

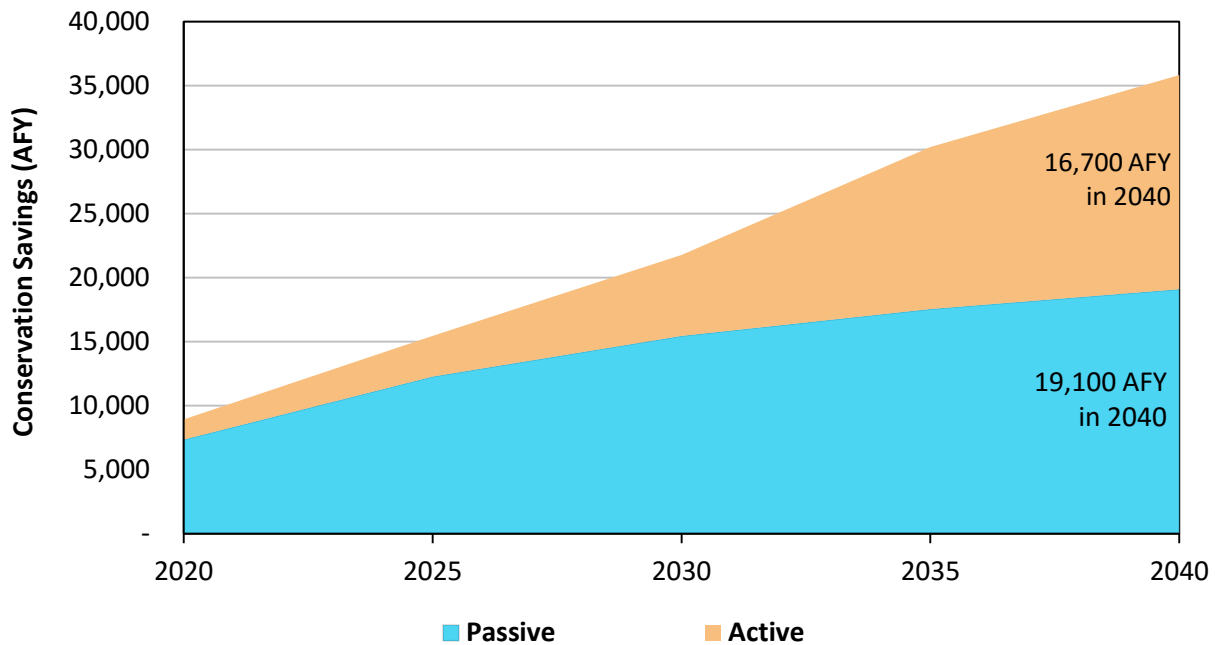


Figure 7. Total Water Conservation in Orange County

### 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**

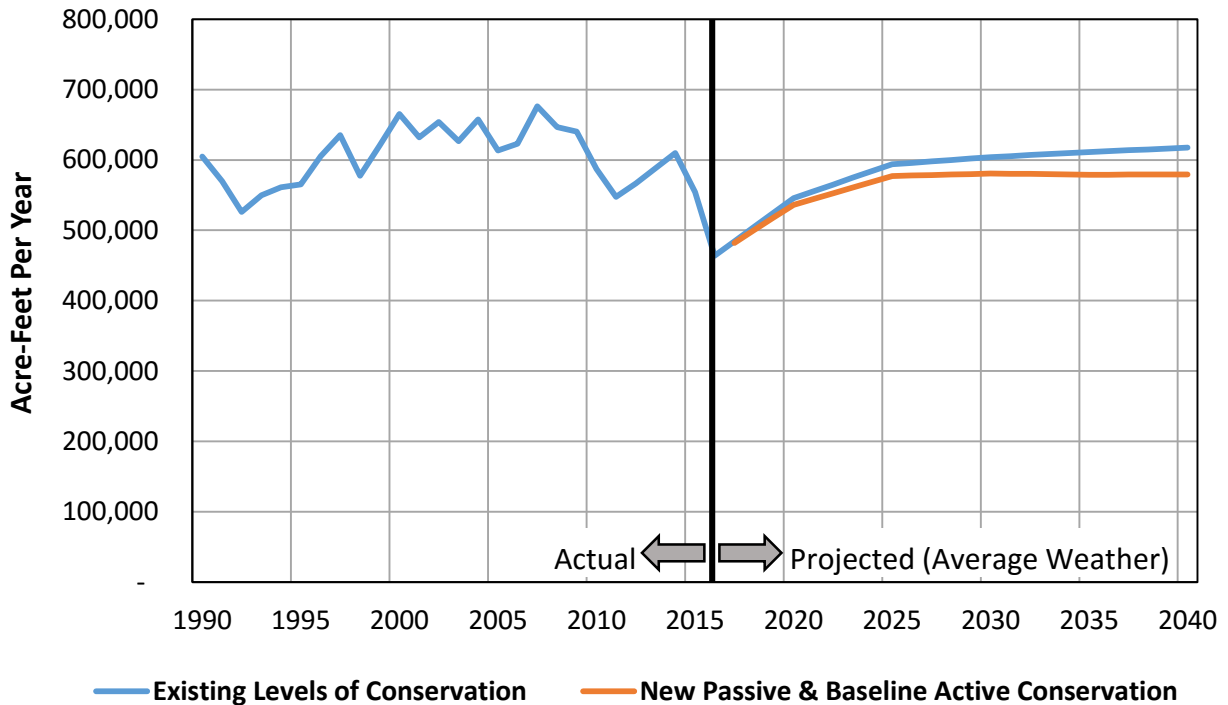
|      | With Conservation Demand |         |         |             |           |
|------|--------------------------|---------|---------|-------------|-----------|
|      | SF AFY                   | MF AFY  | CII AFY | Non Rev AFY | Total AFY |
| 2020 | 148,902                  | 89,733  | 136,077 | 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<br>Year – Sequence 1 | Hydrologic Simulation<br>Year – Sequence 2 | ... | Hydrologic Simulation<br>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                    |
| <b>Net Groundwater for OC Basin Agencies</b>         | <b>288,500</b> | <b>311,500</b> | <b>168,000 to 455,000</b> |

\* 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  $\pm 5$  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  $\pm 80$  percent for the Los Angeles Aqueducts and  $\pm 55$  percent for surface reservoirs. Thus, the variability for demands on MET in any given year can be  $\pm 15$  to 25 percent. This fact alone makes storage so key in assuring supply reliability for MET and the region.

**Table 9. Demands on MET**

| <b>Total Demand (AFY)</b> | <b>2020</b>      | <b>2030</b>      | <b>2040</b>      |
|---------------------------|------------------|------------------|------------------|
| 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          |
| <b>Total Demand</b>       | <b>4,236,645</b> | <b>4,367,650</b> | <b>4,453,698</b> |

| <b>Local Supplies (AFY)</b>    |                  |                  |                  |
|--------------------------------|------------------|------------------|------------------|
| 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           |
| <b>Total Local Supplies</b>    | <b>2,314,061</b> | <b>2,390,637</b> | <b>2,425,663</b> |

| <b>Demand On MET (AFY)</b>              |                  |                  |                  |
|---|------------------|------------------|------------------|
| 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          |
| <b>Total Net Demand on Metropolitan</b> | <b>1,922,584</b> | <b>1,977,013</b> | <b>2,028,035</b> |

#### 4.2.2 Supplies from Colorado River and Delta

MET's water supply from the Colorado River, via the Colorado River Aqueduct (CRA), has historically been the backbone to MET's supply reliability. Before the settlement agreement between lower Colorado River Basin states and water agencies that use Colorado River water within California, MET kept the CRA full at 1.2 million acre-feet (maf) per year or nearly at that level in many years. The settlement agreement requires California to live within its 4.4 maf apportionment, and dictates how Colorado River water within California is prioritized. This eliminated most of the surplus water that MET was using to keep the CRA full. To deal with this challenge, MET has developed a number of water transfers and land fallowing programs to mitigate the impacts of the settlement agreement. The 2015 MET IRP is assuming that it will maintain minimum CRA supply of 0.90 maf, with a goal of a full CRA during dry years, when needed (although it is not specified exactly how that will occur).

For the OC Study, we have assumed similar baseline assumptions as the MET IRP, but have added some uncertainties with regard to climate scenarios under Scenario 2 and more significant impacts under Scenario 3. Under significant climate scenario impacts (Scenario 3), where the BOR simulates that Lake Mead elevation would fall below 1,000 feet about 80 percent of the time, the OC Study assumed MET would get a proportionate share of shortages that are allocated by BOR. Exactly how BOR would manage water shortages when Lake Mead elevation falls below 1,000 is uncharted territory, but assuming some proportional allocation of Colorado River water among the Lower Basin states and within California is a plausible scenario. Figure 11 presents the assumed CRA water supplies to MET for the OC Study with (Scenario 3) and without (Scenarios 1 & 2) significant climate scenario impacts. Under the significant climate scenario (Scenario 3), there is a 50 percent probability that CRA deliveries would be below 815,000 afy and a 20 percent probability that CRA deliveries would be below 620,000 afy.

The other main source of imported water available to MET is from the Delta and is delivered to Southern California via the State Water Project (SWP). Although MET's contract for SWP water is 2.0 maf, it has never received that amount. Prior to the QSA (in 2003) when MET relied more heavily on CRA supplies, the maximum water taken by MET from the SWP exceeded 1.1 maf in only three years (1989, 1990 and 2000). Beginning in 2001, MET has tried to maximize their delivery of SWP water. In very wet years, MET typically receives about 1.7 maf of supply from the SWP (about 80 to 85% of their total contract). More typically, MET receives closer to 1.2 maf of supply from the SWP (about 60% of their maximum contract). Droughts and environmental regulatory restrictions in the Delta have greatly impacted the reliability of SWP supply. Biological opinions regarding endangered species not only limit Delta exports during dry years, but have greatly impacted exports during more normal years when water agencies such as MET are counting on such water for storage replenishment.



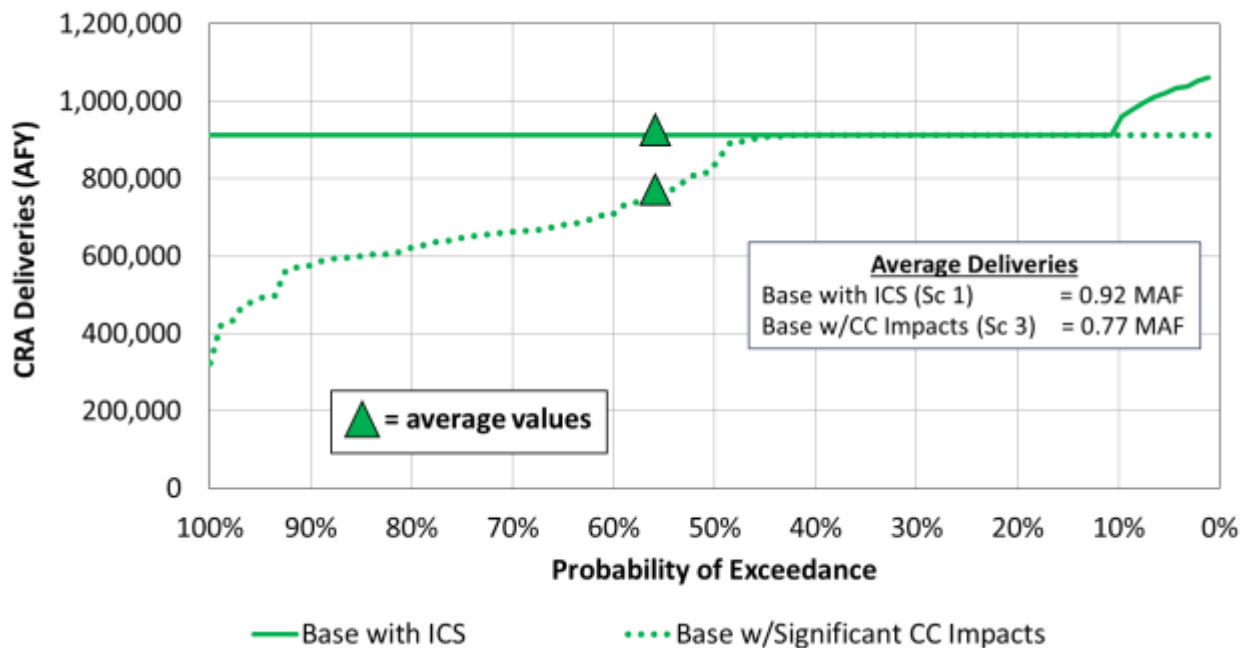


Figure 11. Colorado River Aqueduct Deliveries to MET

To stabilize the decline in SWP deliveries, California has committed to the California WaterFix (Cal Fix) and California EcoRestore. In the long-term, the preferred alternative identified in Cal Fix is expected to increase SWP deliveries (above what they otherwise would have been) by providing more flexible water diversions through improved conveyance and operations. It is important to note that the Cal Fix does not generate **NEW** water supplies per se, but allows supplies lost due to regulatory restrictions to be regained. This project would also provide much needed resiliency during seismic events in the Delta. The new conveyance and diversion facilities will allow for increased water supply reliability and a more permanent solution for flow-based environmental standards. The anticipated implementation of the Cal Fix is expected to be around 2030. Assuming a more flexible, adaptive management strategy, MET is assuming that if Cal Fix moves forward that regulatory relief from further biological opinions in the Delta would occur and SWP deliveries would return to pre-biological opinion deliveries as soon as 2020. However, some might argue this is an optimistic assumption, and there is no certainty that such relief would occur until the project is operational. Therefore for the GAP analysis, the OC Study assumed that improved SWP deliveries from Cal Fix would begin in 2030.

Climate variability can further reduce the reliability of SWP deliveries. The source of water that is pumped from the Delta originates in the Sierra Nevada Mountains as snowpack. It is widely accepted by climate and hydrology experts that climate scenario impacts on snowpack-driven water supplies is even more significant because even a fraction of a degree increase leads to early snowmelt which reduces the ability to capture river flows in surface reservoirs. Using methods described in TM#2, CDM Smith and its climate scenario expert Dr. David Yates estimated the potential impacts to the SWP under significant climate scenario. These estimates are similar to

earlier work that California DWR did on climate scenario impacts on SWP reliability. Figure 12 presents the full range of SWP deliveries to MET with and without Cal Fix and with and without significant climate scenario impacts. As shown, the Cal Fix greatly improves the reliability of SWP supplies to MET—with an average increase in supply (restoration of supplies compared to the no project alternative) of over 400,000 afy. Significant climate scenario reduces SWP deliveries by an average of 200,000 afy, even with the Cal Fix.

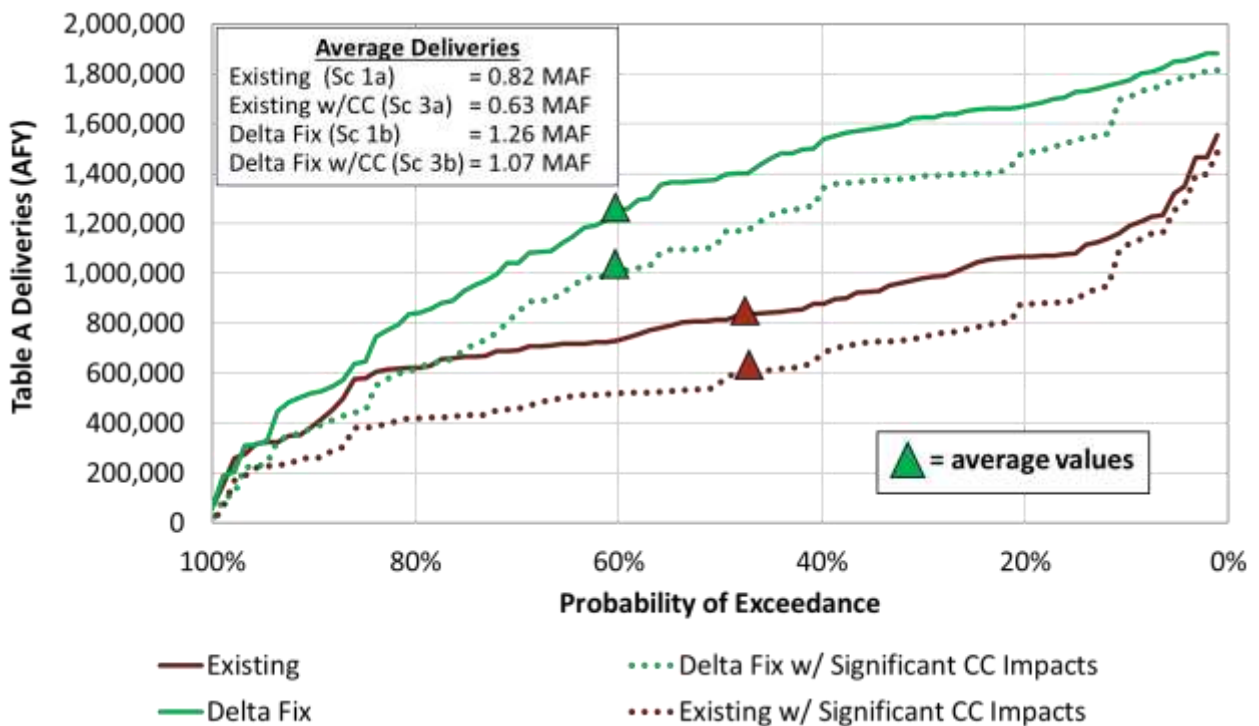


Figure 12. State Water Project Deliveries to MET

### 4.2.3 Overall MET Reliability

In addition to CRA and SWP water, MET has significant surface storage and groundwater storage programs. MET also has a number of water transfers in the Central Valley. These investments have been critical for the region’s supply reliability during droughts. However, since the first MET IRP in 1996 MET has had to allocate its imported water to its member agencies three in the last seven years.

Using the indexed-sequential simulation method described in TM#2, MET water reliability can be illustrated for several hydrologic sequences. Figures 13, 14 and 15 utilize just 2 of the 93 hydrology sequences to demonstrate how the analysis works. Figure 13 shows the MET demands and supplies without a Cal Fix for the forecast period 2015 to 2040 with the last 25-year hydrologic sequence of 1989 to 2014 imposed. In other words, forecast year 2015 is 1989, 2016 is 1990 ... and 2040 is 2014. Of all the 93 possible 25-year hydrologic sequences, this one is the worst in terms of cumulative supply shortages.

Figure 14 shows Met demands and supplies without a Cal Fix for a more normal hydrology sequence imposed on the forecast period (this sequence begins with 1950 and ends in 1975). Even with a normal hydrology, there are still some water shortages in the later years. Figure 15, shows this same hydrology (1950 to 1975) but with a Cal Fix. Under this scenario, regional storage replenishes greatly and shortages in the later years are eliminated.

When all 93 hydrologic sequences are simulated, and under all six scenarios representing various climate scenarios and Cal Fix assumptions, the probability of MET shortages exceeding 15 percent can be derived. A regional 15 percent shortage is similar to the allocation MET imposed in 2015. Figure 16 presents this probability of MET shortage. The results presented here for Scenario 1 with and without Cal Fix are similar to those presented in MET’s Draft IRP.

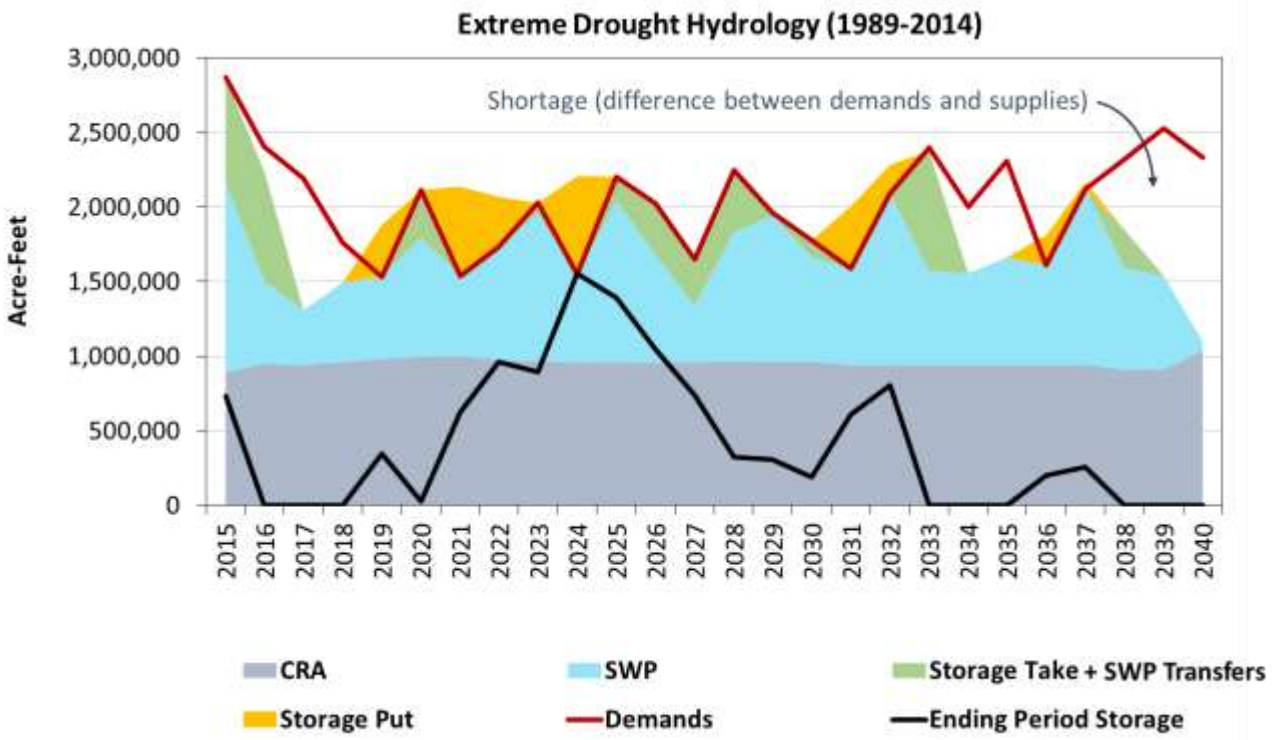


Figure 13. MET Reliability under Drought, for Scenario 1a (no Climate variability, no Cal Fix)



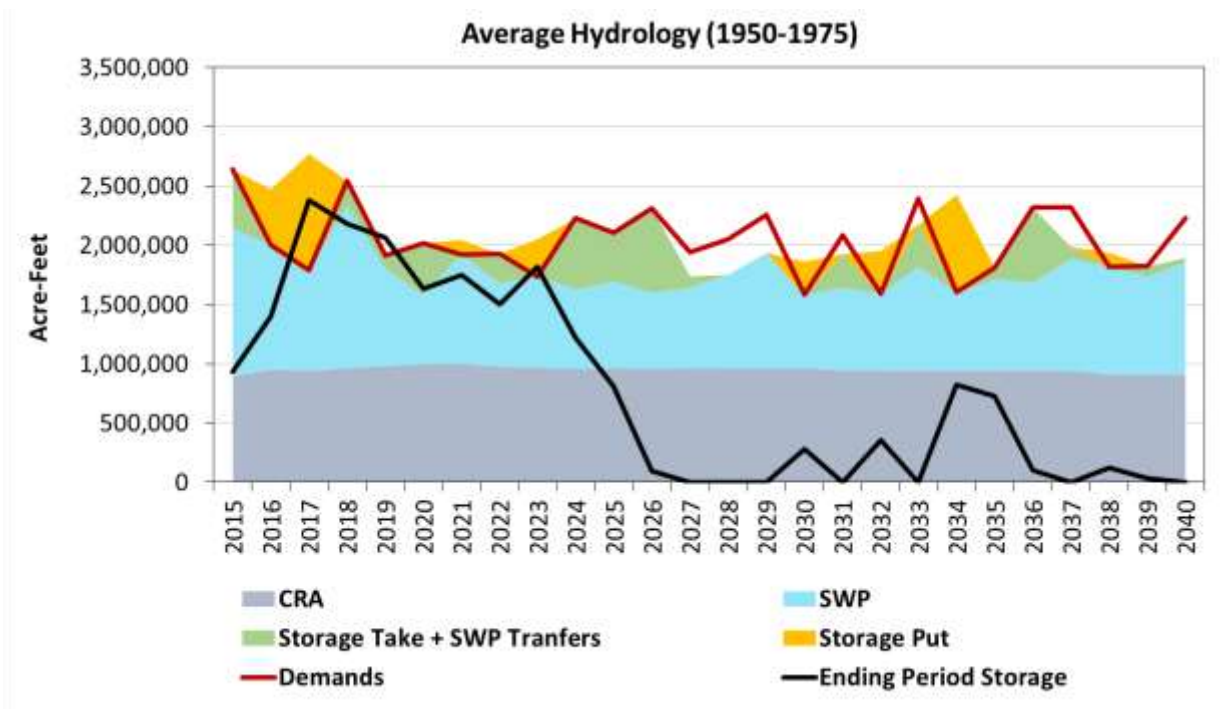


Figure 14. MET Reliability under Average Hydrology, for Scenario 1a (no Climate variability, no Cal Fix)

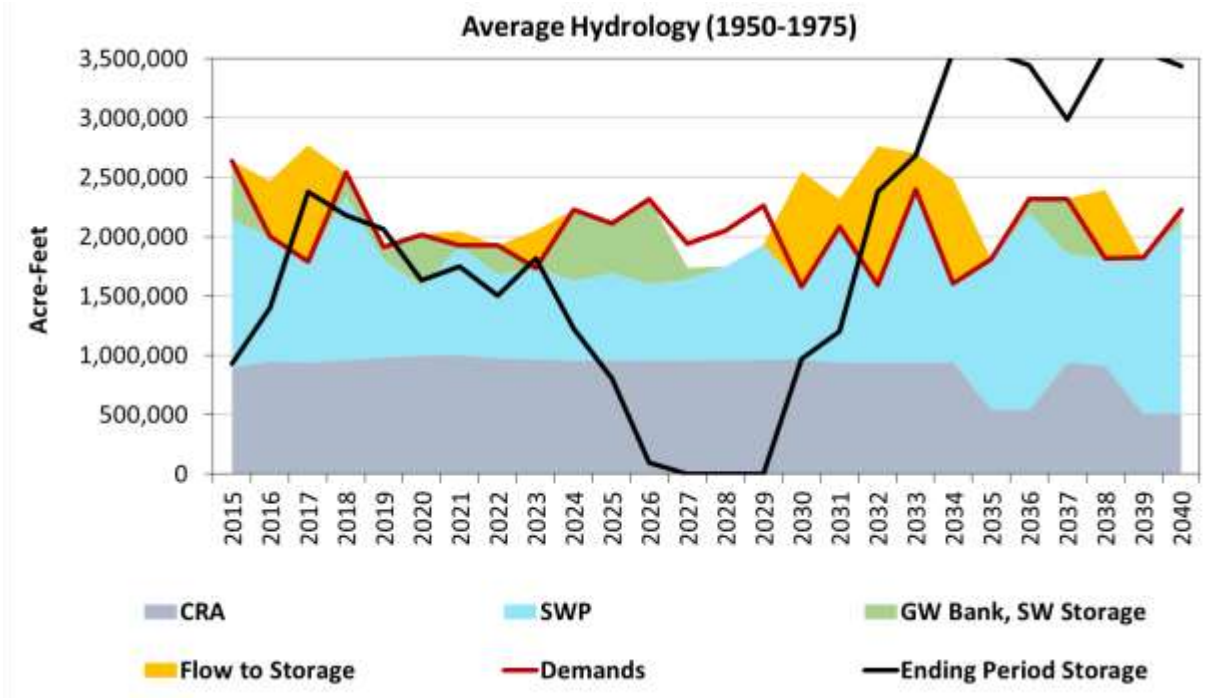


Figure 15. MET Reliability under Average Hydrology, for Scenario 1b (no Climate variability, with Cal Fix)

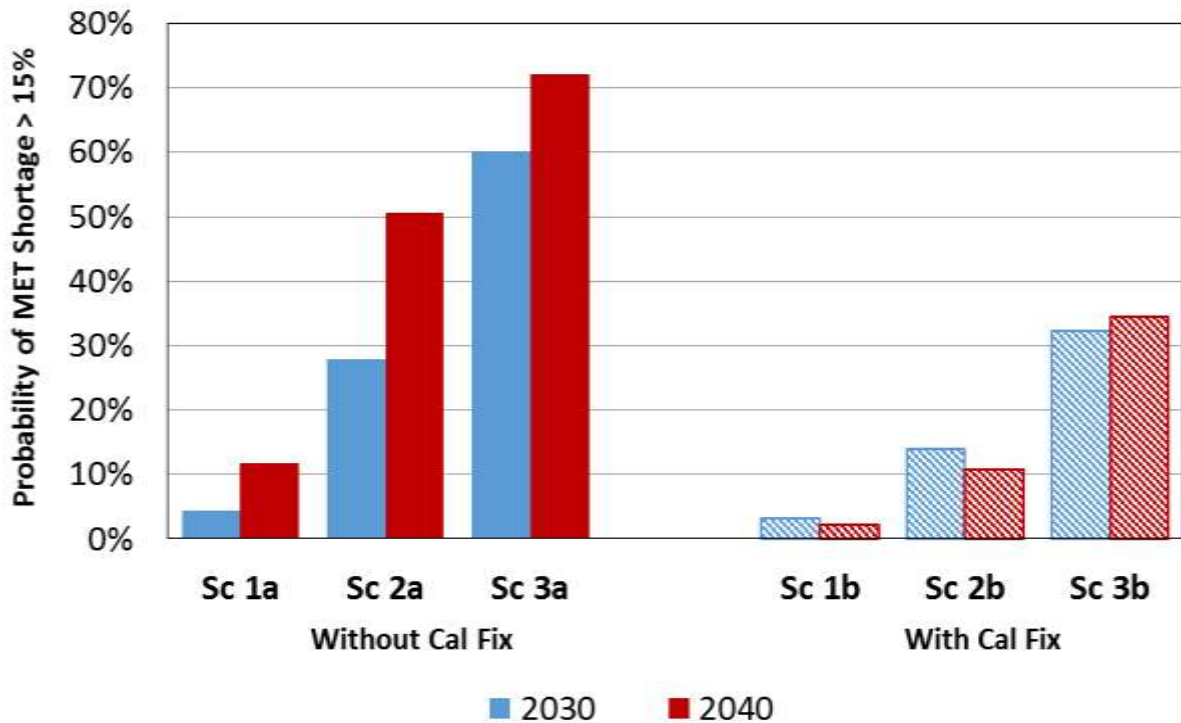


Figure 16. MET Supply Reliability (Percent of Time MET Supply Shortage Greater than 15%)

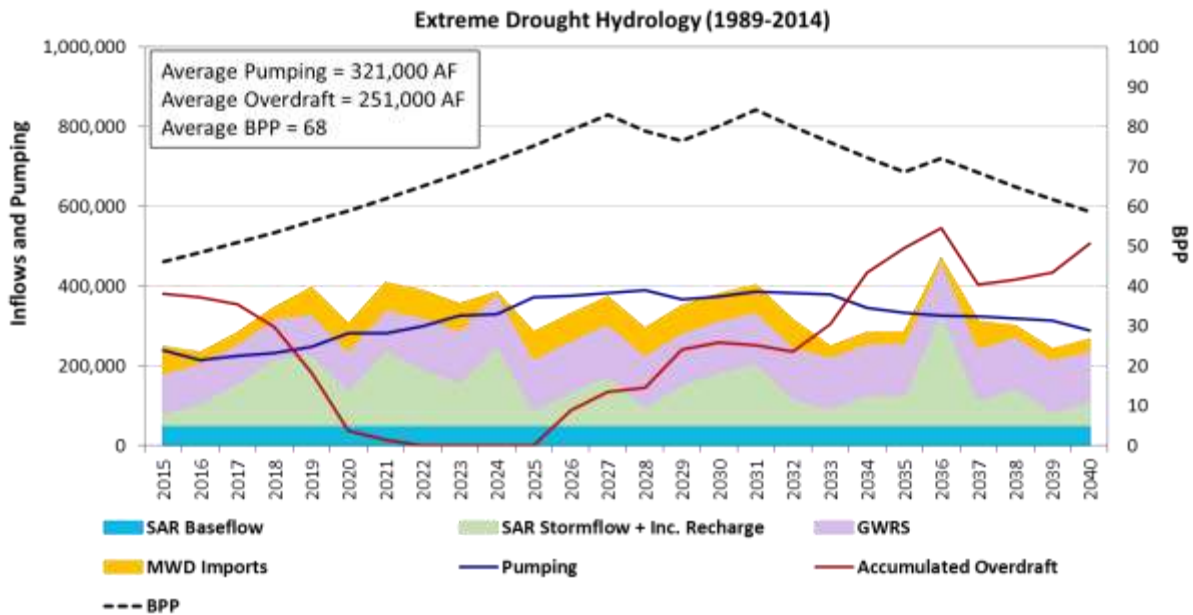
As shown in Figure 16, the impacts of climate variability (Scenarios 2 and 3) can be significant in increasing the probability and magnitude of MET shortages. In 2040, significant climate scenario (Scenario 3) can increase the probability of shortage by 60 percent without Cal Fix. The analysis also shows the enormous benefit that Cal Fix can have on MET reliability, decreasing the probability of shortage from 50 percent in 2040 to 10 percent under Scenario 2.

### 4.3 Orange County Water Supply Gap

When MET shortages occur, imported water is allocated to Orange County based on MET’s current drought allocation formula. For the OC Basin, the estimation of the water supply gap required that the OC Model be able to simulate the way OCWD manages the OC Basin. The OC Basin’s Basin Production Percentage (BPP) was set in the model to look forward each year and estimate all inflows to the basin, then set the BPP so that the cumulative overdraft in the basin would not exceed 500,000 af. In addition, the model does not allow the change in overdraft to exceed certain thresholds—essentially trying to keep some managed overdraft in the basin.

*Note: Modeling the management of the OCWD basin is complex, especially with respect to future uncertainties. The discussion of this effort herein was an initial attempt to reflect on how the BPP could be set within the context of a modeling effort. Since this initial effort, CDM Smith and OCWD have met a number of times to refine the analysis for the Phase 2 effort. The refined analysis will be documented in the final Project Technical Memorandum.*

Figure 17 presents a simulation of the OC Basin for the forecast period of 2015 to 2040, under an extreme drought hydrology of 1989 to 2014. Under Scenario 1, with no climate scenario and no Cal Fix, Figure 17 shows the pumping from the basin (blue line), the sources of inflows to the basin (shaded color areas), the cumulative basin overdraft (red line), and the BPP (dashed black line read on right-hand axis).



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

When the other local Orange County water supplies from the Brea/La Habra and South County areas are added to the simulation, the OC Model estimates the overall supply reliability for the OC County total. Using all 93 hydrologic sequences, a probability chart can be created. The probability chart shows the percent time that any water shortage occurs and to what magnitude. Figure 18 shows the overall reliability for OC County total for Scenarios 1a, 2a and 3a (no Cal Fix) for the year 2040. As shown on this chart, there is a 50 percent chance that some level of shortage occurs for Scenario 1a. This probability of some shortage occurring increases to 80 percent for Scenario 2a and 98 percent for Scenario 3a. The average shortages are 32,000 afy, 74,000 afy, and 126,000 afy for Scenarios 1a, 2a, and 3a respectively.

Figure 19 compares Scenarios 1, 2, and 3 with and without the Cal Fix. As shown in Figure 19, the Cal Fix dramatically reduces the probability of shortages and thus the average shortages. The average shortages under the Cal Fix are 5,000 afy, 17,000 afy, and 64,000 afy for Scenarios 1b, 2b, and 3b respectively. The one thing to note, however, is that the maximum shortages (which occur about 1 to 3 percent of the time) are not reduced substantially with the Cal Fix. These maximum shortages may require a multipronged strategy to minimize or eliminate, such as new base-loaded supplies, storage, water transfers and mandatory restrictions on some water uses.

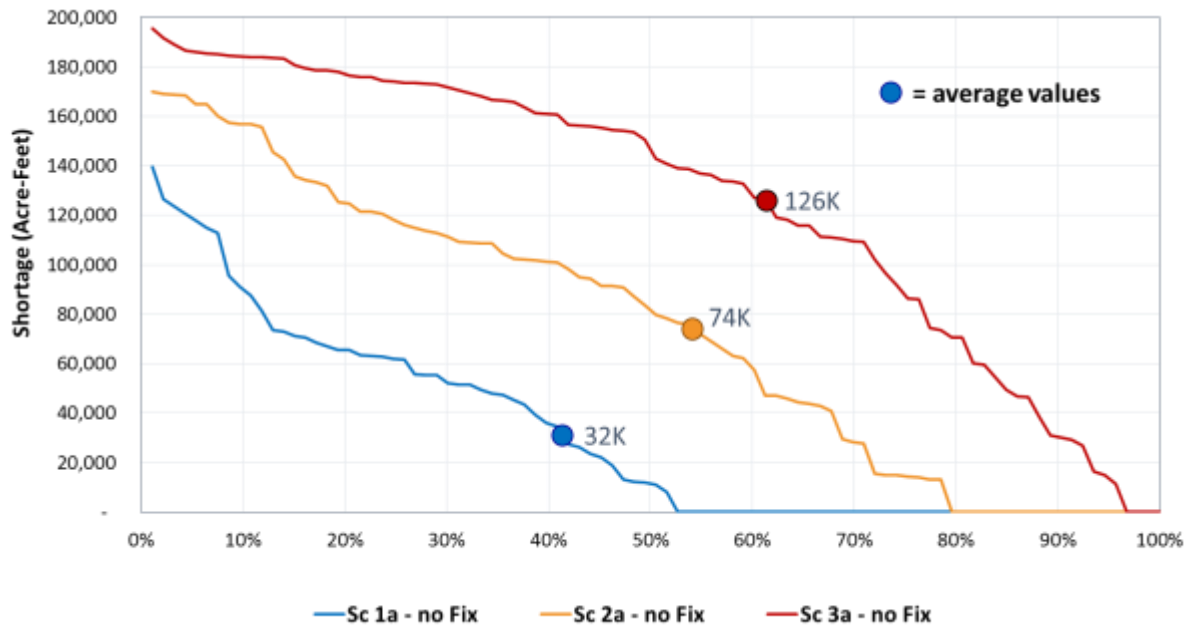


Figure 18. Probability of Water Shortages (Gap) for Orange County Total, No Cal Fix

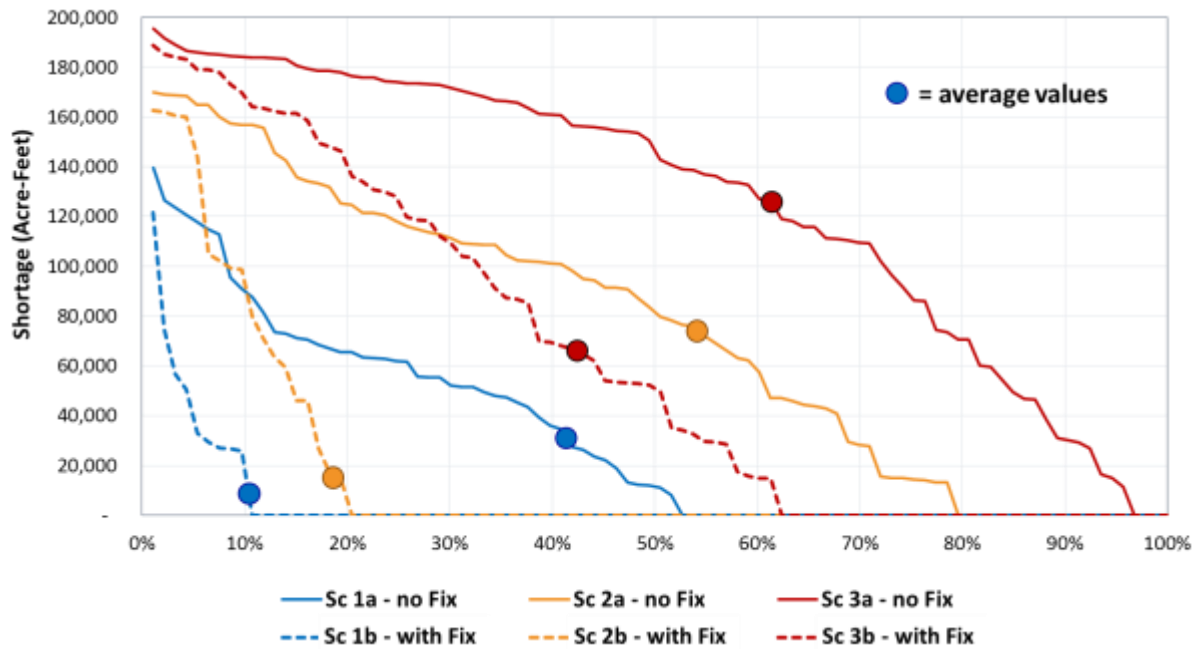


Figure 19. Probability of Water Shortages (Gap) for Orange County Total, with Cal Fix

This supply reliability analysis was done for all three areas of the Orange County, Brea/La Habra, OC Basin, and South County. The average water shortages (averaged for all 93 hydrologic sequences) are shown in Table 10 for all six scenarios.

**Table 10. Summary of Average Water Supply Gap for Orange County Areas (acre-feet year)**

| Area                   | Scenario 1  |              | Scenario 2   |              | Scenario 3    |              |
|------------------------|-------------|--------------|--------------|--------------|---------------|--------------|
|                        | a – no Fix  | b – with Fix | a – no Fix   | b – with Fix | a – no Fix    | b – with Fix |
| <b>Brea / La Habra</b> |             |              |              |              |               |              |
| 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%)   |
| <b>OC Basin</b>        |             |              |              |              |               |              |
| 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%) |
| <b>South County</b>    |             |              |              |              |               |              |
| 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%) |
| <b>OC Total</b>        |             |              |              |              |               |              |
| 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.

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# APPENDIX H

AWWA Water Loss Audit Worksheet



# AWWA Free Water Audit Software v5.0

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

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

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

## Please begin by providing the following information

Name of Contact Person:

Email Address:

Telephone | Ext.:

Name of City / Utility:

City/Town/Municipality:

State / Province:

Country:

Year:

Start Date:  Enter MM/YYYY numeric format

End Date:  Enter MM/YYYY numeric format

Audit Preparation Date:

Volume Reporting Units:

PWSID / Other ID:

## The following guidance will help you complete the Audit

All audit data are entered on the [Reporting Worksheet](#)

- Value can be entered by user
- Value calculated based on input data
- These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt:   Value:

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

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

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

|   |   |   |  |   |   |
|---|---|---|--|---|---|
| <p><b><u>Instructions</u></b></p> <p>The current sheet. Enter contact information and basic audit details (year, units etc)</p> | <p><b><u>Reporting Worksheet</u></b></p> <p>Enter the required data on this worksheet to calculate the water balance and data grading</p> | <p><b><u>Comments</u></b></p> <p>Enter comments to explain how values were calculated or to document data sources</p> | <p><b><u>Performance Indicators</u></b></p> <p>Review the performance indicators to evaluate the results of the audit</p>                        | <p><b><u>Water Balance</u></b></p> <p>The values entered in the Reporting Worksheet are used to populate the Water Balance</p>        | <p><b><u>Dashboard</u></b></p> <p>A graphical summary of the water balance and Non-Revenue Water components</p> |
| <p><b><u>Grading Matrix</u></b></p> <p>Presents the possible grading options for each input component of the audit</p>          | <p><b><u>Service Connection Diagram</u></b></p> <p>Diagrams depicting possible customer service connection line configurations</p>        | <p><b><u>Definitions</u></b></p> <p>Use this sheet to understand the terms used in the audit process</p>              | <p><b><u>Loss Control Planning</u></b></p> <p>Use this sheet to interpret the results of the audit validity score and performance indicators</p> | <p><b><u>Example Audits</u></b></p> <p>Reporting Worksheet and Performance Indicators examples are shown for two validated audits</p> | <p><b><u>Acknowledgements</u></b></p> <p>Acknowledgements for the AWWA Free Water Audit Software v5.0</p>       |

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



# AWWA Free Water Audit Software: Reporting Worksheet

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? Click to access definition  
+ Click to add a comment

Water Audit Report for: **Garden Grove**  
Reporting Year:

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.

### WATER SUPPLIED

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

|                          |                                  |                                  |                                  |   |            |
|--------------------------|----------------------------------|----------------------------------|----------------------------------|---|------------|
| Volume from own sources: | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="n/a"/> | <input type="text" value="0.000"/>      | acre-ft/yr |
| Water imported:          | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="8"/>   | <input type="text" value="24,049.000"/> | acre-ft/yr |
| Water exported:          | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="n/a"/> | <input type="text" value="0.000"/>      | acre-ft/yr |

### Master Meter and Supply Error Adjustments

|                                  |                                  |                                |                               |                       |
|----------------------------------|----------------------------------|--------------------------------|-------------------------------|-----------------------|
| Pcnt:                            | <input type="text" value=""/>    | Value:                         | <input type="text" value=""/> | acre-ft/yr            |
| <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="8"/> | <input type="radio"/>         | <input type="radio"/> |
| <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value=""/>  | <input type="radio"/>         | <input type="radio"/> |
| <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value=""/>  | <input type="radio"/>         | <input type="radio"/> |

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

**WATER SUPPLIED:**  **24,049.000** acre-ft/yr

### AUTHORIZED CONSUMPTION

|                     |                                  |                                  |                                  |   |            |
|---------------------|----------------------------------|----------------------------------|----------------------------------|---|------------|
| Billed metered:     | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="6"/>   | <input type="text" value="22,839.000"/> | acre-ft/yr |
| Billed unmetered:   | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="n/a"/> | <input type="text" value="0.000"/>      | acre-ft/yr |
| Unbilled metered:   | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="n/a"/> | <input type="text" value="0.000"/>      | acre-ft/yr |
| Unbilled unmetered: | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value=""/>    | <input type="text" value="300.613"/>    | acre-ft/yr |

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

**AUTHORIZED CONSUMPTION:**  **23,139.613** acre-ft/yr

Click here:  for help using option buttons below

|                       |                                    |                       |                               |                       |
|-----------------------|------------------------------------|-----------------------|-------------------------------|-----------------------|
| Pcnt:                 | <input type="text" value="1.25%"/> | Value:                | <input type="text" value=""/> | acre-ft/yr            |
| <input type="radio"/> | <input type="radio"/>              | <input type="radio"/> | <input type="radio"/>         | <input type="radio"/> |

Use buttons to select percentage of water supplied OR value

|                       |                                    |                       |                               |                       |
|-----------------------|------------------------------------|-----------------------|-------------------------------|-----------------------|
| Pcnt:                 | <input type="text" value="0.25%"/> | Value:                | <input type="text" value=""/> | acre-ft/yr            |
| <input type="radio"/> | <input type="radio"/>              | <input type="radio"/> | <input type="radio"/>         | <input type="radio"/> |

|                                    |                       |                       |                       |                       |            |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------|
| <input type="text" value="3.00%"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | acre-ft/yr |
| <input type="text" value="0.25%"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | acre-ft/yr |

### WATER LOSSES (Water Supplied - Authorized Consumption)

**909.388** acre-ft/yr

#### Apparent Losses

Unauthorized consumption:    acre-ft/yr

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

|                                  |                                  |                                  |                                |                                      |            |
|----------------------------------|----------------------------------|----------------------------------|--------------------------------|--------------------------------------|------------|
| Customer metering inaccuracies:  | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="6"/> | <input type="text" value="706.361"/> | acre-ft/yr |
| Systematic data handling errors: | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value=""/>  | <input type="text" value="57.098"/>  | acre-ft/yr |

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

**Apparent Losses:**  **823.581** acre-ft/yr

### Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:  **85.807** acre-ft/yr

**WATER LOSSES:**  **909.388** acre-ft/yr

### NON-REVENUE WATER

**NON-REVENUE WATER:**  **1,210.000** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

### SYSTEM DATA

|  |                                  |                                  |                                 |                                     |                 |
|--|----------------------------------|----------------------------------|---------------------------------|-------------------------------------|-----------------|
| Length of mains:   | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="8"/>  | <input type="text" value="444.9"/>  | miles           |
| Number of <u>active</u> AND <u>inactive</u> service connections: | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="7"/>  | <input type="text" value="33,842"/> |                 |
| Service connection density:                                      | <input type="button" value="?"/> | <input type="text" value=""/>    | <input type="text" value="76"/> | <input type="text" value=""/>       | conn./mile main |

Are customer meters typically located at the curbside or property line?

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:     psi

### COST DATA

|   |                                  |                                  |                                 |  |  |
|---|----------------------------------|----------------------------------|---------------------------------|--|--|
| Total annual cost of operating water system:            | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="10"/> | <input type="text" value="\$8,315,373"/> | \$/Year  |
| Customer retail unit cost (applied to Apparent Losses): | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="7"/>  | <input type="text" value="\$2.91"/>      | \$/100 cubic feet (ccf)  |
| Variable production cost (applied to Real Losses):      | <input type="button" value="+"/> | <input type="button" value="?"/> | <input type="text" value="7"/>  | <input type="text" value="\$300.00"/>    | \$/acre-ft <input type="checkbox"/> 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: Water imported**

**2: Billed metered**

**3: Customer metering inaccuracies**



## AWWA Free Water Audit Software: System Attributes and Performance Indicators

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Water Audit Report for:   
Reporting Year:

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

### System Attributes:

|   |                      |   |            |
|---|----------------------|---|------------|
|   | Apparent Losses:     | <input type="text" value="823.581"/>        | acre-ft/yr |
| + | Real Losses:         | <input type="text" value="85.807"/>         | acre-ft/yr |
| = | <b>Water Losses:</b> | <b><input type="text" value="909.388"/></b> | acre-ft/yr |

Unavoidable Annual Real Losses (UARL):  acre-ft/yr

Annual cost of Apparent Losses:

Annual cost of Real Losses:

Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumption

### Performance Indicators:

|            |   |   |                                    |  |
|------------|---|---|------------------------------------|--|
| Financial: | { | Non-revenue water as percent by volume of Water Supplied: | <input type="text" value="5.0%"/>  |  |
|            |   | Non-revenue water as percent by cost of operating system: | <input type="text" value="13.9%"/> | Real Losses valued at Variable Production Cost |

|                         |   |  |                                    |                            |
|-------------------------|---|--|------------------------------------|----------------------------|
| Operational Efficiency: | { | Apparent Losses per service connection per day:              | <input type="text" value="21.73"/> | gallons/connection/day     |
|                         |   | Real Losses per service connection per day:                  | <input type="text" value="2.26"/>  | gallons/connection/day     |
|                         |   | Real Losses per length of main per day*:                     | <input type="text" value="N/A"/>   |                            |
|                         |   | Real Losses per service connection per day per psi pressure: | <input type="text" value="0.04"/>  | gallons/connection/day/psi |

From Above, Real Losses = Current Annual Real Losses (CARL):  acre-feet/year

Infrastructure Leakage Index (ILI) [CARL/UARL]:

\* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline



# AWWA Free Water Audit Software: User Comments

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Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

| General Comment:  |            |
|---|------------|
| <a href="#">Volume from own sources:</a>                              |            |
| <a href="#">Vol. from own sources: Master meter error adjustment:</a> |            |
| <a href="#">Water imported:</a>                                       | From MWDOC |
| <a href="#">Water imported: master meter error adjustment:</a>        |            |
| <a href="#">Water exported:</a>                                       |            |
| <a href="#">Water exported: master meter error adjustment:</a>        |            |
| <a href="#">Billed metered:</a>                                       |            |
| <a href="#">Billed unmetered:</a>                                     |            |
| <a href="#">Unbilled metered:</a>                                     |            |

| Audit Item  | Comment   |
|---|---|
| <a href="#">Unbilled unmetered:</a>                                     |   |
| <a href="#">Unauthorized consumption:</a>                               |   |
| <a href="#">Customer metering inaccuracies:</a>                         |   |
| <a href="#">Systematic data handling errors:</a>                        |   |
| <a href="#">Length of mains:</a>  | 440.3 miles + (4460 x 5.5 ft / 5280 ft = 4.65 mi) = 444.9 miles |
| <a href="#">Number of active AND inactive service connections:</a>      | 33,842 connections + 412 abandoned + 4460 FH connection         |
| <a href="#">Average length of customer service line:</a>                |   |
| <a href="#">Average operating pressure:</a>                             |   |
| <a href="#">Total annual cost of operating water system:</a>            |   |
| <a href="#">Customer retail unit cost (applied to Apparent Losses):</a> | NEED MORE INFORMATION   |
| <a href="#">Variable production cost (applied to Real Losses):</a>      | NEED MORE INFORMATION   |



# AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.

|                         |              |  |
|-------------------------|--------------|--|
| Water Audit Report for: | Garden Grove |  |
| Reporting Year:         |              |  |
| Data Validity Score:    | 72           |  |

|  |                                   | Water Exported<br><i>0.000</i>      | Billed Water Exported                           |  |   |   | Revenue Water<br><b>0.000</b> |
|--|-----------------------------------|-------------------------------------|---|--|---|---|-------------------------------|
| Own Sources<br>(Adjusted for known errors)<br><br><i>0.000</i> | System Input<br><i>24,049.000</i> | Water Supplied<br><i>24,049.000</i> | Authorized Consumption<br><br><i>23,139.613</i> | Billed Authorized Consumption<br><br><i>22,839.000</i> | Billed Metered Consumption (water exported is removed)<br><br><i>22,839.000</i> | Revenue Water<br><br><b>22,839.000</b>          |                               |
|  |                                   |                                     |   |  | Billed Unmetered Consumption<br><br><i>0.000</i>                                |   |                               |
| Water Imported<br><br><i>24,049.000</i>                        | System Input<br><i>24,049.000</i> | Water Supplied<br><i>24,049.000</i> | Water Losses<br><br><i>909.388</i>              | Unbilled Authorized Consumption<br><br><i>300.613</i>  | Unbilled Metered Consumption<br><br><i>0.000</i>                                | Non-Revenue Water (NRW)<br><br><b>1,210.000</b> |                               |
|  |                                   |                                     |   |  | Unbilled Unmetered Consumption<br><br><i>300.613</i>                            |   |                               |
|  |                                   |                                     |   | Apparent Losses<br><br><i>823.581</i>                  | Unauthorized Consumption<br><br><i>60.123</i>                                   |   |                               |
|  |                                   |                                     |   |  | Customer Metering Inaccuracies<br><br><i>706.361</i>                            |   |                               |
|  |                                   |                                     |   | Systematic Data Handling Errors<br><br><i>57.098</i>   |   |   |                               |
|  |                                   |                                     |   | Real Losses<br><br><i>85.807</i>                       | Leakage on Transmission and/or Distribution Mains<br><i>Not broken down</i>     |   |                               |
|  |                                   |                                     |   |  | Leakage and Overflows at Utility's Storage Tanks<br><i>Not broken down</i>      |   |                               |
|  |                                   |                                     |   |  | Leakage on Service Connections<br><i>Not broken down</i>                        |   |                               |



# AWWA Free Water Audit Software: Dashboard

WAS v5.0

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

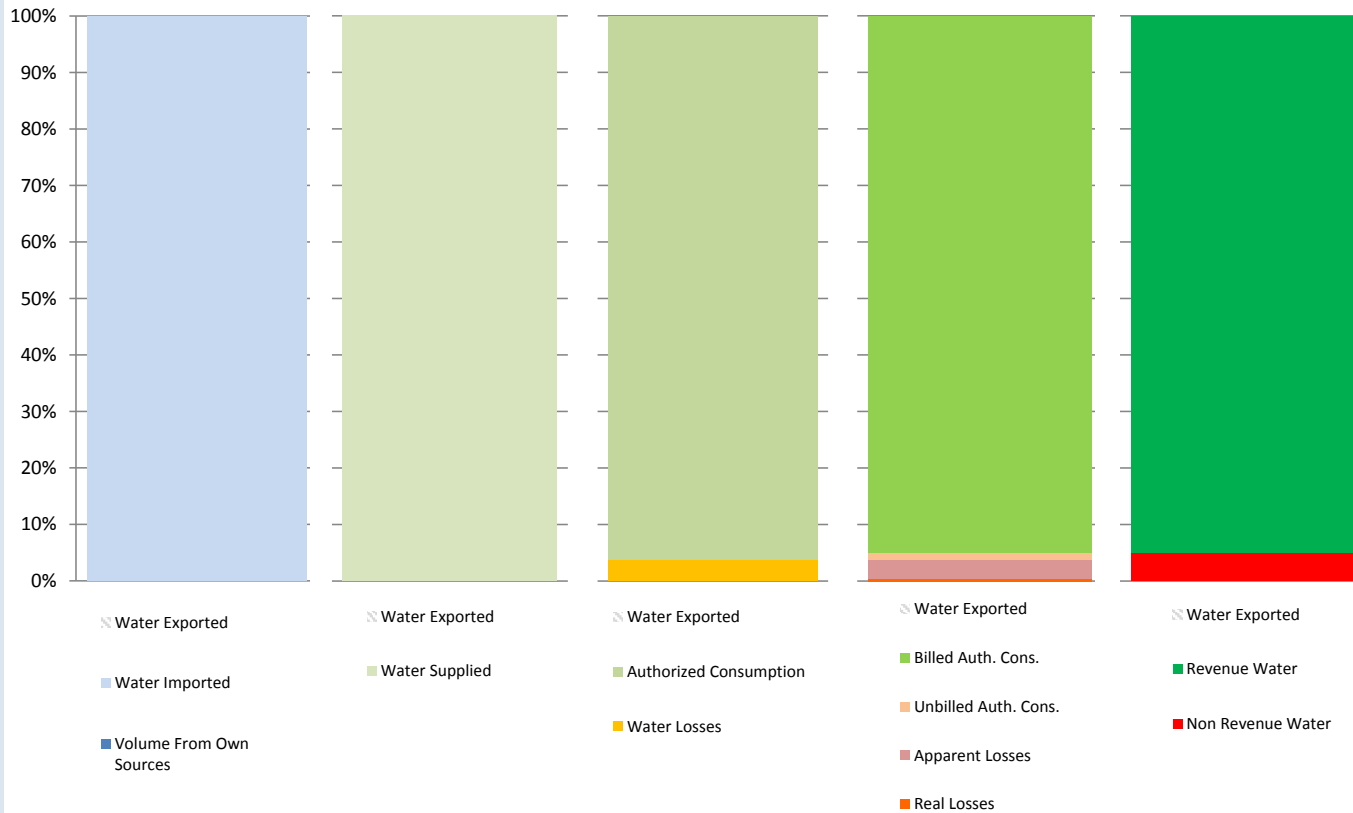
Water Audit Report for: **Garden Grove**

Reporting Year:

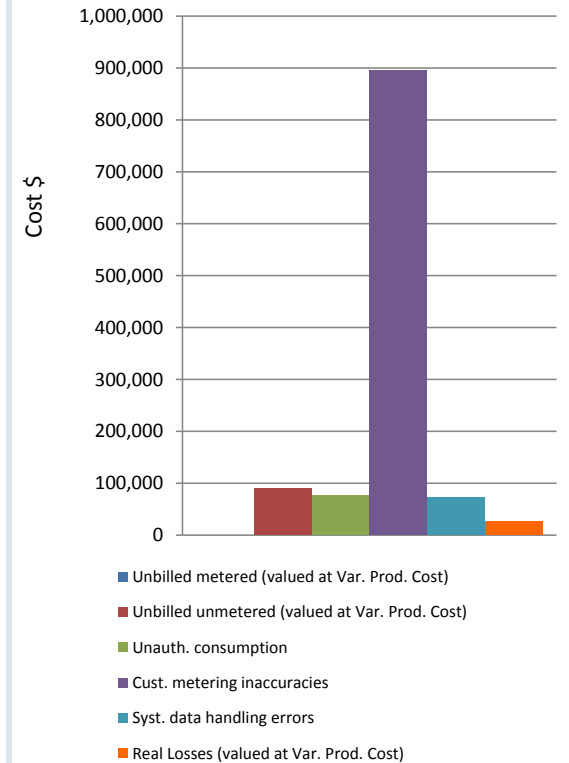
Data Validity Score: **72**

Show me the VOLUME of Non-Revenue Water

Show me the COST of Non-Revenue Water



Total Cost of NRW = \$1,159,894





# APPENDIX I

## Water Use Efficiency Implementation Report



# Orange County

## Water Use Efficiency Programs Savings and Implementation Report

### Retrofits and Acre-Feet Water Savings for Program Activity

| Program   | Program Start Date | Retrofits Installed in | Month Indicated |               | Current Fiscal Year |               | Overall Program   |                         |                             |
|---|--------------------|------------------------|-----------------|---------------|---------------------|---------------|-------------------|-------------------------|-----------------------------|
|   |                    |                        | Interventions   | Water Savings | Interventions       | Water Savings | Interventions     | Annual Water Savings[4] | Cumulative Water Savings[4] |
| High Efficiency Clothes Washer Program                      | 2001               | October-15             | 532             | 1.53          | 2,244               | 16.15         | 105,611           | 3,644                   | 20,708                      |
| Smart Timer Program - Irrigation Timers                     | 2004               | October-15             | 1               | 0.00          | 371                 | 15.65         | 13,438            | 4,655                   | 28,933                      |
| Rotating Nozzles Rebate Program                             | 2007               | October-15             | 3,709           | 14.83         | 18,064              | 135.73        | 478,934           | 2,422                   | 9,721                       |
| SoCal WaterSmart Commercial Plumbing Fixture Rebate Program | 2002               | September-15           | 2,767           | 7.65          | 3,622               | 18.06         | 51,788            | 3,518                   | 34,157                      |
| Water Smart Landscape Program [1]                           | 1997               | September-15           | 12,690          | 905.55        | 12,690              | 2,710.58      | 12,690            | 10,632                  | 71,574                      |
| Industrial Process Water Use Reduction Program              | 2006               | September-15           | 0               | 11.26         | 1                   | 11.26         | 14                | 357                     | 1,357                       |
| Turf Removal Program <sup>[3]</sup>                         | 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 <sup>[2]</sup>              | 1992               |                        |                 |               |                     |               | 363,926           | 13,452                  | 162,561                     |
| Home Water Surveys <sup>[2]</sup>                           | 1995               |                        |                 |               |                     |               | 11,867            | 160                     | 1,708                       |
| Showerhead Replacements <sup>[2]</sup>                      | 1991               |                        |                 |               |                     |               | 270,604           | 1,667                   | 19,083                      |
| <b>Total Water Savings All Programs</b>                     |                    |                        |                 | <b>960</b>    | <b>2,914,059</b>    | <b>3,090</b>  | <b>12,435,583</b> | <b>44,073</b>           | <b>364,706</b>              |

(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                          |
| <b>MWDOC Totals</b>         | <b>7,406</b> | <b>7,987</b> | <b>8,106</b> | <b>3,331</b> | <b>10,686</b> | <b>7,350</b> | <b>5,365</b> | <b>5,094</b> | <b>6,002</b> | <b>2,048</b> | <b>89,218</b>  | <b>14.78</b>                                | <b>17,352.00</b>                                 | <b>17,237</b>                  |
| 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                          |
| <b>Non-MWDOC Totals</b>     | <b>1,359</b> | <b>1,416</b> | <b>1,368</b> | <b>1,016</b> | <b>1,662</b>  | <b>937</b>   | <b>694</b>   | <b>602</b>   | <b>638</b>   | <b>196</b>   | <b>16,393</b>  | <b>1.37</b>                                 | <b>3,356.08</b>                                  | <b>3,167</b>                   |
| <b>Orange County Totals</b> | <b>8,765</b> | <b>9,403</b> | <b>9,474</b> | <b>4,347</b> | <b>12,348</b> | <b>8,287</b> | <b>6,059</b> | <b>5,696</b> | <b>6,640</b> | <b>2,244</b> | <b>105,611</b> | <b>16.15</b>                                | <b>20,708.07</b>                                 | <b>20,404</b>                  |

**SMART TIMERS INSTALLED BY AGENCY**  
through MWDOC and Local Agency Conservation Programs

| Agency                      | FY 04/05  |           | FY 05/06   |            | FY 06/07   |              | FY 07/08   |            | FY 08/09   |            | FY 09/10   |              | FY 10/11   |            | FY 11/12     |            | FY 12/13     |            | FY 13/14   |            | FY 14/15   |              | FY 15/16   |           | Total Program |              | Cumulative Water Savings across all Fiscal Years |      |
|-----------------------------|-----------|-----------|------------|------------|------------|--------------|------------|------------|------------|------------|------------|--------------|------------|------------|--------------|------------|--------------|------------|------------|------------|------------|--------------|------------|-----------|---------------|--------------|--|------|
|                             | Res       | Comm.     | Res        | Comm.      | Res        | Comm.        | Res        | Comm.      | Res        | Comm.      | Res        | Comm.        | Res        | Comm.      | Res          | Comm.      | Res          | Comm.      | Res        | Comm.      | Res        | Comm.        | Res        | Comm.     | Res           | Comm.        |  |      |
| Brea                        | 2         | 0         | 1          | 3          | 8          | 6            | 0          | 40         | 3          | 9          | 0          | 0            | 2          | 0          | 8            | 0          | 9            | 8          | 4          | 0          | 43         | 6            | 5          | 0         | 85            | 72           | 398.22   |      |
| Buena Park                  | 0         | 0         | 0          | 0          | 0          | 0            | 0          | 0          | 3          | 1          | 0          | 0            | 0          | 4          | 19           | 3          | 0            | 0          | 0          | 4          | 10         | 0            | 0          | 14        | 30            | 85.75        |  |      |
| East Orange CWD RZ          | 1         | 0         | 2          | 0          | 0          | 0            | 0          | 0          | 0          | 0          | 0          | 1            | 0          | 5          | 0            | 2          | 0            | 0          | 0          | 2          | 0          | 0            | 0          | 13        | 0             | 3.55         |  |      |
| El Toro WD                  | 1         | 0         | 8          | 0          | 4          | 95           | 1          | 174        | 0          | 25         | 2          | 18           | 5          | 26         | 2            | 7          | 2            | 11         | 0          | 8          | 9          | 4            | 0          | 77        | 330           | 1,976.03     |  |      |
| Fountain Valley             | 3         | 3         | 2          | 2          | 11         | 0            | 4          | 0          | 1          | 0          | 0          | 6            | 2          | 2          | 8            | 2          | 3            | 2          | 4          | 0          | 7          | 10           | 2          | 0         | 47            | 27           | 114.99   |      |
| Garden Grove                | 2         | 2         | 11         | 1          | 2          | 0            | 1          | 3          | 2          | 1          | 6          | 0            | 5          | 4          | 7            | 0          | 5            | 2          | 9          | 0          | 10         | 14           | 3          | 3         | 63            | 30           | 106.46   |      |
| Golden State WC             | 0         | 0         | 15         | 2          | 24         | 12           | 8          | 8          | 1          | 2          | 9          | 22           | 7          | 4          | 13           | 3          | 9            | 49         | 9          | 25         | 39         | 12           | 1          | 0         | 135           | 139          | 520.07   |      |
| Huntington Beach            | 5         | 2         | 21         | 9          | 12         | 12           | 7          | 1          | 13         | 1          | 6          | 27           | 6          | 36         | 15           | 4          | 18           | 33         | 20         | 35         | 19         | 2            | 11         | 0         | 153           | 162          | 665.38   |      |
| Irvine Ranch WD             | 2         | 2         | 68         | 111        | 160        | 434          | 66         | 183        | 29         | 56         | 14         | 145          | 28         | 153        | 267          | 71         | 414          | 135        | 71         | 59         | 67         | 310          | 9          | 0         | 1,195         | 1,659        | 7,923.73   |      |
| La Habra                    | 0         | 0         | 0          | 0          | 7          | 1            | 1          | 0          | 0          | 0          | 0          | 21           | 0          | 0          | 3            | 0          | 4            | 7          | 2          | 0          | 4          | 7            | 57         | 43        | 78            | 79           | 171.24   |      |
| La Palma                    | 0         | 0         | 0          | 0          | 0          | 0            | 0          | 0          | 0          | 0          | 0          | 0            | 0          | 0          | 1            | 0          | 1            | 0          | 2          | 0          | 2          | 0            | 1          | 1         | 7             | 1            | 1.60   |      |
| Laguna Beach CWD            | 3         | 0         | 5          | 0          | 21         | 0            | 5          | 0          | 2          | 0          | 2          | 14           | 4          | 1          | 109          | 2          | 76           | 2          | 71         | 0          | 86         | 0            | 0          | 0         | 384           | 19           | 157.52   |      |
| Mesa Water                  | 5         | 0         | 13         | 27         | 14         | 6            | 12         | 0          | 6          | 7          | 13         | 7            | 7          | 22         | 21           | 0          | 10           | 2          | 15         | 2          | 17         | 28           | 5          | 0         | 138           | 101          | 486.67   |      |
| Moulton Niguel WD           | 2         | 0         | 25         | 10         | 39         | 52           | 59         | 20         | 21         | 23         | 17         | 162          | 36         | 60         | 179          | 31         | 51           | 74         | 40         | 45         | 46         | 95           | 2          | 0         | 517           | 572          | 2,337.11   |      |
| Newport Beach               | 3         | 17        | 35         | 4          | 125        | 86           | 98         | 40         | 10         | 27         | 7          | 58           | 6          | 0          | 275          | 12         | 242          | 26         | 168        | 75         | 11         | 9            | 53         | 25        | 1,033         | 379          | 1,957.82   |      |
| Orange                      | 8         | 4         | 37         | 13         | 28         | 38           | 4          | 0          | 5          | 2          | 2          | 13           | 5          | 8          | 25           | 0          | 20           | 24         | 13         | 9          | 18         | 31           | 4          | 0         | 169           | 142          | 667.97   |      |
| San Juan Capistrano         | 0         | 0         | 5          | 4          | 5          | 4            | 11         | 1          | 10         | 0          | 7          | 49           | 13         | 1          | 103          | 2          | 14           | 18         | 6          | 11         | 6          | 19           | 4          | 2         | 184           | 111          | 448.73   |      |
| San Clemente                | 4         | 0         | 483        | 1          | 46         | 7            | 21         | 60         | 81         | 20         | 13         | 209          | 46         | 11         | 212          | 17         | 26           | 7          | 28         | 2          | 28         | 24           | 16         | 6         | 1,004         | 364          | 2,056.38   |      |
| Santa Margarita WD          | 3         | 0         | 15         | 8          | 40         | 96           | 53         | 70         | 25         | 44         | 10         | 152          | 61         | 53         | 262          | 7          | 53           | 171        | 64         | 93         | 53         | 321          | 8          | 0         | 647           | 1,015        | 3,563.97   |      |
| Santiago CWD                | 0         | 0         | 0          | 0          | 0          | 0            | 0          | 0          | 0          | 0          | 0          | 0            | 0          | 0          | 0            | 0          | 0            | 0          | 0          | 0          | 0          | 0            | 31         | 1         | 1             | 31           | 1  | 2.10 |
| Seal Beach                  | 0         | 0         | 0          | 0          | 0          | 0            | 0          | 0          | 0          | 0          | 0          | 1            | 0          | 0          | 3            | 1          | 0            | 1          | 36         | 1          | 12         | 0            | 0          | 0         | 3             | 52           | 104.07   |      |
| Serrano WD                  | 0         | 0         | 0          | 0          | 0          | 0            | 0          | 0          | 0          | 0          | 11         | 0            | 4          | 0          | 3            | 0          | 1            | 0          | 0          | 0          | 4          | 0            | 1          | 0         | 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   |      |
| <b>MWDOC Totals</b>         | <b>48</b> | <b>30</b> | <b>820</b> | <b>218</b> | <b>610</b> | <b>976</b>   | <b>385</b> | <b>693</b> | <b>242</b> | <b>238</b> | <b>142</b> | <b>949</b>   | <b>289</b> | <b>374</b> | <b>1,671</b> | <b>185</b> | <b>1,017</b> | <b>583</b> | <b>571</b> | <b>402</b> | <b>648</b> | <b>1,026</b> | <b>254</b> | <b>82</b> | <b>6,697</b>  | <b>5,756</b> | <b>26,151.20</b>                                 |      |
| 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   |      |
| <b>Non-MWDOC Totals</b>     | <b>6</b>  | <b>1</b>  | <b>10</b>  | <b>13</b>  | <b>28</b>  | <b>78</b>    | <b>25</b>  | <b>57</b>  | <b>13</b>  | <b>65</b>  | <b>8</b>   | <b>93</b>    | <b>29</b>  | <b>44</b>  | <b>51</b>    | <b>116</b> | <b>36</b>    | <b>58</b>  | <b>24</b>  | <b>34</b>  | <b>56</b>  | <b>105</b>   | <b>21</b>  | <b>14</b> | <b>307</b>    | <b>678</b>   | <b>2,781.54</b>                                  |      |
| <b>Orange County Totals</b> | <b>54</b> | <b>31</b> | <b>830</b> | <b>231</b> | <b>638</b> | <b>1,054</b> | <b>410</b> | <b>750</b> | <b>255</b> | <b>303</b> | <b>150</b> | <b>1,042</b> | <b>318</b> | <b>418</b> | <b>1,722</b> | <b>301</b> | <b>1,053</b> | <b>641</b> | <b>595</b> | <b>436</b> | <b>704</b> | <b>1,131</b> | <b>275</b> | <b>96</b> | <b>7,004</b>  | <b>6,434</b> | <b>28,933</b>                                    |      |

**ROTATING NOZZLES INSTALLED BY AGENCY**  
through MWDOC and Local Agency Conservation Programs

| Agency                      | FY 06/07  |            |          | FY 07/08     |              |              | FY 08/09     |               |              | FY 10/11      |               |          | FY 11/12      |               |              | FY 12/13      |               |          | FY 13/14      |               |          | FY 14/15      |               |          | FY 15/16     |               |          | Total Program  |                |               | Cumulative Water Savings across all Fiscal Years |
|-----------------------------|-----------|------------|----------|--------------|--------------|--------------|--------------|---------------|--------------|---------------|---------------|----------|---------------|---------------|--------------|---------------|---------------|----------|---------------|---------------|----------|---------------|---------------|----------|--------------|---------------|----------|----------------|----------------|---------------|--|
|                             | Small     | Large      |          | Small        | Large        |              | Small        | Large         |              | Small         | Large         |          | Small         | Large         |              | Small         | Large         |          | Small         | Large         |          | Small         | Large         |          | Small        | Large         |          | Small          | Large          |               |  |
|                             | Res       | Comm.      | Comm.    | Res          | Comm.        | Comm.        | Res          | Comm.         | Comm.        | Res           | Comm.         | Comm.    | Res           | Comm.         | Comm.        | Res           | Comm.         | Comm.    | Res           | Comm.         | Comm.    | Res           | Comm.         | Comm.    | Res          | Comm.         | Comm.    | Res            | Comm.          | Comm.         |  |
| Brea                        | 0         | 0          | 0        | 0            | 0            | 0            | 22           | 0             | 0            | 32            | 0             | 0        | 130           | 0             | 0            | 65            | 120           | 0        | 84            | 0             | 0        | 157           | 45            | 0        | 0            | 842           | 0        | 498            | 1,107          | 0             | 13.71  |
| Buena Park                  | 0         | 0          | 0        | 0            | 0            | 0            | 37           | 75            | 0            | 29            | 0             | 0        | 32            | 0             | 0            | 65            | 0             | 0        | 53            | 0             | 0        | 248           | 0             | 0        | 0            | 0             | 0        | 464            | 75             | 2,535         | 450.81   |
| East Orange                 | 0         | 0          | 0        | 0            | 0            | 0            | 105          | 0             | 0            | 0             | 0             | 0        | 340           | 0             | 0            | 55            | 0             | 0        | 30            | 0             | 0        | 221           | 0             | 0        | 0            | 0             | 0        | 751            | 0              | 0             | 9.60   |
| El Toro                     | 0         | 0          | 0        | 0            | 0            | 0            | 88           | 290           | 0            | 174           | 0             | 0        | 357           | 76            | 0            | 23            | 6,281         | 0        | 56            | 3,288         | 0        | 1,741         | 28,714        | 0        | 90           | 4,457         | 0        | 2,674          | 45,980         | 890           | 635.80   |
| Fountain Valley             | 0         | 0          | 0        | 51           | 0            | 0            | 83           | 0             | 0            | 83            | 0             | 0        | 108           | 0             | 0            | 35            | 0             | 0        | 0             | 0             | 0        | 107           | 0             | 0        | 18           | 0             | 0        | 506            | 0              | 0             | 7.95   |
| Garden Grove                | 0         | 0          | 0        | 44           | 0            | 0            | 153          | 106           | 0            | 38            | 0             | 0        | 119           | 0             | 0            | 95            | 0             | 0        | 80            | 0             | 0        | 88            | 50            | 0        | 44           | 0             | 0        | 812            | 201            | 0             | 17.16  |
| Golden State                | 0         | 0          | 0        | 161          | 0            | 0            | 83           | 0             | 0            | 303           | 943           | 0        | 294           | 0             | 0            | 257           | 2,595         | 0        | 192           | 0             | 0        | 583           | 1,741         | 0        | 65           | 0             | 0        | 2,218          | 5,308          | 0             | 102.89   |
| Huntington Beach            | 0         | 0          | 0        | 93           | 845          | 1,202        | 322          | 19            | 1,174        | 203           | 625           | 0        | 458           | 0             | 0            | 270           | 0             | 0        | 120           | 0             | 0        | 798           | 1,419         | 0        | 198          | 1,432         | 0        | 2,501          | 7,760          | 2,681         | 746.72   |
| Irvine Ranch                | 0         | 0          | 0        | 610          | 7,435        | 440          | 1,594        | 5,108         | 85           | 2,411         | 2,861         | 0        | 1,715         | 4,255         | 0            | 25,018        | 1,014         | 0        | 11,010        | 4,257         | 0        | 1,421         | 632           | 0        | 171          | 1,110         | 0        | 44,984         | 81,113         | 2,004         | 2,656.37   |
| La Habra                    | 0         | 535        | 0        | 9            | 0            | 0            | 15           | 0             | 900          | 0             | 0             | 0        | 33            | 90            | 0            | 0             | 0             | 0        | 15            | 0             | 0        | 109           | 338           | 0        | 21           | 0             | 0        | 202            | 1,236          | 900           | 217.49   |
| La Palma                    | 0         | 0          | 0        | 0            | 0            | 0            | 10           | 0             | 0            | 0             | 0             | 0        | 0             | 0             | 0            | 0             | 0             | 0        | 0             | 0             | 0        | 0             | 0             | 0        | 0            | 0             | 0        | 10             | 0              | 0             | 0.24   |
| Laguna Beach                | 0         | 0          | 0        | 115          | 0            | 0            | 101          | 47            | 0            | 156           | 0             | 0        | 763           | 0             | 0            | 3,596         | 0             | 0        | 2,948         | 878           | 0        | 2,879         | 1,971         | 0        | 46           | 0             | 0        | 10,795         | 2,896          | 0             | 164.61   |
| Mesa Water                  | 83        | 0          | 0        | 0            | 25           | 343          | 198          | 0             | 0            | 118           | 0             | 0        | 297           | 277           | 0            | 270           | 0             | 0        | 361           | 0             | 0        | 229           | 0             | 0        | 77           | 0             | 0        | 1,828          | 385            | 343           | 117.26   |
| Moulton Niguel              | 0         | 0          | 0        | 297          | 120          | 0            | 426          | 6,883         | 1,986        | 1,578         | 0             | 0        | 1,225         | 0             | 0            | 512           | 1,385         | 0        | 361           | 227           | 0        | 1,596         | 4,587         | 0        | 473          | 233           | 0        | 6,702          | 13,435         | 2,945         | 906.15   |
| Newport Beach               | 0         | 0          | 0        | 22           | 569          | 0            | 65           | 170           | 0            | 337           | 1,208         | 0        | 640           | 3,273         | 0            | 25,365        | 50            | 0        | 19,349        | 6,835         | 0        | 460           | 3,857         | 0        | 250          | 0             | 0        | 46,580         | 20,743         | 0             | 947.31   |
| Orange                      | 0         | 0          | 0        | 158          | 0            | 0            | 961          | 163           | 0            | 135           | 30            | 0        | 343           | 0             | 0            | 264           | 0             | 0        | 245           | 120           | 0        | 304           | 668           | 0        | 271          | 0             | 0        | 2,810          | 981            | 0             | 58.18  |
| San Clemente                | 0         | 0          | 0        | 118          | 0            | 0            | 466          | 25            | 0            | 2,612         | 851           | 0        | 4,266         | 117           | 1,343        | 631           | 172           | 0        | 415           | 5,074         | 0        | 326           | 0             | 0        | 279          | 0             | 0        | 9,842          | 7,538          | 1,343         | 387.00   |
| San Juan Capistrano         | 0         | 0          | 0        | 70           | 0            | 0            | 434          | 1,660         | 0            | 1,452         | 0             | 0        | 949           | 0             | 0            | 684           | 30            | 0        | 370           | 0             | 0        | 495           | 737           | 0        | 15           | 0             | 0        | 5,125          | 8,136          | 0             | 239.81   |
| Santa Margarita             | 0         | 0          | 0        | 165          | 0            | 0            | 1,079        | 68            | 0            | 3,959         | 3,566         | 0        | 4,817         | 0             | 0            | 983           | 0             | 0        | 389           | 0             | 0        | 1,207         | 1,513         | 0        | 711          | 107           | 0        | 15,041         | 6,191          | 611           | 415.93   |
| Seal Beach                  | 0         | 0          | 0        | 0            | 0            | 0            | 115          | 0             | 0            | 0             | 0             | 0        | 0             | 0             | 0            | 0             | 0             | 0        | 0             | 0             | 0        | 40            | 5,261         | 0        | 0            | 0             | 0        | 155            | 5,552          | 0             | 50.97  |
| Serrano                     | 0         | 0          | 0        | 94           | 0            | 0            | 24           | 0             | 0            | 364           | 0             | 0        | 58            | 0             | 0            | 190           | 0             | 0        | 105           | 0             | 0        | 377           | 0             | 0        | 291          | 0             | 0        | 3,001          | 0              | 0             | 48.15  |
| South Coast                 | 0         | 0          | 0        | 74           | 133          | 0            | 115          | 0             | 0            | 318           | 1,772         | 0        | 688           | 359           | 0            | 435           | 0             | 0        | 70            | 0             | 0        | 4,993         | 13,717        | 0        | 116          | 179           | 0        | 6,809          | 16,160         | 0             | 213.13   |
| Trabuco Canyon              | 0         | 0          | 0        | 130          | 0            | 0            | 0            | 0             | 0            | 0             | 0             | 0        | 379           | 0             | 0            | 34            | 0             | 0        | 0             | 0             | 0        | 56            | 0             | 0        | 77           | 0             | 0        | 2,033          | 791            | 0             | 52.43  |
| Tustin                      | 0         | 0          | 0        | 23           | 0            | 0            | 549          | 0             | 0            | 512           | 0             | 0        | 476           | 1,013         | 0            | 378           | 0             | 0        | 329           | 0             | 0        | 408           | 0             | 0        | 120          | 45            | 0        | 3,109          | 1,058          | 0             | 60.05  |
| Westminster                 | 0         | 0          | 0        | 0            | 0            | 0            | 111          | 0             | 0            | 0             | 0             | 0        | 26            | 0             | 0            | 15            | 0             | 0        | 0             | 0             | 0        | 54            | 0             | 0        | 57           | 0             | 0        | 343            | 0              | 0             | 5.47   |
| Yorba Linda                 | 0         | 0          | 0        | 563          | 0            | 0            | 440          | 113           | 500          | 529           | 0             | 0        | 559           | 0             | 0            | 730           | 0             | 0        | 40            | 990           | 0        | 921           | 0             | 0        | 636          | 0             | 0        | 4,789          | 4,359          | 500           | 255.63   |
| <b>MWDOC Totals</b>         | <b>83</b> | <b>535</b> | <b>0</b> | <b>2,797</b> | <b>9,127</b> | <b>1,985</b> | <b>7,596</b> | <b>14,727</b> | <b>4,645</b> | <b>15,343</b> | <b>11,856</b> | <b>0</b> | <b>19,072</b> | <b>9,460</b>  | <b>1,343</b> | <b>59,970</b> | <b>11,647</b> | <b>0</b> | <b>36,622</b> | <b>21,669</b> | <b>0</b> | <b>19,818</b> | <b>65,250</b> | <b>0</b> | <b>4,026</b> | <b>8,405</b>  | <b>0</b> | <b>174,582</b> | <b>231,005</b> | <b>14,752</b> | <b>8,780.80</b>                                  |
| 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  |
| <b>Non-MWDOC Totals</b>     | <b>0</b>  | <b>0</b>   | <b>0</b> | <b>308</b>   | <b>0</b>     | <b>0</b>     | <b>871</b>   | <b>120</b>    | <b>0</b>     | <b>841</b>    | <b>382</b>    | <b>0</b> | <b>1,173</b>  | <b>38,619</b> | <b>0</b>     | <b>677</b>    | <b>813</b>    | <b>0</b> | <b>531</b>    | <b>2,533</b>  | <b>0</b> | <b>1,492</b>  | <b>1,908</b>  | <b>0</b> | <b>412</b>   | <b>5,221</b>  | <b>0</b> | <b>6,674</b>   | <b>50,332</b>  | <b>1,589</b>  | <b>939.71</b>                                    |
| <b>Orange County Totals</b> | <b>83</b> | <b>535</b> | <b>0</b> | <b>3,105</b> | <b>9,127</b> | <b>1,985</b> | <b>8,467</b> | <b>14,847</b> | <b>4,645</b> | <b>16,184</b> | <b>12,238</b> | <b>0</b> | <b>20,245</b> | <b>48,079</b> | <b>1,343</b> | <b>60,647</b> | <b>12,460</b> | <b>0</b> | <b>37,153</b> | <b>24,202</b> | <b>0</b> | <b>21,310</b> | <b>67,158</b> | <b>0</b> | <b>4,438</b> | <b>13,626</b> | <b>0</b> | <b>181,256</b> | <b>281,337</b> | <b>16,341</b> | <b>9,720.51</b>                                  |

**SOCAL WATER\$MART COMMERCIAL PLUMBING FIXTURES REBATE PROGRAM<sup>[1]</sup>**  
**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  |
| <b>MWDOC Totals</b>         | <b>1,079</b> | <b>4,134</b> | <b>4,537</b> | <b>3,424</b> | <b>1,966</b> | <b>1,594</b> | <b>1,172</b> | <b>2,161</b> | <b>2,430</b> | <b>34,337</b> | <b>22,466</b>                                    |
| 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  |
| <b>Non-MWDOC Totals</b>     | <b>1,392</b> | <b>4,692</b> | <b>1,339</b> | <b>107</b>   | <b>60</b>    | <b>275</b>   | <b>359</b>   | <b>646</b>   | <b>1,192</b> | <b>17,451</b> | <b>11,691</b>                                    |
| <b>Orange County Totals</b> | <b>2,471</b> | <b>8,826</b> | <b>5,876</b> | <b>3,531</b> | <b>2,026</b> | <b>1,869</b> | <b>1,531</b> | <b>2,807</b> | <b>3,622</b> | <b>51,788</b> | <b>34,157</b>                                    |

[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                               |
| <b>MWDOC Totals</b>      | <b>1,406</b> | <b>1,785</b> | <b>1,969</b> | <b>2,733</b> | <b>4,395</b> | <b>10,025</b> | <b>10,787</b> | <b>11,273</b> | <b>11,766</b> | <b>12,196</b> | <b>12,435</b> | <b>12,500</b> | <b>70,425.9</b>                    |
| 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                               |
| <b>Non-MWDOC Totals</b>  | <b>0</b>     | <b>0</b>     | <b>0</b>     | <b>0</b>     | <b>0</b>     | <b>142</b>    | <b>146</b>    | <b>144</b>    | <b>190</b>    | <b>190</b>    | <b>190</b>    | <b>190</b>    | <b>1,147.97</b>                    |
| <b>Orange Co. Totals</b> | <b>1,406</b> | <b>1,785</b> | <b>1,969</b> | <b>2,733</b> | <b>4,395</b> | <b>10,167</b> | <b>10,933</b> | <b>11,417</b> | <b>11,956</b> | <b>12,386</b> | <b>12,625</b> | <b>12,690</b> | <b>71,573.83</b>                   |

## 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   |
| <b>MWDOC Totals</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>0</b> | <b>13</b>                     | <b>346</b>              | <b>1335</b>   |
| 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  |
| <b>OC Totals</b>    | <b>2</b> | <b>1</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>1</b> | <b>14</b>                     | <b>357</b>              | <b>1357</b>   |

[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   |
| <b>MWDOC Totals</b>         | <b>38</b> | <b>2,779</b> | <b>1,494</b> | <b>11,282</b> | <b>5,106</b> | <b>809</b> | <b>103</b> | <b>1,651</b> | <b>3,330</b> | <b>12,038</b> | <b>7,300</b> | <b>45,930</b> | <b>9,405.17</b>                                  |
| <b> </b>                    | <b> </b>  | <b> </b>     | <b> </b>     | <b> </b>      | <b> </b>     | <b> </b>   | <b> </b>   | <b> </b>     | <b> </b>     | <b> </b>      | <b> </b>     | <b> </b>      | <b> </b>   |
| 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   |
| <b>Non-MWDOC Totals</b>     | <b>0</b>  | <b>270</b>   | <b>131</b>   | <b>3,982</b>  | <b>768</b>   | <b>160</b> | <b>0</b>   | <b>0</b>     | <b>250</b>   | <b>2,083</b>  | <b>802</b>   | <b>8,446</b>  | <b>2,033.86</b>                                  |
| <b> </b>                    | <b> </b>  | <b> </b>     | <b> </b>     | <b> </b>      | <b> </b>     | <b> </b>   | <b> </b>   | <b> </b>     | <b> </b>     | <b> </b>      | <b> </b>     | <b> </b>      | <b> </b>   |
| <b>Orange County Totals</b> | <b>38</b> | <b>3,049</b> | <b>1,625</b> | <b>15,264</b> | <b>5,874</b> | <b>969</b> | <b>103</b> | <b>1,651</b> | <b>3,580</b> | <b>14,121</b> | <b>8,102</b> | <b>54,376</b> | <b>11,439.03</b>                                 |

**TURF REMOVAL BY AGENCY<sup>[1]</sup>**  
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  |
| <b>MWDOC Totals</b> | <b>23,990</b> | <b>108,421</b> | <b>183,524</b> | <b>241,224</b> | <b>216,104</b> | <b>303,923</b> | <b>238,978</b> | <b>304,598</b> | <b>2,195,544</b> | <b>3,692,153</b> | <b>643,119</b> | <b>2,225,804</b> | <b>3,501,259</b> | <b>6,876,123</b> | <b>2,978.20</b>                                  |

|                         |          |          |          |          |          |          |          |              |          |          |          |          |          |              |             |
|-------------------------|----------|----------|----------|----------|----------|----------|----------|--------------|----------|----------|----------|----------|----------|--------------|-------------|
| 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            | -           |
| <b>Non-MWDOC Totals</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>9,214</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>9,214</b> | <b>3.87</b> |

|                             |               |                |                |                |                |                |                |                |                  |                  |                |                  |                  |                  |              |
|-----------------------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|----------------|------------------|------------------|------------------|--------------|
| <b>Orange County Totals</b> | <b>23,990</b> | <b>108,421</b> | <b>183,524</b> | <b>241,224</b> | <b>216,104</b> | <b>303,923</b> | <b>238,978</b> | <b>313,812</b> | <b>2,195,544</b> | <b>3,692,153</b> | <b>643,119</b> | <b>2,225,804</b> | <b>3,501,259</b> | <b>6,885,337</b> | <b>2,982</b> |
|-----------------------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|----------------|------------------|------------------|------------------|--------------|

[1] Installed device numbers are listed as square feet

# HOME WATER SURVEYS PERFORMED BY AGENCY

through MWDOC and Local Agency Conservation Programs

| Agency              | FY 13/14  |            | FY 14/15   |            | FY 15/16  |            | Total      |            | Cumulative Water Savings |
|---------------------|-----------|------------|------------|------------|-----------|------------|------------|------------|--------------------------|
|                     | Surveys   | Cert Homes | Surveys    | Cert Homes | Surveys   | Cert Homes | Surveys    | Cert Homes |                          |
| Brea                | 1         | 0          | 2          | 0          | 0         | 0          | 3          | 0          | 0.16                     |
| Buena Park          | 0         | 0          | 1          | 0          | 0         | 0          | 1          | 0          | 0.05                     |
| East Orange         | 19        | 0          | 1          | 0          | 0         | 0          | 20         | 0          | 1.39                     |
| El Toro             | 0         | 0          | 3          | 0          | 0         | 0          | 3          | 0          | 0.14                     |
| Fountain Valley     | 3         | 0          | 4          | 0          | 0         | 0          | 7          | 0          | 0.40                     |
| Garden Grove        | 0         | 0          | 6          | 0          | 1         | 0          | 7          | 0          | 0.31                     |
| Golden State        | 0         | 0          | 0          | 0          | 0         | 0          | 0          | 0          | 0.00                     |
| Huntington Beach    | 2         | 0          | 5          | 0          | 2         | 0          | 9          | 0          | 0.42                     |
| Irvine Ranch        | 1         | 0          | 3          | 0          | 5         | 0          | 9          | 0          | 0.33                     |
| La Habra            | 0         | 0          | 1          | 0          | 0         | 0          | 1          | 0          | 0.05                     |
| La Palma            | 0         | 0          | 0          | 0          | 0         | 0          | 0          | 0          | 0.00                     |
| Laguna Beach        | 4         | 0          | 8          | 0          | 1         | 0          | 13         | 0          | 0.68                     |
| Mesa Water          | 0         | 0          | 0          | 0          | 0         | 0          | 0          | 0          | 0.00                     |
| Moulton Niguel      | 4         | 0          | 4          | 0          | 0         | 0          | 8          | 0          | 0.47                     |
| Newport Beach       | 2         | 0          | 8          | 0          | 3         | 0          | 13         | 0          | 0.59                     |
| Orange              | 2         | 0          | 18         | 0          | 1         | 0          | 21         | 0          | 1.01                     |
| San Clemente        | 15        | 0          | 13         | 0          | 0         | 0          | 28         | 0          | 1.67                     |
| San Juan Capistrano | 4         | 0          | 13         | 0          | 2         | 0          | 19         | 0          | 0.94                     |
| Santa Margarita     | 15        | 0          | 40         | 1          | 12        | 0          | 67         | 1          | 3.22                     |
| Seal Beach          | 0         | 0          | 1          | 0          | 1         | 0          | 2          | 0          | 0.07                     |
| Serrano             | 0         | 0          | 2          | 0          | 0         | 0          | 2          | 0          | 0.09                     |
| South Coast         | 6         | 0          | 4          | 0          | 1         | 0          | 11         | 0          | 0.64                     |
| Trabuco Canyon      | 0         | 0          | 4          | 0          | 0         | 0          | 4          | 0          | 0.19                     |
| Tustin              | 0         | 0          | 10         | 0          | 4         | 0          | 14         | 0          | 0.56                     |
| Westminster         | 0         | 0          | 0          | 0          | 0         | 0          | 0          | 0          | 0.00                     |
| Yorba Linda         | 0         | 0          | 13         | 0          | 8         | 0          | 21         | 0          | 0.80                     |
| <b>MWDOC Totals</b> | <b>78</b> | <b>0</b>   | <b>164</b> | <b>1</b>   | <b>41</b> | <b>0</b>   | <b>283</b> | <b>1</b>   | <b>14.18</b>             |

|                         |          |          |           |          |          |          |           |          |             |
|-------------------------|----------|----------|-----------|----------|----------|----------|-----------|----------|-------------|
| 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        |
| <b>Non-MWDOC Totals</b> | <b>0</b> | <b>0</b> | <b>17</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>18</b> | <b>0</b> | <b>0.82</b> |

|                             |           |          |            |          |           |          |            |          |               |
|-----------------------------|-----------|----------|------------|----------|-----------|----------|------------|----------|---------------|
| <b>Orange County Totals</b> | <b>78</b> | <b>0</b> | <b>181</b> | <b>1</b> | <b>42</b> | <b>0</b> | <b>301</b> | <b>1</b> | <b>15.007</b> |
|-----------------------------|-----------|----------|------------|----------|-----------|----------|------------|----------|---------------|

**SYNTHETIC TURF INSTALLED BY AGENCY<sup>[1]</sup>**  
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  |
| <b>MWDOC Totals</b> | <b>132,820</b> | <b>18,033</b> | <b>181,848</b> | <b>89,642</b> | <b>97,806</b> | <b>8,624</b> | <b>20,184</b> | <b>0</b> | <b>432,658</b> | <b>116,299</b> | <b>384.83</b>                                    |

|                         |              |            |               |               |               |               |              |          |               |               |              |
|-------------------------|--------------|------------|---------------|---------------|---------------|---------------|--------------|----------|---------------|---------------|--------------|
| 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         |
| <b>Non-MWDOC Totals</b> | <b>9,400</b> | <b>876</b> | <b>16,282</b> | <b>20,093</b> | <b>20,303</b> | <b>65,300</b> | <b>4,227</b> | <b>0</b> | <b>50,212</b> | <b>86,269</b> | <b>83.81</b> |

|                             |                |               |                |                |                |               |               |          |                |                |               |
|-----------------------------|----------------|---------------|----------------|----------------|----------------|---------------|---------------|----------|----------------|----------------|---------------|
| <b>Orange County Totals</b> | <b>142,220</b> | <b>18,909</b> | <b>198,130</b> | <b>109,735</b> | <b>118,109</b> | <b>73,924</b> | <b>24,411</b> | <b>0</b> | <b>482,870</b> | <b>202,568</b> | <b>468.63</b> |
|-----------------------------|----------------|---------------|----------------|----------------|----------------|---------------|---------------|----------|----------------|----------------|---------------|

[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   |
| <b>MWDOC Totals</b> | <b>24,256</b>  | <b>12,879</b> | <b>18,778</b> | <b>20,765</b> | <b>21,136</b> | <b>30,242</b> | <b>24,918</b> | <b>27,175</b> | <b>31,827</b> | <b>27,568</b> | <b>3,654</b> | <b>3,242</b> | <b>2,031</b> | <b>861</b> | <b>4</b> | <b>249,336</b> | <b>113,878.61</b>                                |

|                         |              |              |              |              |              |               |               |               |               |               |            |            |            |            |          |                |                  |
|-------------------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|------------|------------|------------|------------|----------|----------------|------------------|
| 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        |
| <b>Non-MWDOC Totals</b> | <b>3,011</b> | <b>4,161</b> | <b>3,687</b> | <b>7,583</b> | <b>5,207</b> | <b>18,477</b> | <b>12,133</b> | <b>19,298</b> | <b>22,636</b> | <b>15,988</b> | <b>924</b> | <b>582</b> | <b>531</b> | <b>369</b> | <b>3</b> | <b>114,590</b> | <b>48,682.70</b> |

|                             |               |               |               |               |               |               |               |               |               |               |              |              |              |              |          |                |                   |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|----------|----------------|-------------------|
| <b>Orange County Totals</b> | <b>27,267</b> | <b>17,040</b> | <b>22,465</b> | <b>28,348</b> | <b>26,343</b> | <b>48,719</b> | <b>37,051</b> | <b>46,473</b> | <b>54,463</b> | <b>43,556</b> | <b>4,578</b> | <b>3,824</b> | <b>2,562</b> | <b>1,230</b> | <b>7</b> | <b>363,926</b> | <b>162,561.30</b> |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|----------|----------------|-------------------|

# APPENDIX J

CUWCC BMP Report





## Base Year Data

Agency name: **City of Garden Grove**

Reporting unit number:

Reporting unit name : **City of Garden Grove**

**60**

Base Year

### BMP 1.3 Metering

Number of unmetered accounts in Base Year

### BMP 3.1 & BMP 3.2 & BMP 3.3 Residential Programs

Number of Single Family Customers  and Multy Family Customers  in Base Year

### BMP 3.4 WaterSense Specification (WSS) Toilets

Number of Single Family Units  and Number of Multi Family Units  prior to 1992

Average number of toilets per Single Family household  and Multi Family households

Five year average resale rate of Single Family households  and Multi Family households

Average number of persons per Single Family households  and Multi Family households

### BMP 4.0 & BMP 5.0 CII & Landscape

Total water use (in Acre Feet) by CII accounts

Number of accounts with dedicated irrigation meters

Number of CII accounts without meters or with Mixed Use Meters

Number of CII accounts

Comments



# BMP1.1 Operation Practices - Retail Only 2011

Reporting unit name (District name)

Reporting unit number:

City of Garden Grove

60

Conservation Coordinator:  Yes

### Contact Information

First Name:

Last Name:

Title:

Phone:

Email:

### Water Waste Prevention

| WW Document Name  | WWP File Name | WW Prevention URL   | WW Prevention Ordinance Terms Description  |
|---|---------------|---|--|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP.                    |               | <a href="http://www.ci.garden-grove.ca.us/cgi-bin/municode_public/code.cgi">http://www.ci.garden-grove.ca.us/cgi-bin/municode_public/code.cgi</a> | Section 14.40.025 Permanent Water Conservation Requirements--Prohibition Against Waste. Prior to enforcement, any person who is suspected of violating this Chapter shall be given a written notice containing the description of the violation. |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. |               |   |  |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste.  |               |   |  |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP.       |               |   |  |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP.                   |               |   |  |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development.        |               |   |  |





# BMP1.1 Operation Practices - Retail Only 2011

At Least As effective As

No

Exemption

No

Comments:



# BMP1.1 Operation Practices - Retail Only 2012

Reporting unit name (District name)

Reporting unit number:

City of Garden Grove

60

Conservation Coordinator:  Yes

### Contact Information

First Name:

Last Name:

Title:

Phone:

Email:

### Water Waste Prevention

| WW Document Name  | WWP File Name | WW Prevention URL   | WW Prevention Ordinance Terms Description  |
|---|---------------|---|--|
| Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP.                    |               | <a href="http://www.ci.garden-grove.ca.us/cgi-bin/municode_public/code.cgi">http://www.ci.garden-grove.ca.us/cgi-bin/municode_public/code.cgi</a> | Section 14.40.025 Permanent Water Conservation Requirements--Prohibition Against Waste. Prior to enforcement, any person who is suspected of violating this Chapter shall be given a written notice containing the description of the violation. |
| Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area. |               |   |  |
| Option C Describe any documentation of support for legislation or regulations that prohibit water waste.  |               |   |  |
| Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP.       |               |   |  |
| Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP.                   |               |   |  |
| Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development.        |               |   |  |



## BMP1.1 Operation Practices - Retail Only 2012

---

**At Least As effective As**

**Exemption**

**Comments:**



BMP 1.2 Water Loss Control 2011

Reporting unit name  Reporting unit number:

**AWWA Water Audit**

Agency to complete a Water Audit & Balance Using The AWWA Software

Uploaded filename:

Water Audit Validity Score from AWWA spreadsheet:

Agency Completed Training In The AWWA Water Audit Method

Agency Completed Training In The Component Analysis Process

Completed/Updated the Component Analysis (at least every 4 years)?

Component Analysis Completed/Updated Date

**Water Loss Performance**

Agency Repaired All Reported Leaks & Breaks To The Extent Cost Effective

**Recording Keeping Requirements Beginning in Year 2**

Does your agency maintain a record keeping system for the following?

|   |                                  |  |                                  |
|---|----------------------------------|--|----------------------------------|
| Date/Time Leak Reported                 | <input type="text" value="Yes"/> | Leak Location  | <input type="text" value="Yes"/> |
| Type of Leaking Pipe Segment or Fitting | <input type="text" value="Yes"/> | Leak Running Time From Report to Repair                            | <input type="text" value="Yes"/> |
| Leak Volume Estimate                    | <input type="text" value="Yes"/> | Cost of Repair   | <input type="text" value="Yes"/> |
|   |                                  | Do you have an infrastructure rehabilitation and renewal program ? | <input type="text" value="Yes"/> |

Agency Located and Repaired Unreported Leaks to the Extent Cost Effective

Type of Program Activities Used to Detect Unreported Leaks

Does your agency maintain in-house records of audit results or the completed AWWA worksheet for the completed audit which could be forwarded to CUWCC?

Does your agency keeps records of each component analysis performed, and incorporates results into future annual standard water balances?

**Annual Summary Information**

Complete the following table with annual summary information (required for reporting years 2-5 only)

Please describe your infrastructure rehabilitation and renewal activity below

**AWWA Model**

**Operational Efficiency Indicator**

Apparent Losses per service connection per day:

Real Losses per service connection per day:

Real Losses per length of main per day:



BMP 1.2 Water Loss Control 2011

|  |         |
|--|---------|
| Real Losses per service connection per day per psi pressure: | 0.64    |
| Unavoidable Annual Real Losses(UARL):                        | 149.44  |
| Above, Real Losses=Current Annual Real Losses(CARL):         | 1346.56 |
| Infrastructure Leakage Index (ILI) [CARL/UARL]:              | 2.94    |

At Least As effective As

Exemption

Comments:



BMP 1.2 Water Loss Control 2012

Reporting unit name  Reporting unit number:

**AWWA Water Audit**

Agency to complete a Water Audit & Balance Using The AWWA Software

Uploaded filename:

Water Audit Validity Score from AWWA spreadsheet:

Agency Completed Training In The AWWA Water Audit Method

Agency Completed Training In The Component Analysis Process

Completed/Updated the Component Analysis (at least every 4 years)?

Component Analysis Completed/Updated Date

**Water Loss Performance**

Agency Repaired All Reported Leaks & Breaks To The Extent Cost Effective

**Recording Keeping Requirements Beginning in Year 2**

Does your agency maintain a record keeping system for the following?

|  |                                  |   |                                  |
|--|----------------------------------|---|----------------------------------|
| Date/Time Leak Reported  | <input type="text" value="Yes"/> | Leak Location                           | <input type="text" value="Yes"/> |
| Type of Leaking Pipe Segment or Fitting                            | <input type="text" value="Yes"/> | Leak Running Time From Report to Repair | <input type="text" value="Yes"/> |
| Leak Volume Estimate   | <input type="text" value="Yes"/> | Cost of Repair                          | <input type="text" value="Yes"/> |
| Do you have an infrastructure rehabilitation and renewal program ? |                                  |   | <input type="text" value="Yes"/> |

Agency Located and Repaired Unreported Leaks to the Extent Cost Effective

Type of Program Activities Used to Detect Unreported Leaks

Does your agency maintain in-house records of audit results or the completed AWWA worksheet for the completed audit which could be forwarded to CUWCC?

Does your agency keeps records of each component analysis performed, and incorporates results into future annual standard water balances?

**Annual Summary Information**

Complete the following table with annual summary information (required for reporting years 2-5 only)

Please describe your infrastructure rehabilitation and renewal activity below

**AWWA Model**

**Operational Efficiency Indicator**

Apparent Losses per service connection per day:

Real Losses per service connection per day:

Real Losses per length of main per day:



BMP 1.2 Water Loss Control 2012

|  |        |
|--|--------|
| Real Losses per service connection per day per psi pressure: | 0.31   |
| Unavoidable Annual Real Losses(UARL):                        | 148.52 |
| Above, Real Losses=Current Annual Real Losses(CARL):         | 637.1  |
| Infrastructure Leakage Index (ILI) [CARL/UARL]:              | 1.4    |

At Least As effective As

Exemption

Comments:



**BMP 1.3 Metering With Commodity 2011**

Reporting unit name:  Reporting unit number:

**Implementation**

Does your agency have any unmetered service connections?

If YES, has your agency completed a meter retrofit plan?

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered?

Are all new service connections being billed volumetrically?

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters?

**Meters Matrix**

| Account Type         | Num Of Metered Accounts | Num Of Metered Accounts Read | Num Of Metered Accounts Billed By Volume | Billing Frequency | Estimated Bills Per Year | Meter Readings Per Year |
|----------------------|-------------------------|------------------------------|--|-------------------|--------------------------|-------------------------|
| Single-Family        | 29330                   | 29330                        | 29330                                    | Bi-monthly        | 175980                   | 175980                  |
| Multi-Family         | 1741                    | 1741                         | 1741                                     | Bi-monthly        | 10446                    | 10446                   |
| Commercial           | 1736                    | 1736                         | 1736                                     | Bi-monthly        | 10416                    | 10416                   |
| Institutional        | 158                     | 158                          | 158                                      | Bi-monthly        | 948                      | 948                     |
| Industrial           | 315                     | 315                          | 315                                      | Bi-monthly        | 1890                     | 1890                    |
| Dedicated Irrigation | 348                     | 348                          | 348                                      | Bi-monthly        | 2088                     | 2088                    |
| Other                | 61                      | 61                           | 61                                       | Bi-monthly        | 366                      | 366                     |

Number of CII Accounts with Mixed-use Meters:  Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period:

**Feasibility Study**

Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?

If YES, please fill in the following information:

A. When was the Feasibility Study conducted

Describe, upload or provide an electronic link to the Feasibility Study Upload File





**BMP 1.3 Metering With Commodity      2011**

At Least As effective As

Exemption

Comments:



**BMP 1.3 Metering With Commodity 2012**

Reporting unit name:  Reporting unit number:

**Implementation**

Does your agency have any unmetered service connections?

If YES, has your agency completed a meter retrofit plan?

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered?

Are all new service connections being billed volumetrically?

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters?

**Meters Matrix**

| Account Type         | Num Of Metered Accounts | Num Of Metered Accounts Read | Num Of Metered Accounts Billed By Volume | Billing Frequency | Estimated Bills Per Year | Meter Readings Per Year |
|----------------------|-------------------------|------------------------------|--|-------------------|--------------------------|-------------------------|
| Single-Family        | 29311                   | 29311                        | 29311                                    | Bi-monthly        | 175866                   | 175866                  |
| Multi-Family         | 1750                    | 1750                         | 1750                                     | Bi-monthly        | 10500                    | 10500                   |
| Commercial           | 1651                    | 1651                         | 1651                                     | Bi-monthly        | 9906                     | 9906                    |
| Industrial           | 312                     | 312                          | 312                                      | Bi-monthly        | 1872                     | 1872                    |
| Institutional        | 192                     | 192                          | 192                                      | Bi-monthly        | 1152                     | 1152                    |
| Dedicated Irrigation | 339                     | 339                          | 339                                      | Bi-monthly        | 2034                     | 2034                    |
| Agricultural         | 4                       | 4                            | 4  | Bi-monthly        | 24                       | 24                      |
| Other                | 12                      | 12                           | 12                                       | Bi-monthly        | 72                       | 72                      |

Number of CII Accounts with Mixed-use Meters:  Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period:

**Feasibility Study**

Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?

If YES, please fill in the following information:  
 A. When was the Feasibility Study conducted



**BMP 1.3 Metering With Commodity 2012**

Describe, upload or provide an electronic link to the Feasibility Study Upload File

At Least As effective As

Exemption

Comments:



**BMP 1.4 Retail Conservation Pricing 2011**

Reporting unit name

Reporting unit number:

City of Garden Grove

60

**Implementation (Water Rate Structure)**

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

| Customer Class       | Water Rate Type           | Total Revenue Commodity Charges | Total Revenue Fixed Charges |
|----------------------|---------------------------|---------------------------------|-----------------------------|
| Single-Family        | Increasing Block          | 13209279.48                     | 2491838.94                  |
| Multi-Family         | Increasing Block          | 6272510.32                      | 561811.19                   |
| Commercial           | Increasing Block          | 4589139.79                      | 471601.24                   |
| Industrial           | Increasing Block          | 1497066.63                      | 100129.59                   |
| Institutional        | Increasing Block          | 2024199.07                      | 133803.66                   |
| Dedicated Irrigation | Increasing Block          | 1542264.85                      | 136109.52                   |
| Other                | Increasing Block          | 15730.61                        | 100381.23                   |
| Agricultural         | Increasing Block Seasonal | 11428.77                        | 2079.95                     |
|                      |                           | <b>29161619.52</b>              | <b>3997755.32</b>           |

**Implementation (Conservation Pricing Option)**

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

Use Annual Revenue As Reported

Use Canadian Water Wastewater (CWWA) Association Rate Design Model

Use 3 years average instead of most recent year

If CWWA is selected, please upload spreadsheet here.

**Canadian Water and Wastewater Association**

**Retail Waste Water (Sewer) Rate Structure by Customer Class**

Agency Provide Sewer Service

Select the Retail Waste Water (Sewer) Rate Structure assigned to the majority of your customers within a specific customer class.

| Sewer Rate Name | Customer Class Name  | Sewer Total Revenue Commodity Charges | Sewer Total Revenue Customer Meter/Service (Fixed Charges) |
|-----------------|----------------------|---------------------------------------|--|
| Uniform         | Single-Family        | 6033526.77                            | 1149243.20   |
| Uniform         | Multi-Family         | 2665011.40                            | 507621.22  |
| Uniform         | Commercial           | 1502647.50                            | 286218.57  |
| Uniform         | Industrial           | 408909.77                             | 77887.57   |
| Uniform         | Institutional        | 442923.92                             | 70867.83   |
| Uniform         | Dedicated Irrigation | 1489.80                               | 283.77   |
| Uniform         | Other                | 529.28                                | 100.81   |

At Least As effective As

Exemption

Comments:



**BMP 1.4 Retail Conservation Pricing 2012**

Reporting unit name

Reporting unit number:

City of Garden Grove

60

**Implementation (Water Rate Structure)**

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

| Customer Class       | Water Rate Type  | Total Revenue<br>Commodity Charges | Total Revenue<br>Fixed Charges |
|----------------------|------------------|------------------------------------|--------------------------------|
| Single-Family        | Increasing Block | 14290333.79                        | 2592699.97                     |
| Multi-Family         | Increasing Block | 9696823.14                         | 622848.27                      |
| Commercial           | Increasing Block | 5411918.26                         | 509830.08                      |
| Industrial           | Increasing Block | 2050921.68                         | 105678.2                       |
| Institutional        | Increasing Block | 4350964.98                         | 157966.18                      |
| Dedicated Irrigation | Increasing Block | 899215.92                          | 145527.29                      |
| Other                | Increasing Block | 16136.22                           | 105632.62                      |
| Agricultural         | Increasing Block | 11488.24                           | 1959.3                         |
|                      |                  | <b>36727802.23</b>                 | <b>4242141.91</b>              |

**Implementation (Conservation Pricing Option)**

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

Use Annual Revenue  
As Reported

Use Canadian Water Wastewater (CWWA) Association  
Rate Design Model

Use 3 years average instead  
of most recent year

If CWWA is selected, please upload spreadsheet here.

**Canadian Water and Wastewater Association**

**Retail Waste Water (Sewer) Rate Structure by Customer Class**

Agency Provide Sewer Service

Yes

Select the Retail Waste Water (Sewer) Rate Structure assigned to the majority of your customers within a specific customer class.

| Sewer Rate Name | Customer Class Name  | Sewer Total Revenue<br>Commodity Charges | Sewer Total Revenue<br>Customer Meter/Service<br>(Fixed Charges) |
|-----------------|----------------------|--|--|
| Uniform         | Single-Family        | 6162045.10                               | 1173722.88   |
| Uniform         | Multi-Family         | 2921080.48                               | 564777.23  |
| Uniform         | Commercial           | 2240100.26                               | 429451.48  |
| Uniform         | Industrial           | 432000.71                                | 88448.14   |
| Uniform         | Institutional        | 431266.10                                | 82145.92   |
| Uniform         | Dedicated Irrigation | 1662.19                                  | 316.61   |
| Uniform         | Other                | 513.00                                   | 97.72  |

At Least As effective As

No

Exemption

No

Comments:



**BMP 2.1 Public Outreach**

**2011**

Reporting unit name  Reporting unit #   
 /

Does your agency perform Public Outreach programs?

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

**Public Information Programs List**

Did at least one contact take place during each quarter of the reporting year?

| Number of Public Contacts | Public Information Programs Name       |
|---------------------------|--|
| 2750                      | General water conservation information |

**Contact with the Media**

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

Did at least one contact take place during each quarter of the reporting year?

| Number of Media Contacts | Public Outreach Media Contact Name List |
|--------------------------|---|
| 1                        | Television contacts                     |
| 1                        | Newspaper contacts                      |

**Wholesale Agency Website Updates**

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

**Agency Website Updates**

Enter your agency's URL (website address):

Describe a minimum of four water conservation related updates to your agency's website that took place during the year:





**BMP 2.1 Public Outreach**

**2011**



**BMP 2.1 Public Outreach**

**2011**

Did at least one Website Update take place during each quarter of the reporting year?

**Public Information Programs Annual Budget**

Enter budget for public outreach programs. You may enter total budget in a single line or break the budget into discrete categories by entering many rows. Please indicate if personnel costs are included in the entry.

**Public Information Expenses**

Enter expenses for public outreach programs. Please include the same kind of expenses you included in the question related to your budget (Section 2.1.7, above). For example, if you included personnel costs in the budget entered above, be sure to include them here as well.

| Public Outreach Expense Category | Expense Amount | Personal Cost Included? |
|----------------------------------|----------------|-------------------------|
| Giveaway Materials               | 1000           |                         |

**Additional Public Information Program**

Please report additional public information contacts. List these additional contacts in order of how your agency views their importance / effectiveness with respect to conserving water, with the most important / effective listed first (where 1 = most important).

Were there additional Public Outreach efforts?

**Public Outreach Additional Information**

**Social Marketing Programs**

**Branding** Does your agency have a water conservation "brand," "theme" or mascot?

Describe the brand, theme or mascot.

**Market Research** Have you sponsored or participated in market research to refine your message?

Market Research Topic

Brand Message

Brand Mission Statement

**Community Committees**

Do you have a community conservation committee?

Enter the names of the community committees:

**Training**

**Social Marketing Expenditures**

Public Outreach Social Marketing Expenses

**Partnering Programs**

**Name** **Type of Program**

CLCA?

Green Building Programs?

Master Gardeners?



**BMP 2.1 Public Outreach**

**2011**



**BMP 2.1 Public Outreach**

**2011**

Cooperative Extension?

Local Colleges?

Other

Retail and wholesale outlet; name(s) and type(s) of programs:

**Partnering Programs - Newsletters**

Number of newsletters per year

Number of customers per year

**Partnering with Other Utilities**

Describe other utilities your agency partners with, including electrical utilities

MWDOC, Metropolitan Water District, OC Water District, OC Sanitation District, Southern California Edison, Southern California Gas Company, all 31 retail water utilities (water districts and city water departments) within Orange County, California

**Conservation Gardens**

Describe water conservation gardens at your agency or other high traffic areas or new homes

The City has two demonstration gardens located at the City's Municipal Service Center and the Regional Garden Grove Library.

**Landscape contests or awards**

Describe water wise landscape contest or awards program conducted by your agency

Garden Grove PRIDE honors residents and businesses for their water wise landscaping.

Additional Programs supported by Agency but not mentioned above:

At Least As effective As

No

Exemption

No

0

Comments



**BMP 2.1 Public Outreach**

**2011**



**BMP 2.1 Public Outreach**

**2012**

Reporting unit name

Reporting unit #

/

Does your agency perform Public Outreach programs?

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

**Public Information Programs List**

Did at least one contact take place during each quarter of the reporting year?

| Number of Public Contacts | Public Information Programs Name   |
|---------------------------|--|
| 500                       | Website  |
| 1500                      | Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information |

**Contact with the Media**

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

Did at least one contact take place during each quarter of the reporting year?

| Number of Media Contacts | Public Outreach Media Contact Name List |
|--------------------------|---|
| 1                        | Newspaper contacts                      |
| 1                        | Television contacts                     |

**Wholesale Agency Website Updates**

The list of wholesale agencies performing public outreach which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

Agency Website Updates

Enter your agency's URL (website address):

Describe a minimum of four water conservation related updates to your agency's website that took place during the year:



**BMP 2.1 Public Outreach**

**2012**



**BMP 2.1 Public Outreach**

**2012**

Every quarter, updates are made to our web page, including: new information on landscaping classes, rebate programs, and water savings tips.

Did at least one Website Update take place during each quarter of the reporting year?

**Public Information Programs Annual Budget**

Enter budget for public outreach programs. You may enter total budget in a single line or break the budget into discrete categories by entering many rows. Please indicate if personnel costs are included in the entry.

**Public Information Expenses**

Enter expenses for public outreach programs. Please include the same kind of expenses you included in the question related to your budget (Section 2.1.7, above). For example, if you included personnel costs in the budget entered above, be sure to include them here as well.

| Public Outreach Expense Category | Expense Amount | Personal Cost Included? |
|----------------------------------|----------------|-------------------------|
| Giveaway Materials               | 1000           |                         |

**Additional Public Information Program**

Please report additional public information contacts. List these additional contacts in order of how your agency views their importance / effectiveness with respect to conserving water, with the most important / effective listed first (where 1 = most important).

Were there additional Public Outreach efforts?

**Public Outreach Additional Information**

**Social Marketing Programs**

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Does your agency have a water conservation "brand," "theme" or mascot?

Describe the brand, theme or mascot.

**Market Research**

Have you sponsored or participated in market research to refine your message?

Market Research Topic

Brand Message

Brand Mission Statement

**Community Committees**

Do you have a community conservation committee?

Enter the names of the community committees:

**Training**

**Social Marketing Expenditures**

Public Outreach Social Marketing Expenses

**Partnering Programs**

**Name**

**Type of Program**

CLCA?

Green Building Programs?





**BMP 2.1 Public Outreach**

**2012**



**BMP 2.1 Public Outreach**

**2012**

Master Gardeners?

Cooperative Extension?

Local Colleges?

Other

Retail and wholesale outlet; name(s) and type(s) of programs:

**Partnering Programs - Newsletters**

Number of newsletters per year  Number of customers per year

**Partnering with Other Utilities**

Describe other utilities your agency partners with, including electrical utilities

MWDOC, Metropolitan Water District, OC Water District, OC Sanitation District, Southern California Edison, Southern California Gas Company, all 31 retail water utilities (water districts and city water departments) within Orange County, California

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Describe water conservation gardens at your agency or other high traffic areas or new homes

The City has two demonstration gardens located at the City's Municipal Service Center and the Regional Garden Grove Library.

**Landscape contests or awards**

Describe water wise landscape contest or awards program conducted by your agency

Garden Grove PRIDE honors residents and businesses for their water wise landscaping.

Additional Programs supported by Agency but not mentioned above:

**At Least As effective As**

**Exemption**

Comments



**BMP 2.1 Public Outreach**

**2012**



**BMP 2.1 Public Outreach**

**2012**

---



**BMP 2.1 Public Outreach**

**2012**



**BMP 2.2 School Education Programs 2011**

Reporting unit name  Reporting unit #   
 /

Does your agency perform Public Outreach programs? Yes

The list of wholesale agencies performing school education programs which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

Materials meet state education framework requirements? Description

Materials distributed to K-6 Students? Description

Number of students reached

Materials distributed to 7-12 Students? (optional) Description

Annual budget for school education program

Description of all other water supplier education programs

**School Programs Activities**

**Classroom Presentation:**

Number of presentation / Number of attendees

Describe the topics covered in your classroom presentations:

**Large group assemblies:**

Number of presentation  Number of attendees

**Children's water festivals or other events:**

Number of presentation  Number of attendees

**Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:**

Number of presentation  Number of attendees

**Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):**

Description  Number distributed

**Staffing children's booths at events & festivals:**

Number of booths  Number of attendees

**Water conservation contests such as poster and photo:**



**BMP 2.2 School Education Programs 2011**

Description  Number of participants

**Offer monetary awards/funding or scholarships to students:**

Number offered  Total funding

**Teacher training workshops:**

Number of presentation  Number of attendees

**Fund and/or staff student field trips to treatment facilities, recycling facilities, water conservation gardens, etc.:**

Number of tours or fieldtrips  Number of participants

**College internships in water conservation offered:**

Number of internship  Total funding

**Career Fairs / Workshops:**

Number of presentation  Number of attendees

**Additional program(s) supported by agency but not mentioned above:**

| Description          | Number of events     | Number of participants |
|----------------------|----------------------|------------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/>   |

Comments

At Least As effective As

Exemption



# BMP 2.2 School Education Programs 2012

Reporting unit name Reporting unit #   
 /

Does your agency perform Public Outreach programs?  Yes

The list of wholesale agencies performing school education programs which can be counted to help the agency comply with the BMP

Please provide the name of Agency if not CUWCC Group1 members

Materials meet state education framework requirements? Description

Materials distributed to K-6 Students? Description

Number of students reached

Materials distributed to 7-12 Students? (optional) Description

Annual budget for school education program

Description of all other water supplier education programs

### School Programs Activities

**Classroom Presentation:**   
 Number of presentation  Number of attendees

Describe the topics covered in your classroom presentations:

**Large group assemblies:**  
 Number of presentation  Number of attendees

**Children's water festivals or other events:**  
 Number of presentation  Number of attendees

**Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:**  
 Number of presentation  Number of attendees

**Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):**  
 Description  Number distributed

**Staffing children's booths at events & festivals:**  
 Number of booths  Number of attendees





## BMP 2.2 School Education Programs 2012

### Water conservation contests such as poster and photo:

Description  Number of participants

### Offer monetary awards/funding or scholarships to students:

Number offered  Total funding

### Teacher training workshops:

Number of presentation  Number of attendees

### Fund and/or staff student field trips to treatment facilities, recycling facilities, water conservation gardens, etc.:

Number of tours or fieldtrips  Number of participants

### College internships in water conservation offered:

Number of internship  Total funding

### Career Fairs / Workshops:

Number of presentation  Number of attendees

### Additional program(s) supported by agency but not mentioned above:

| Description          | Number of events     | Number of participants |
|----------------------|----------------------|------------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/>   |

Comments

At Least As effective As

Exemption



**BMP 3. Residential**

**2011**

Agency **City of Garden Grove**

Date Agency Signed MOU: 11/12/1996

Coverage Option: GPCD

**Total Measured Water Savings (AF/Year)**

| TRADITIONAL | FLEXTRACK | ACTUAL | TARGET | Prior Activities Credit |
|-------------|-----------|--------|--------|-------------------------|
| 27.63       | 0         | 27.63  | 0      |                         |

**Residential Assistance**

|   | Single Family Accounts | Single Family Target | Multi Family Accounts | Multi Family Target |
|---|------------------------|----------------------|-----------------------|---------------------|
| Total Number Of Customers   | 2                      |                      | 0                     |                     |
| Total Participants during Reporting                                 | 0                      |                      | 0                     |                     |
| Number of Leak Detection Surveys or Assistance on Customer Property | 0                      | 0.02                 | 0                     | 0.00                |
| Number of Faucet Aerators Distributed                               | 0                      |                      | 0                     |                     |
| Number of WSS Showerheads Distributed                               | 0                      |                      |                       |                     |
| <b>Landscape Water Surveys</b>                                      | 0                      | 0.02                 |                       |                     |

Has agency reached a 75% market saturation for showerheads?

No

**High Efficiency Clothes Washers**

Single Family Accounts

Single Family Target

Number of installations for HECW

481

0.02

Are financial incentives provided for HECWs?

Yes

Has agency completed a HECW Market Penetration Study?

No

**Water Sense Specification Toilets**

Retrofit 'On Resale' Ordinance exists No

75% Market Penetration Achieved No

|                               | Single Family Units | Multi Family Units |
|-------------------------------|---------------------|--------------------|
| Five year average Resale Rate | 0.05                | 0.14               |
| Number Toilets per Household  | 1.5                 | 1                  |
| Number WSS Toilets Installed  | 24                  | 0                  |
| Target Number of WSS Toilets  | 0.08                | 0.00               |

**WSS for New Residential Development**

Does an Ordinance Exists Requiring WSS Fixtures and Appliances in new SF and MF residences?

Single Family Units

Multi Family Units

No

No

Number of new SF & MF units built

0

0

Incentives

**Unique Conservation Measures**

**Residential Assistance / Landscape Water Survey unique water savinigs**

Measured water savings (AF/YR) 0

Uploaded file name:

**High Efficiency Clothes Washers unique water savinigs**

Measured water savings (AF/YR) 0

Uploaded file name:

**WaterSense Specification toilets unique water savinigs**

SF Measured water savings (AF/YR) MF Measured water savings (AF/YR)

Uploaded file name:

**WaterSense Specification toilets for New Residential development unique water savinigs**

Measured water savings (AF/YR) 0

Uploaded file name:

**High bill contact with single-family and multi-family customers**

Measured water savings (AF/YR)

Uploaded file name:

**Educate residential customers about the behavioral aspects of water conservation**

Measured water savings (AF/YR) 0

Uploaded file name:

**Notify residential customers of leaks on the customer's side of the meters**

Measured water savings (AF/YR) 0

Uploaded file name:

**Provide bill or surcharge refunds for customers to repair leaks on the customer's side of the meters**

Measured water savings (AF/YR) 0

Uploaded file name:

**Provide unique water savings fixtures that are not included in the BMP list above**

Measured water savings (AF/YR) 0

Uploaded file name:

**Install residence water use monitors**

Measured water savings (AF/YR) 0

Uploaded file name:

**Participate in programs that provide residences with school water conservation kits**

Measured water savings (AF/YR) 0

Uploaded file name:

**Implement in automatic meter reading program for residential customers**

Measured water savings (AF/YR) 0

Uploaded file name:

**OTHER Types of Measures**

Measured water savings (AF/YR) 0

Uploaded file name:

Comments:

At Least As Effective As No

Exemption No



**BMP 3. Residential**

**2012**

Agency **City of Garden Grove**

Date Agency Signed MOU: 11/12/1996

Coverage Option: GPCD

**Total Measured Water Savings (AF/Year)**

| TRADITIONAL | FLEXTRACK | ACTUAL | TARGET | Prior Activities Credit |
|-------------|-----------|--------|--------|-------------------------|
| 40.85       | 0         | 40.85  | 0.01   |                         |

**Residential Assistance**

|   | Single Family Accounts | Single Family Target | Multi Family Accounts | Multi Family Target |
|---|------------------------|----------------------|-----------------------|---------------------|
| Total Number Of Customers   | 3                      |                      | 0                     |                     |
| Total Participants during Reporting                                 | 0                      |                      | 0                     |                     |
| Number of Leak Detection Surveys or Assistance on Customer Property | 0                      | 0.02                 | 0                     | 0.00                |
| Number of Faucet Aerators Distributed                               | 0                      |                      | 0                     |                     |
| Number of WSS Showerheads Distributed                               | 0                      |                      |                       |                     |
| <b>Landscape Water Surveys</b>                                      | 0                      | 0.02                 |                       |                     |

Has agency reached a 75% market saturation for showerheads?

No

**High Efficiency Clothes Washers**

Single Family Accounts

Single Family Target

Number of installations for HECW

236

0.02

Are financial incentives provided for HECWs?

No

Has agency completed a HECW Market Penetration Study?

No

**Water Sense Specification Toilets**

Retrofit 'On Resale' Ordinance exists

No

75% Market Penetration Achieved

No

Single Family Units

Multi Family Units

Five year average Resale Rate

0.05

0.14

Number Toilets per Household

1.5

1

Number WSS Toilets Installed

0

0

Target Number of WSS Toilets

0.11

0.00

**WSS for New Residential Development**

Does an Ordinance Exists Requiring WSS Fixtures and Appliances in new SF and MF residences?

Single Family Units

Multi Family Units

No

No

Number of new SF & MF units built

0

0

Incentives

**Unique Conservation Measures**

**Residential Assistance / Landscape Water Survey unique water savinigs**

Measured water savings (AF/YR) 0

Uploaded file name:

**High Efficiency Clothes Washers unique water savinigs**

Measured water savings (AF/YR) 0

Uploaded file name:

**WaterSense Specification toilets unique water savinigs**

SF Measured water savings (AF/YR) MF Measured water savings (AF/YR)

Uploaded file name:

**WaterSense Specification toilets for New Residential development unique water savinigs**

Measured water savings (AF/YR) 0

Uploaded file name:

**High bill contact with single-family and multi-family customers**

Measured water savings (AF/YR)

Uploaded file name:

**Educate residential customers about the behavioral aspects of water conservation**

Measured water savings (AF/YR) 0

Uploaded file name:

**Notify residential customers of leaks on the customer's side of the meters**

Measured water savings (AF/YR) 0

Uploaded file name:

**Provide bill or surcharge refunds for customers to repair leaks on the customer's side of the meters**

Measured water savings (AF/YR) 0

Uploaded file name:

**Provide unique water savings fixtures that are not included in the BMP list above**

Measured water savings (AF/YR) 0

Uploaded file name:

**Install residence water use monitors**

Measured water savings (AF/YR) 0

Uploaded file name:

**Participate in programs that provide residences with school water conservation kits**

Measured water savings (AF/YR) 0

Uploaded file name:

**Implement in automatic meter reading program for residential customers**

Measured water savings (AF/YR) 0

Uploaded file name:

**OTHER Types of Measures**

Measured water savings (AF/YR) 0

Uploaded file name:

Comments:

At Least As Effective As No

Exemption No



**BMP 4. Commercial Industrial Institutional 2011**

Agency **City of Garden Grove**

Date Agency Signed MOU: 11/12/1996

Coverage Option: GPCD

CII Baseline Water Use (AF): 7534.00

CII Water Use Reduction(AF): 753.4

**Total Measured Water Savings (AF/Year)**

| TRADITIONAL | FLEXTRACK | ACTUAL | TARGET | Prior Activities Credit |
|-------------|-----------|--------|--------|-------------------------|
| 0.44        | 0         | 0.44   |        |                         |

| <u>Water Efficiency Measures:</u>                        | <u>Quantity Installed:</u> | <u>Water Savings:</u> | <u>Accept Council's default value</u> | <u>Uploaded backup data</u> |
|--|----------------------------|-----------------------|---------------------------------------|-----------------------------|
| 1 High Efficiency Toilets (1.2 GPF or less)              | 0                          | 0.00                  | Yes                                   |                             |
| 2 High Efficiency Urinals (0.5 GPF or less)              | 0                          | 0.00                  | Yes                                   |                             |
| 3 Ultra Low Flow Urinals                                 | 0.00                       | 0.00                  | Yes                                   |                             |
| 4 Zero Consumption Urinals                               | 22.00                      | 0.44                  | Yes                                   |                             |
| 5 Commercial High Efficiency Single Load Clothes Washers | 0.00                       | 0.00                  | Yes                                   |                             |
| 6 Cooling Tower Conductivity Controllers                 | 0.00                       | 0.00                  | Yes                                   |                             |
| 7 Cooling Tower pH Controllers                           | 0.00                       | 0.00                  | Yes                                   |                             |
| 8 Connectionless Food Steamers                           | 0.00                       | 0.00                  | Yes                                   |                             |
| 9 Medical Equipment Steam Sterilizers                    | 0.00                       | 0.00                  | Yes                                   |                             |
| 10 Water Efficient Ice Machines                          | 0.00                       | 0.00                  | Yes                                   |                             |
| 11 Pressurized Water Brooms                              | 0.00                       | 0.00                  | Yes                                   |                             |
| 12 Dry Vacuum Pumps                                      | 0.00                       | 0.00                  | Yes                                   |                             |

**Unique Conservation Measures**

**Industrial Process Water Use Reduction**

Measured water savings (AF/YR)

Uploaded file name:

**Commercial Laundry Retrofits**

Measured water savings (AF/YR)

Uploaded file name:

**Industrial Laundry Retrofits**

Measured water savings (AF/YR)

Uploaded file name:

**Filter Upgrades (for pools, spas and fountains)**

Measured water savings (AF/YR)



Uploaded file name:

**Car Wash Reclamation Systems**

Measured water savings (AF/YR)

Uploaded file name:

**Wet Cleaning**

Measured water savings (AF/YR)

Uploaded file name:

**Water Audits (to avoid double counting, do not include device/replacement water savings)**

Measured water savings (AF/YR)

Uploaded file name:

**Clean In Place (CIP)Technology (such as bottle sterilization in a beverage processing plant)**

Measured water savings (AF/YR)

Uploaded file name:

**Waterless Wok**

Measured water savings (AF/YR)

Uploaded file name:

**Alternative On-site Water Sources**

Measured water savings (AF/YR)

Uploaded file name:

**Sub-metering**

Measured water savings (AF/YR)

Uploaded file name:

**High Efficiency Showerheads**

Measured water savings (AF/YR)

Uploaded file name:

**Faucet Flow Restrictors**

Measured water savings (AF/YR)

Uploaded file name:

**Water Efficiency Dishwashers**

Measured water savings (AF/YR)

Uploaded file name:

**Hot Water on Demand**

Measured water savings (AF/YR)

Uploaded file name:

**Pre-rinse spray Valves of 1.3 gpm (gallons per minute) or less**

Measured water savings (AF/YR)

Uploaded file name:

**Central Flush Systems**

Measured water savings (AF/YR)

Uploaded file name:

**Other Measures chosen by the Agency**

Measured water savings (AF/YR)

Uploaded file name:

**Comments:**

**At Least As Effective As**                      No

Exemption    No



Reporting Unit Name  
**City of Garden Grove**  
Retail Only

Reporting Unit ID#: **60**

**2011 Potable Water Sources**

Service Area Population: 171327

| Local Watershed | AF / Year       | Water Supply Type | Water Supply Description |
|-----------------|-----------------|-------------------|--------------------------|
|                 | 9379.90         | Surface           |                          |
|                 | 15305.80        | Groundwater       |                          |
|                 | <b>24685.70</b> |                   |                          |



Reporting Unit Name  
**City of Garden Grove**  
Retail Only

Reporting Unit ID#: **60**

**2012 Potable Water Sources**

Service Area Population: 172648

| Local Watershed | AF / Year       | Water Supply Type | Water Supply Description |
|-----------------|-----------------|-------------------|--------------------------|
|                 | 16297.00        | Groundwater       |                          |
|                 | 8775.10         | Surface           |                          |
|                 | <b>25072.10</b> |                   |                          |



Reporting Unit Name  
**City of Garden Grove**  
Retail Only

Reporting Unit ID#:  
**60**

**2011 Potable Water Uses**

Billed:

| CustomerType         | Metered Accounts | Metered Water Delivered AF/Year | Un-Metered Accounts | Un-Metered Water Delivered AF/Year | Description |
|----------------------|------------------|---------------------------------|---------------------|------------------------------------|-------------|
| Single-Family        | 29330            | 11729.00                        |                     |                                    |             |
| Multi-Family         | 1741             | 4894.00                         |                     |                                    |             |
| Commercial           | 1736             | 3145.00                         |                     |                                    |             |
| Institutional        | 158              | 1531.00                         |                     |                                    |             |
| Industrial           | 315              | 976.00                          |                     |                                    |             |
| Dedicated Irrigation | 348              | 695.00                          |                     |                                    |             |
| Other                | 61               | 24.00                           |                     |                                    |             |
| Agricultural         | 4                | 9.00                            |                     |                                    |             |
|                      | <b>33693</b>     | <b>23003.00</b>                 |                     |                                    |             |

Un-Billed:



Reporting Unit Name  
**City of Garden Grove**  
Retail Only

Reporting Unit ID#:  
**60**

**2012 Potable Water Uses**

Billed:

| CustomerType         | Metered Accounts | Metered Water Delivered AF/Year | Un-Metered Accounts | Un-Metered Water Delivered AF/Year | Description |
|----------------------|------------------|---------------------------------|---------------------|------------------------------------|-------------|
| Single-Family        | 29311            | 11691.00                        |                     |                                    |             |
| Multi-Family         | 1750             | 5329.00                         |                     |                                    |             |
| Commercial           | 1651             | 3292.00                         |                     |                                    |             |
| Industrial           | 312              | 1043.00                         |                     |                                    |             |
| Institutional        | 192              | 1749.00                         |                     |                                    |             |
| Dedicated Irrigation | 339              | 756.00                          |                     |                                    |             |
| Agricultural         | 4                | 10.00                           |                     |                                    |             |
| Other                | 12               | 179.00                          |                     |                                    |             |
|                      | <b>33571</b>     | <b>24049.00</b>                 |                     |                                    |             |

Un-Billed:

Arcadis U.S., Inc.

445 South Figueroa Street

Suite 3650

Los Angeles, California 90071

Tel 213 486 9884

Fax 213 486 9894

[www.arcadis.com](http://www.arcadis.com)

A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the width of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, crossing the horizontal line.