2015

URBAN WATER MANAGEMENT PLAN

FINAL

May 2016

2015 URBAN WATER MANAGEMENT PLAN

City of La Habra

FINAL

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ACRONYMS AND ABBREVIATIONS

20x2020	20% water use reduction in GPCD by year 2020
1,2,3-TCP	Trichloropropane
Act	Urban Water Management Planning Act
AF	Acre-Feet
AFY	Acre-Feet per Year
AWWA	American Water Works Association
Basin	La Habra Groundwater Basin
Biops	Biological Opinions
BMO	Best Management Objective
BMP	Best Management Practice
BPOU	Baldwin Park Operable Unit
CCC	California Coastal Commission
CDR	Center for Demographic Research
CDWC	California Domestic Water Company
CFS	Cubic Feet per Second
CII	Commercial/Industrial/Institutional
City	City of La Habra
Cr VI	Hexavalent Chromium
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin River Delta
DMM	Demand Management Measure
DOF	Department of Finance
DVL	Diamond Valley Lake
DWR	Department of Water Resources
EIR	Environmental Impact Report
FCV	Flow-Control Valves
FY	Fiscal Year
GCM	General Circulation Model
GPCD	Gallons per Capita per Day
GWRS	Groundwater Replenishment System
HECW	High Efficiency Clothes Washer
HET	High Efficiency Toilet
IRP	Integrated Water Resources Plan
IWA	International Water Association
LAFCO	Local Agency Formation Commission
LBCWD	Laguna Beach County Water District

LRP	Local Resources Program
LTFP	Long-Term Facilities Plan
MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
MG	Million Gallon
MGD	Million Gallons per Day
MHI	Median Household Income
MSL	Mean Sea Level
MWDOC	Municipal Water District of Orange County
NDMA	N-nitrosodimethylamine
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
Poseidon	Poseidon Resources LLC
PPCP	Pharmaceuticals and Personal Care Product
Ppb	Parts per Billion
RHNA	Regional Housing Needs Assessment
SBx7-7	Senate Bill 7 as part of the Seventh Extraordinary Session
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCWD	South Coast Water District
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program
Study	Colorado River Basin Water Supply and Demand Study
SWP	State Water Project
SWS	Suburban Water Systems
SWRCB	California State Water Resources Control Board
TDS	Total Dissolved Solids
TVMWD	Three Valleys Municipal Water District
USGVMWD	Upper San Gabriel Valley Municipal Water District
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
WBIC	Weather Based Irrigation Controller
WEROC	Water Emergency Response Organization of Orange County
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 the present and future water resources and demands within the City of La Habra'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

- 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 providers 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**
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☑	Water Supplier is also a member of a Regional Alliance	Orange County 20x2020 Regional Alliance
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Table 1-2: Agency Identification

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

1.2 Agency Overview

The history of the water service area provides a basis for understanding present conditions, limitations on the water supply sources, and a background of present policies and practices. Data and conditions that exist throughout much of the Lower Santa Ana Basin are not applicable to the City, which overlays a separate small non–adjudicated water basin. It is for this reason that a brief history of water development within the City's service area is included in this plan.

Within the current City, Coyote Creek and the La Mirada Channel were the only surface water sources that were available to the early settlers. The fact that the surface water was not a reliable supply and only provided small quantities of water were probably the primary reasons that no record has been found of any permanent Native American settlement within the area that is now the City. Since these small streams were not large enough or dependable enough to provide irrigation water through dry periods or on a year round basis, the early settlers attempted to save run–off water. However, due to limited rainfall this effort resulted in water used primarily for domestic and livestock use, rather than agriculture irrigation.

The first water wells within the City were hand dug, shallow, generally near the creek beds, and produced insufficient quantities of water to provide for agricultural irrigation. One settler constructed a 100,000 gallon reservoir, supplied by several small wells. Additionally, attempts to transport water from a spring in a neighboring area to supply water to the reservoir were unsuccessful. The largest early source of water supplied was a pit located on the Little Coyote Creek that supplied sufficient water for pumping water through a mile–long four inch line to the aforementioned reservoir. This system, the first in the City, was sufficient to supply the owner's ranch and provide a small amount of water for sale to a few neighbors.

Only a few wells of sufficient production quantity for irrigation purposes were developed within the City's service area.

In 1889, the East Whittier Land and Water Company was formed and financed the purchase of water bearing lands in the Basset area on the west side of the San Gabriel River and the construction of water transportation facilities from the well field to the East Whittier area (the western boundary of the historic La Habra Valley and water basin). Construction was completed in 1891 with a flow of 400 miner's inches (approximately 5,730 acre-feet per year (AFY) or 1.86 billion gallons). In 1898 the well was deepened. The Basset area is within the Upper San Gabriel Water Basin, in what is now the eastern portion of the City of El Monte and the extreme western portion of the City of Industry.

The La Habra Water Company was incorporated in October 1902 for the purpose of constructing facilities for farmers living in the area now within the boundaries of the City. At the same time, the California Domestic Water Company was incorporated and simultaneously purchased the facilities of the East Whittier Land and Water Company. The La Habra Water Company originally owned fifty percent of the California Domestic Water Company stock. Ultimately, the surviving company was California Domestic Water Company. The facilities to supply the La Habra Water Company were completed and water flowed to the service area in August 1903. With the California Domestic/La Habra Water Company facilities, the City became the first community in Orange County to import water from sources outside the County, a practice that continues to this day.

In 1913 the La Habra Domestic Water Company was formed, with the basic distribution lines constructed soon thereafter. Meters were installed in 1916. The company was sold by the original founders in 1928 to other investors and then sold to the City in 1933.

The residents of the City are represented by a five-member City Council. The members of the City Council are elected on an at-large basis to four-year terms. The current City Council members are:

- Jim Gomez, Mayor
- Tim Shaw, Mayor Pro Tem
- Rose Espinoza, Council Member
- Tom Beamish, Council Member
- Michael Blazey, Council Member

The City receives its water from three main sources, local well water from the La Habra Basin and the Main San Gabriel Basin, which is provided by the California Domestic Water Company (CDWC), and imported water from the Municipal Water District of Orange County (MWDOC). MWDOC is OC's wholesale supplier and is a member agency of the Metropolitan Water District of Southern California (Metropolitan). The City's location within MWDOC is shown on Figure 1-1.

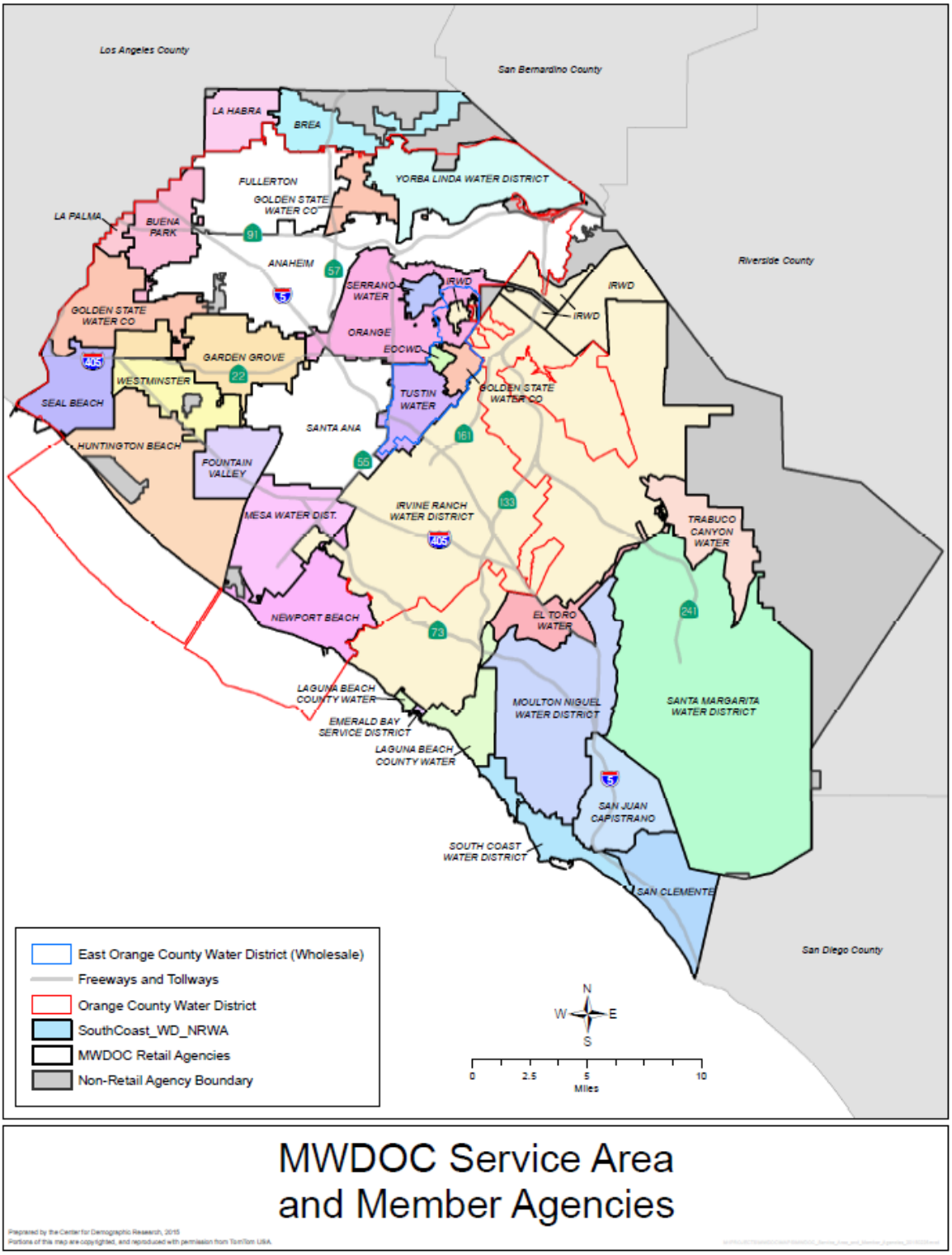

Figure 1-1. Regional Location of Urban Water Supplier

1.3 Service Area and Facilities

1.3.1 City of La Habra Service Area

The City is located in the most northern part of Orange County and borders the cities of Whittier, La Mirada, and La Habra Heights within Los Angeles County on the north and west, city of Brea on the east, and city of Fullerton to the south and southeast. The City manages and operates its domestic water system that serves a 2015 population of 61,843 through approximately 140 miles of pipelines within City boundaries. The City serves potable water to a 7.3 square mile area within the City limits as shown on Figure 1-2.

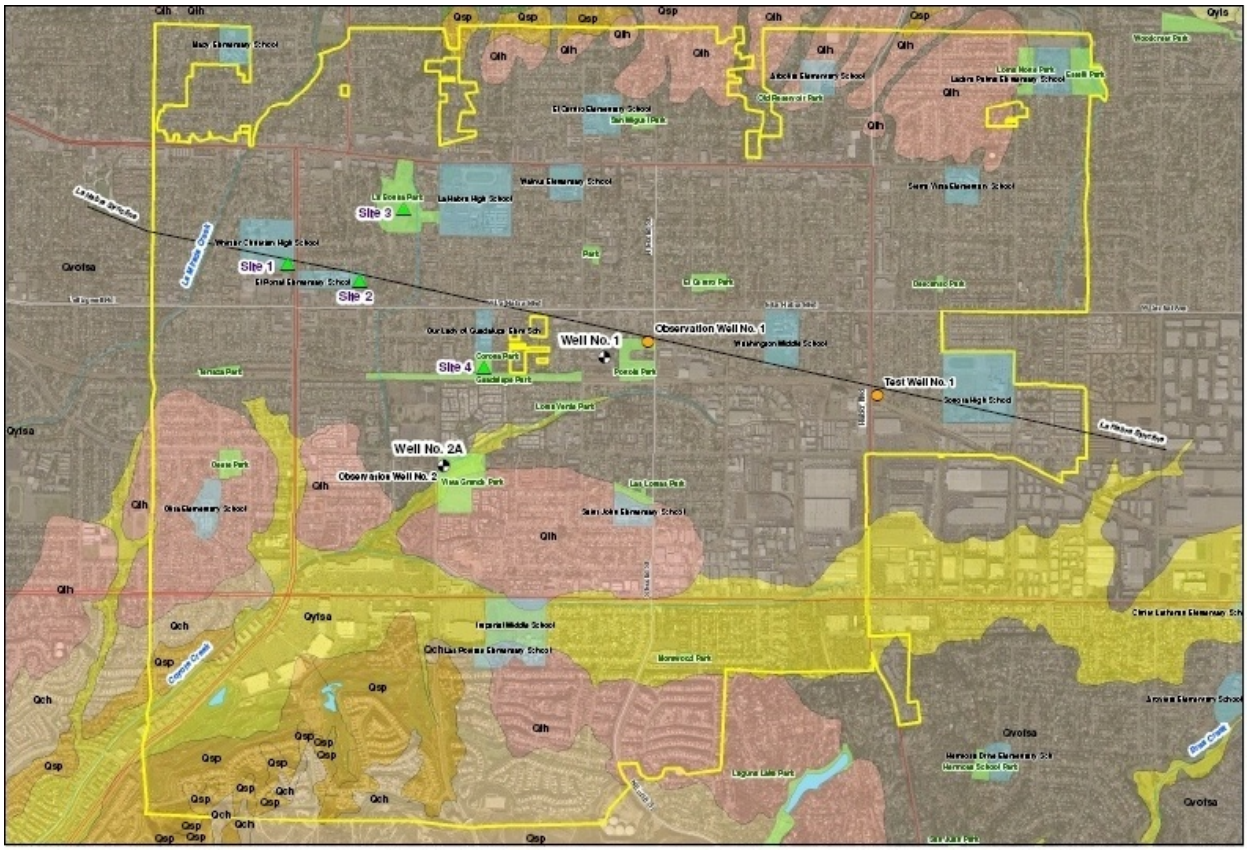

Figure 1-2: City of La Habra Service Area

1.3.2 City of La Habra Water Facilities

The City has three storage reservoirs totaling 16.8 million gallons in capacity within City limits as well as three groundwater wells, five booster pumping stations, and 57 pressure regulating stations. The pressure regulating stations divide the distribution system into 19 different pressure zones. The City also has interconnections with Metropolitan, CDWC, and emergency interconnections with Suburban Water Systems, City of Fullerton, and City of Brea.

The City obtains domestic water from groundwater and from imported water supplies. Groundwater is supplied from three City owned wells. Together the Idaho Street well, La Bonita Well, and Portola Well provide about 35 to 40 percent of the City's recent water supply. All three wells pump water from the La Habra Groundwater Basin (Basin) into the City's Zone 1 pressure zone.

Imported water accounts for the remaining 60 to 65 percent of the City's total production. Water imported into the City comes from two sources, the CDWC and Metropolitan through MWDOC. The majority of imported water is purchased from the CDWC. Less than 5 percent of the City's water comes from Metropolitan since the completion of the La Bonita and Portola Wells in 2012 and 2013, respectively.

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

Table 1-3: Public Water Systems (AF)

Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
CA3010018	City of La Habra	12,548	9,584
	TOTAL	12,548	9,584
NOTES:			

Table 1-4: Water Supplier Information Exchange

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

2 DEMANDS

2.1 Overview

Since the last UWMP update, Southern California's urban water demand has been largely shaped by the efforts to comply with SBx7-7. This law requires all California retail urban water suppliers serving more than 3,000 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 28 percent set for the City (discussed later in Section 2.5).

In addition to local water conservation ordinances, the City has partnered with MWDOC on educational programs, indoor retrofits and training.

These efforts have been part of statewide water conservation ordinances that require watering landscape, 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 20 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 OC, 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.

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 61,843 according to the California State University at Fullerton's Center of Demographics Research (CDR). The City is experiencing a development phase, and its population is projected to increase 10.2 percent by 2040, representing an average growth rate of 0.41 percent per year.

Growth has increased slightly since the 2010 UWMP as housing is becoming denser and new residential units are multi-storied. Several new developments within the City are moving forward and the City will potentially take over service areas within the City previously held by Cal Domestic and LA County. The potentially expanded service area is not included in the population projections listed below. 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
	61,843	64,552	65,859	67,144	68,012	68,159
NOTES: MWDOC Retail Agency Population Projections						

2.2.3 Land Use

Land use within the service area of the City is primarily residential with sections of commercial and industrial facilities. The City has taken a progressive approach to growth and rezoned several commercial areas to mixed use. The Urban Village development will bring three story townhomes and mixed use development with an "urban feel" to the City, construction began in 2015 for this project. Other new developments currently proposed include 71 single-family homes by City Ventures, the Fairfield development will bring 335 luxury apartments homes and the Cervetto development will create 32 single family homes to the City. These three projects are currently in progress and another smaller eight townhome development called Walnut Gardens and seven attached Habitat for Humanity homes are also projected for development in the City. The development of these residential units, some on previously commercial properties, is consistent with the City's dominantly residential land use trends. Figure 2-1 shows the City's planned development projects for 2016.

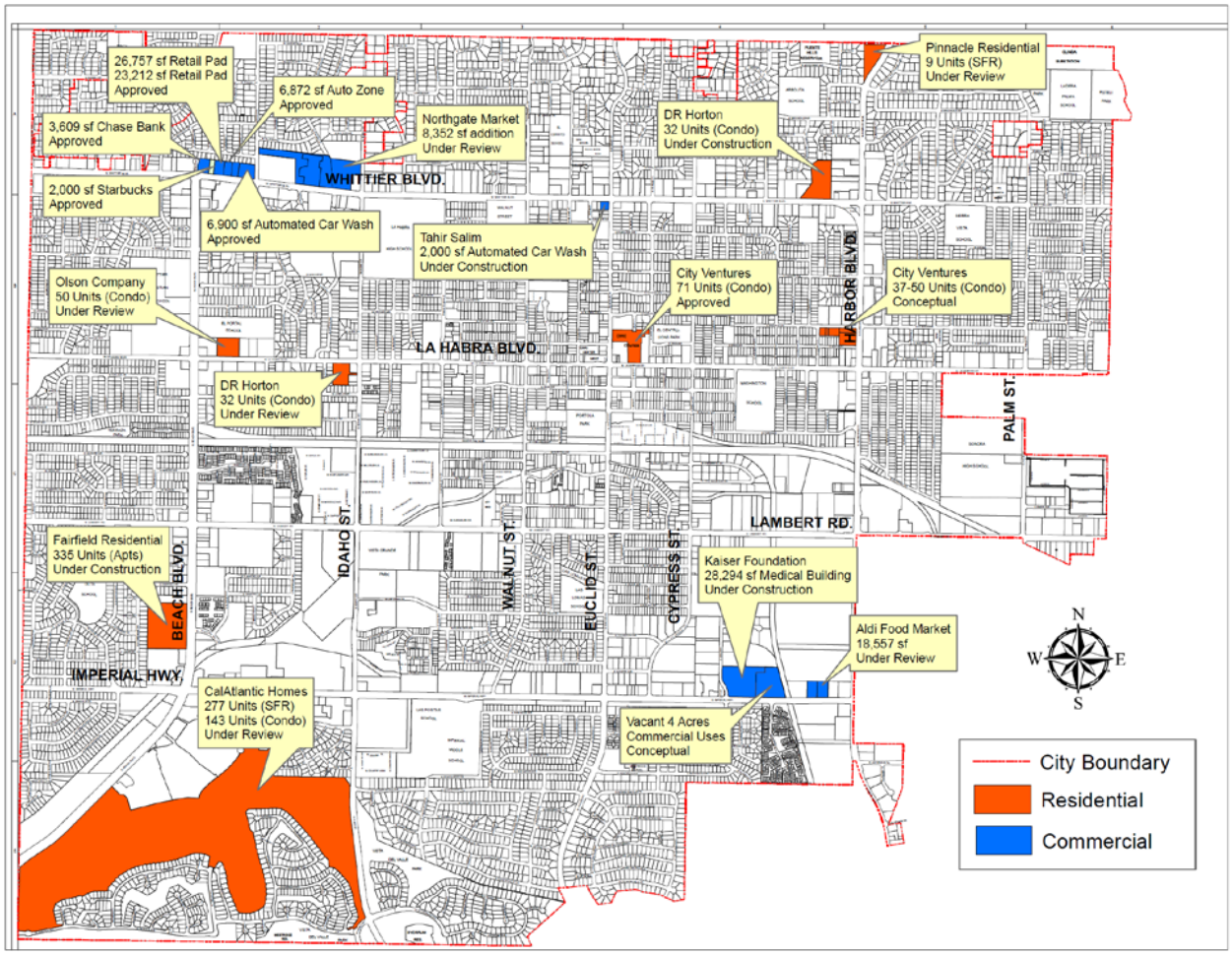

Figure 2-1: City of La Habra Development Projects

In addition to new development, the City has taken over water service areas within the City's boundary from Cal Domestic in Los Angeles County. Over 500 new connections were added to the City's service area when this occurred. The City is currently working with the Orange County Local Agency Formation Commission to take over Cal Domestic's service area within the Orange County portion of the City. Figure 2-2 shows an updated map of the Cal Domestic (gray) and City service areas.

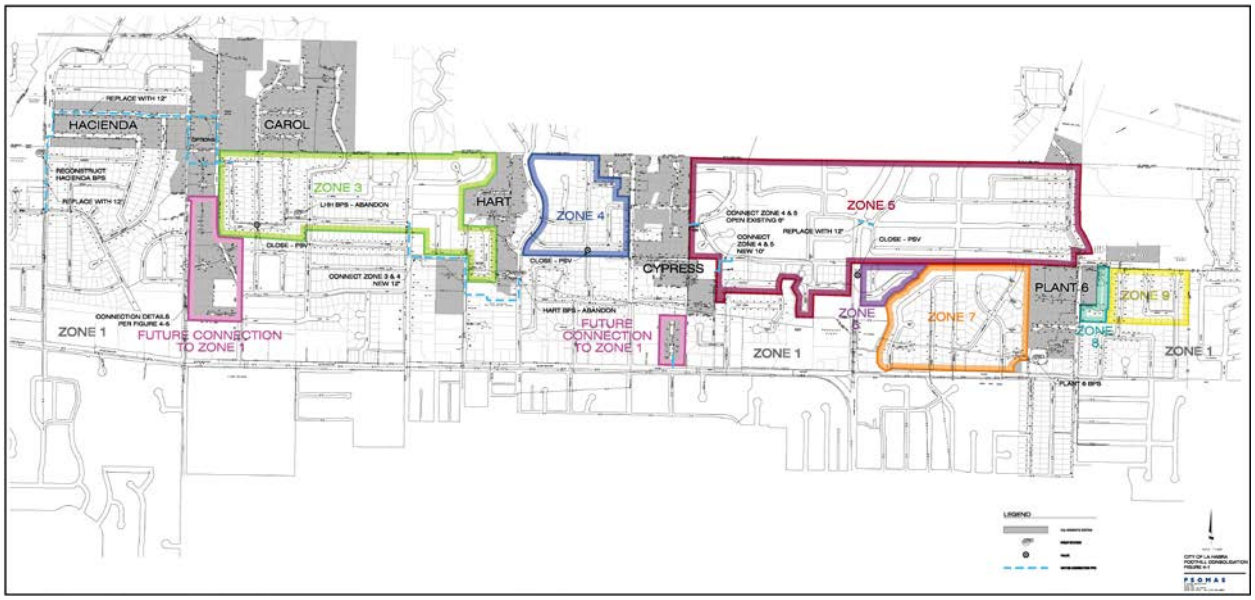

Figure 2-2: City of La Habra Foothill Consolidation

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
- 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 12,548 current customer active and inactive service connections in the City's water distribution system with all existing connections metered. Approximately 76.5 percent of the City's water demand is residential; commercial, industrial, institutional and dedicated landscape, accounts for the remaining 23.5 percent of the total demand.

Table 2-2 contains a summary of the City's total water demand in the fiscal year (FY) of 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		
	Additional Description	Level of Treatment When Delivered	Volume
Single Family		Drinking Water	5,763
Multi-Family		Drinking Water	1,574
Institutional/Governmental		Drinking Water	258
Commercial	Includes Industrial	Drinking Water	1,211
Landscape		Drinking Water	778
		TOTAL	9,584
NOTES:			

2.3.2 Non-Residential

Non-residential use includes commercial, industrial and institutional water demands. Institutional/governmental water use accounts for 2.7 percent of total water demands, commercial and industrial accounts for 12.6 percent of total water 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. Dedicated landscape accounts for 8.1 percent of total demand within the City.

2.3.3 Sales to Other Agencies

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

2.3.4 Non-Revenue Water

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

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

Table 2-4 below is a result of the AWWA Water Audit completed for the City and the 2015 UWMP. The water loss summary was calculated over a one-year period from available data and the methodology explained above. The volume of water loss calculated for this period represents 11.3 percent of the City's annual water supplied, this presents an opportunity to identify areas of high water loss and develop strategies to minimize it. A copy of the water loss audit is included as Appendix H.

Table 2-3: Water Loss Audit Summary

Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
07/2014	1,061
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 OC.

2.4.1 Demand Projection Methodology

The water demand projections were an outcome of the Orange County Reliability Study led by MWDOC where demand projections were divided into three regions within OC: Brea/La Habra, Orange County Groundwater 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 Orange County 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 Orange County Reliability Study provided demand projections for three regions within Orange County: Brea/La Habra, Orange County Groundwater Basin, and South County. The City's water demand represents a portion of the Brea/La Habra 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 Brea/La Habra 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 Orange County 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 9,584 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	Additional Description	Projected Water Use				
		2020	2025	2030	2035	2040
Single Family		5,175	5,503	5,511	5,521	5,507
Multi-Family		1,413	1,503	1,505	1,508	1,504
Institutional/Governmental		232	246	247	247	247
Commercial	Includes Industrial	1,087	1,156	1,158	1,160	1,157
Landscape		699	743	744	745	743
TOTAL		8,606	9,152	9,165	9,182	9,158
NOTES:						

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 as displayed in Table 2-5.

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	9,584	8,606	9,152	9,165	9,182	9,158
Recycled Water Demand	0	0	0	0	0	0
TOTAL WATER DEMAND	9,584	8,606	9,152	9,165	9,182	9,158
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, April 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 46.91 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	2,305
Very Low Income	2,364
Lower Income	4,078
Moderate Income	3,922
Above Moderate Income	5,977
Total Households	***18,646***

Table 2-8 provides the projected water needs for low income single family and multifamily units. The projected water demands shown here represent 46.91 percent of the projected water demand for the single-family and multifamily categories provided in Table 2-4 above. For example, the total low income single family residential demand is projected to be 2,428 AFY in 2020 and 2,583 AFY in 2040.

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

Water Use Sector	Fiscal Year Ending				
	2020	2025	2030	2035	2040
Total Residential Demand	6,589	7,007	7,016	7,030	7,011
SF Residential Demand - Low Income Households	2,428	2,582	2,585	2,590	2,583
MF Residential Demand - Low Income Households	663	705	706	708	706
Total Low Income Households Demand	***3,091***	***3,287***	***3,291***	***3,298***	***3,289***

2.5 SBx7-7 Requirements

The Water Conservation Act of 2009, SBx7-7, signed into law on February 3, 2010, requires the State of California to reduce urban water use by 20 percent by the year 2020. The 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 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 161 GPCD, obtained from the 10-year period July 1, 1995 to June 30, 2005.

2.5.1.2 Five-Year Baseline Period (Target Confirmation)

Water suppliers are required to calculate water use, in GPCD, for a five-year baseline period. This number is used to confirm that the selected 2020 target meets the minimum water use reduction

requirements. Regardless of the compliance option adopted by 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 158 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 at 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, the City's 2015 target is 151 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

Baselines and Targets Summary *Retail Agency*					
Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*1996*	*2005*	*161*	*151*	*142*
5 Year	*2004*	*2008*	*158*		
*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 is on track to meeting the 2020 water use target.

Table 2-10: 2015 Compliance

2015 Compliance *Retail Agency*		
Actual 2015 GPCD*	2015 Interim Target GPCD*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
138	151	Yes
**All values are in Gallons per Capita per Day (GPCD)*		
NOTES:		

2.5.3 Regional Alliance

A retail supplier may choose to meet the SBx7-7 targets on its own or it may form a regional alliance with other retail suppliers to meet the water use target as a region. Within a Regional Alliance, each retail water supplier will have an additional opportunity to achieve compliance under both an individual target and a regional target.

- If the Regional Alliance meets its water use target on a regional basis, all agencies in the alliance are deemed compliant.

- If the Regional Alliance fails to meet its water use target, each individual supplier will have an opportunity to meet their water use targets individually.

The 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's sources of water supply are local groundwater from the Basin, imported groundwater from the Main San Gabriel Basin through CDWC, and imported water from Metropolitan through MWDOC. The City relies mainly on imported groundwater from CDWC and from local groundwater, with each source representing approximately 60 percent and 38 percent of the City's water supply respectively.

The sources of imported water supplies from Metropolitan include the Colorado River and the SWP. Metropolitan's 2015 Integrated Water Resources Plan (IRP) update includes a strategy that will be used to meet full-service demands (non-interruptible agricultural and replenishment supplies) at the retail level under all foreseeable hydrologic conditions through 2040. Imported water from Metropolitan makes up approximately 2 percent of the City's water supply.

The City's water supplies are projected to comprise of local groundwater, imported groundwater from CDWC and imported water from MWDOC by 2040, with each source representing approximately 46 percent, 49 percent, and 5 percent of the City's water supplies, respectively. The City's projected water supply portfolio is shown on Figure 3-1.

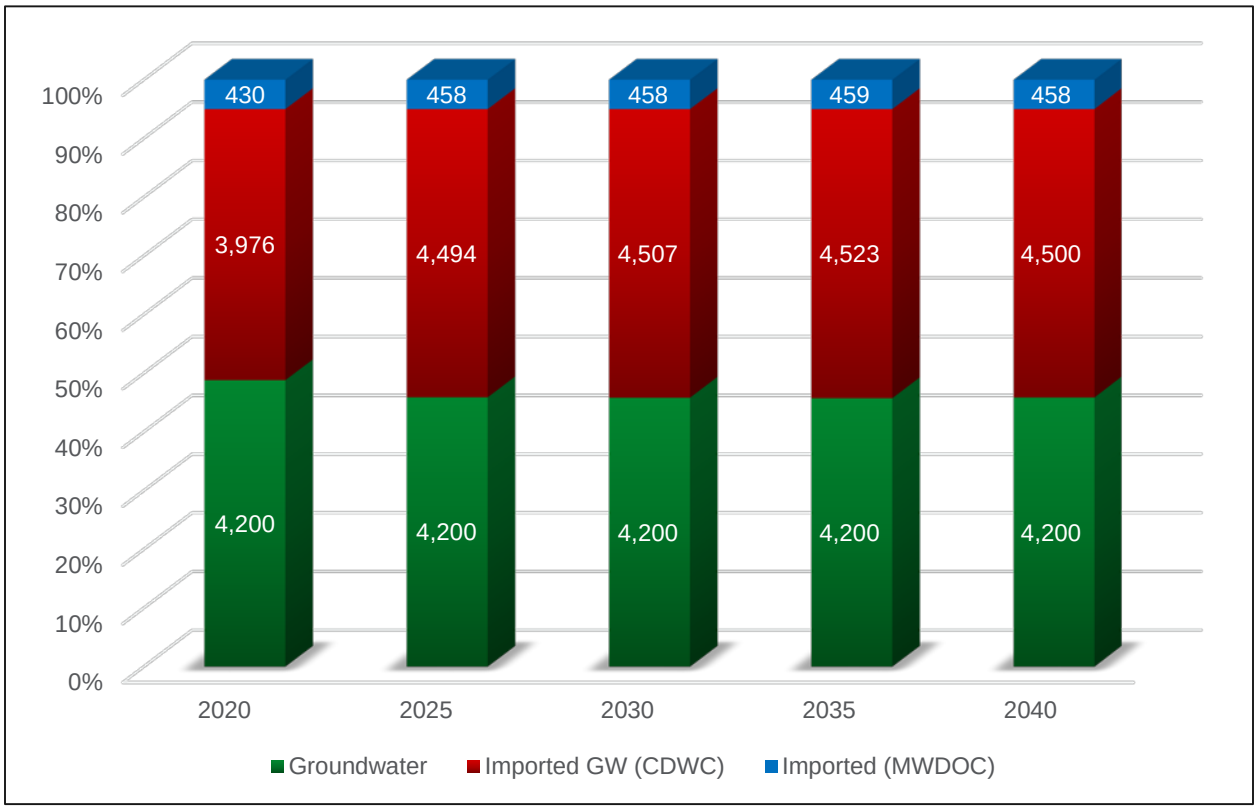

Figure 3-1: Water Supply Sources in the City (AF)

The following sections provide a detailed discussion of the City's water source portfolio as well as the future water supply portfolio for the next 25 years. In addition, this section will evaluate the City's projected supply and demand under various hydrological conditions to determine the City's supply reliability during a 25 year planning horizon.

3.2 Imported Water

3.2.1 Imported Groundwater Supply (CDWC)

The City obtains imported groundwater supply from CDWC, a mutual water company. The CDWC provides groundwater from the Main San Gabriel Basin to each of its member agencies who own and/or lease stock in the company. The City has 17 interconnections with CDWC. Most of the interconnections are regulated with flow-control valves (FCV), allowing the flow to be adjusted in order to meet changing demands. CDWC supplies the City with water using two different hydraulic grade systems, Lift 1 and Lift 2. Lift 1 delivers water at a hydraulic grade higher than 625 feet mean sea level (MSL), and Lift 2 delivers water at a higher hydraulic grade of 625 feet MSL. Water from Lift 2 is fed directly into higher pressure zones located in the northern part of the City. The CDWC completed construction of a new Lift 1 transmission main that provides the City with the ability to take additional Lift 1 water, which has a lower cost than Lift 2 or Metropolitan water. However, the water must be pumped into the City's distribution system first as the hydraulic grade line of the transmission main is lower than required to provide adequate service to the City's pressure zones.

The City currently owns 2,332.25 shares of common stock and 912.85 shares of preferred stock. The City has purchased on average 5,750 AFY of CDWC water from 2012 to 2014. The City is only able to take 7,200 AFY of water from CDWC. The amount of water the City can receive annually from CDWC is limited by the capacity of the facilities transmitting water from the CDWC system to the City system.

Each CDWC member agency receives a prescribed entitlement to water based upon the number of shares owned and the safe yield of the Main San Gabriel Basin. The member agency entitlement criterion per share varies year by year, based on CDWC's allotted percentage and the Basin Operating Safe Yield of the Main San Gabriel Basin. The City procures three categories of CDWC water, entitlement to water rights, lease shares, and contract lease share with the amounts of each category varying every year based on availability. The Basin Operating Safe Yield is determined annually by the Main San Gabriel Basin Watermaster, the agency created by the Main San Gabriel Judgment to manage the Main San Gabriel Basin. Historically, this has been about 1.38 to 1.85 acre–feet per share. The voluntary adjudication of the Main San Gabriel Water Basin provided CDWC 5.60 percent of the basin's safe yield (La Habra, Water Master Plan, 2015).

3.2.1.1 Main San Gabriel Basin

CDWC has water rights, production, treatment and conveyance facilities in the Main San Gabriel Basin that serve customers overlying the basin within Suburban Water Company as well serving the City and the City of Brea. The annual deliveries of groundwater to the City and the City of Brea are estimated at approximately 12,000 AFY.

The Main San Gabriel Basin lies in eastern Los Angeles County and occupies most of San Gabriel Valley. The hydrologic basin or watershed coincides with a portion of the upper San Gabriel River watershed, and the aquifer or groundwater basin underlies most of the San Gabriel Valley. It is bounded on the north by the San Gabriel Mountains, on the northwest by Raymond Basin, on the southeast by Puente Basin, and on the south by Central Basin. The Main San Gabriel Basin encompasses approximately 107,000 acres and has a storage of 8.9 MAF when the groundwater elevation at the Baldwin Park Key Well is 316 feet. Generally speaking, one foot of groundwater elevation is equivalent to approximately 8,000 AF of storage.

The hydrogeological San Gabriel Basin is divided between three sub-basins, Main Basin, Puente Basin, and portions of Six Basins area. A portion of Six Basins area is tributary to the Main Basin. Each of the sub-basins are adjudicated and managed separately.

Major sources of recharge to the Main San Gabriel Basin are infiltration of rainfall on the valley floor and runoff from the nearby mountains. The Main San Gabriel Basin is the first of a series of basins to receive the water from mountain runoff. The Main San Gabriel Basin interacts hydrogeologically and institutionally with adjoining basins, including Puente Basin, Central Basin, and West Coast Basin (Main San Gabriel Basin Watermaster, Annual Report, 2015).

Figure 3-2 depicts the Main San Gabriel Basin.

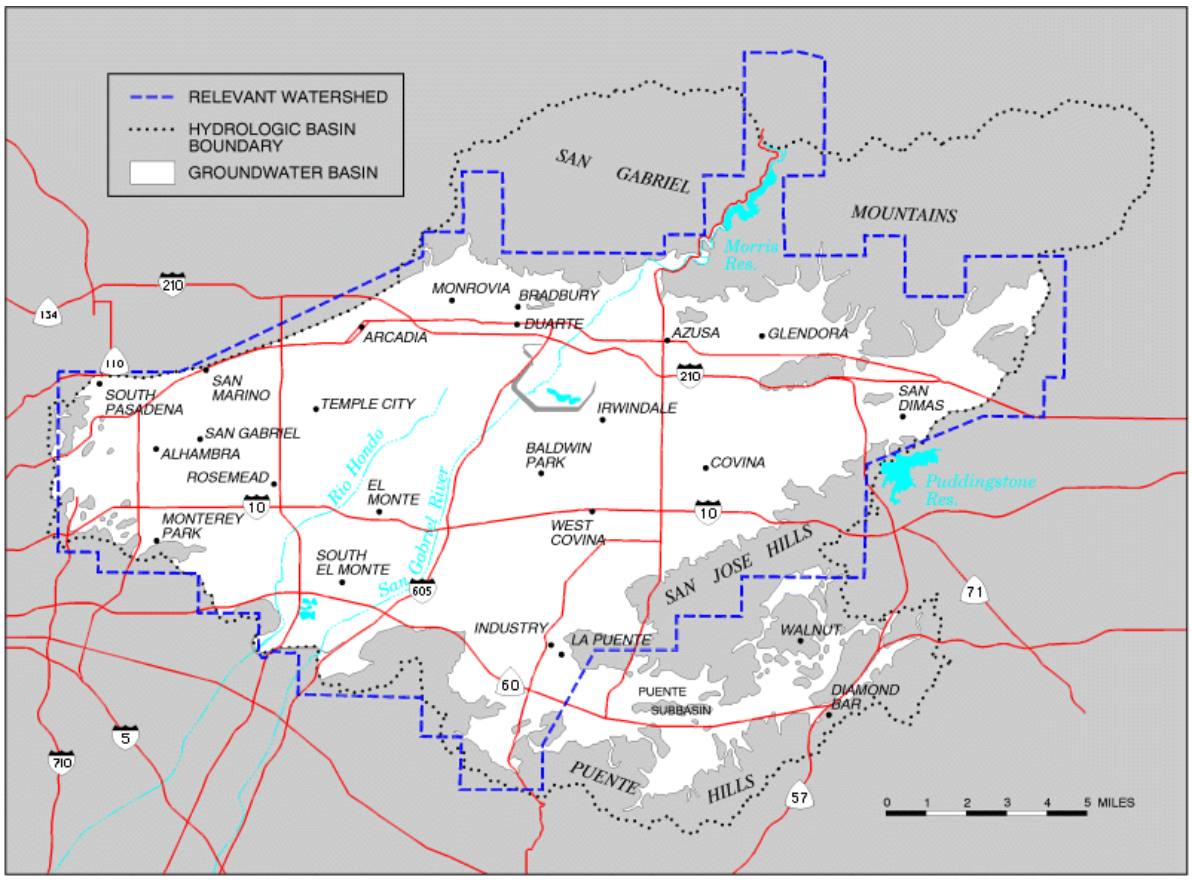

Figure 3-2: Main San Gabriel Groundwater Basin

3.2.1.2 Main San Gabriel Basin Judgment

Rapid urbanization in the San Gabriel Valley in the 1940s resulted in an increased demand for groundwater drawn from the Upper Area users in Main San Gabriel Basin. Consequently, the Main San Gabriel Basin was in a state of overdraft and the available water supply for the Lower Area and downstream users decreased. In 1968, at the request of producers, the Upper San Gabriel Municipal Water District filed a complaint that would adjudicate water rights in the Basin and would bring all Basin producers under control of one governing body. The final result was the entry of the Main San Gabriel Basin Judgment in 1973.

The Judgment defined the water rights of 190 original parties to the legal action. It created a new governing body, the Main San Gabriel Basin Watermaster, and described a program for management of water in the Basin. Under the terms of the Main San Gabriel Basin Judgment all rights to the diversion of surface water and production of groundwater within the Main Basin and its Relevant Watershed were adjudicated. The Main Basin Judgment does not restrict the quantity of water agencies may extract from the Main Basin. Rather, it provides a means for replacing with Supplemental Water all annual extractions in excess of an agency's annual right to extract water. The Main Basin Watermaster annually establishes an Operating Safe Yield for the Main Basin that is then used to allocate to each agency its portion of the Operating Safe Yield that can be produced free of a Replacement Water Assessment. If a producer extracts water in excess of his right under the annual Operating Safe Yield, it must pay an assessment for Replacement Water that is sufficient to purchase one AF of Supplemental Water to be spread in the Main San Gabriel Basin for each AF of excess production. All water production is metered and is reported quarterly to the Main Basin Watermaster. The Operating Safe yield for FY 2014 to 2015 was set at 150,000 AF.

In addition to Replacement Water Assessments, the Main Basin Watermaster levies an Administration Assessment to fund the administration of the Main Basin management program under the Main Basin Judgment and a Make-up Obligation Assessment in order to fulfill the requirements for any make-up Obligation under the Long Beach Judgment and to supply fifty percent of the administration costs of the River Watermaster service. The Main Basin Watermaster levies an In-lieu Assessment and may levy special Administration Assessments.

Water rights under the Main Basin Judgment are transferable by lease or purchase so long as such transfers meet the requirements of the Judgment. There is also provision for Cyclic Storage Agreements that allow Parties and non-parties to store imported supplemental water in the Main Basin under such agreements with the Main Basin Watermaster pursuant to uniform rules and conditions and Court approval (Main San Gabriel Basin Watermaster, Annual Report, 2015).

The Main Basin Watermaster has entered into a Cyclic Storage Agreement with three municipal water districts, Metropolitan, Three Valleys Municipal Water District (TVMWD), and Upper San Gabriel Valley Municipal Water District (USGVMWD). The first agreement with Metropolitan and USGVMWD permits Metropolitan to deliver and store imported water in the Main Basin in an amount not to exceed 100,000 AF for future Replacement Water use. The second Cyclic Storage Agreement is with TVMWD and permits Metropolitan to deliver and store 40,000 AF for future Replacement Water use. The third is with SGVMWD.

3.2.2 Imported Water

3.2.2.1 Colorado River Supplies

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

The CRA includes supplies from the implementation of the Quantification Settlement Agreement and related agreements to transfer water from agricultural agencies to urban uses. The 2003 Quantification Settlement Agreement enabled California to implement major Colorado River water conservation and transfer programs, stabilizing water supplies for 75 years and reducing the state's demand on the river to its 4.4 MAF entitlement. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 million acre-feet (MAF) on an as-needed basis. Water from the Colorado River or its tributaries is available to users in California, Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming, as well as to Mexico. California is apportioned the use of 4.4 MAF of water from the Colorado River each year plus one-half of any surplus that may be available for use collectively in Arizona, California, and Nevada. In addition, California has historically been allowed to use Colorado River water apportioned to but not used by Arizona or Nevada. Metropolitan has a basic entitlement of 550,000 AFY of Colorado River water, plus surplus water up to an additional 662,000 AFY when the following conditions exists (Metropolitan, 2015 UWMP, March 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, March 2016). The long-term imbalance in future supply and demand is projected to be approximately 3.2 MAF by the year 2060.

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

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.

3.2.2.2 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 million AFY. Of this amount, 4.13 million AFY is the maximum Table A water available for delivery from the Delta pumps as stated in the State Water Contract. However, deliveries commonly are less than 50 percent of the Table A.

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

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

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

SWP Delta exports are the water supplies that are transferred directly to SWP contractors or to San Luis Reservoir storage south of the Delta via the Harvey O. Banks pumping plant. Estimated average annual Delta exports and SWP Table A water deliveries have generally decreased since 2005, when Delta export regulations affecting SWP pumping operations became more restrictive due to the Biops. A summary SWP water deliveries from the years 2005 and 2013 is summarized in Table 3-1.

Table 3-1: Metropolitan Colorado River Aqueduct Program Capabilities

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

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

- Water availability at the source: Availability depends on the amount and timing of rain and snow that fall in any given year. Generally, during a single dry year or two, surface and groundwater storage can supply most water deliveries, but multiple dry years can result in critically low water reserves.

- Water rights with priority over the SWP: Water users with prior water rights are assigned higher priority in DWR's modeling of the SWP's water delivery reliability, even ahead of SWP Table A water.
- Climate change: mean temperatures are predicted to vary more significantly than previously expected. This change in climate is anticipated to bring warmer winter storms that result in less snowfall at lower elevations, reducing total snowpack. From historical data, DWR projects that by 2050, the Sierra snowpack will be reduced from its historical average by 25 to 40 percent. Increased precipitation as rain could result in a larger number of "rain-on-snow" events, causing snow to melt earlier in the year and over fewer days than historically, affecting the availability of water for pumping by the SWP during summer.
- Regulatory restrictions on SWP Delta exports due to the Biops to protect special-status species such as delta smelt and spring- and winter-run Chinook salmon. Restrictions on SWP operations imposed by state and federal agencies contribute substantially to the challenge of accurately determining the SWP's water delivery reliability in any given year.
- Ongoing environmental and policy planning efforts: the California WaterFix involves water delivery improvements that could reduce salinity levels by diverting a greater amount of lower salinity Sacramento water to the South Delta export pumps. The EcoRestore Program aims to restore at least 30,000 acres of Delta habitat, and plans to be well on the way to meeting that goal by the year 2020.
- Delta levee failure: The levees are vulnerable to failure because most original levees were simply built with soils dredged from nearby channels and were not engineered. A breach of one or more levees and island flooding could affect Delta water quality and SWP operations for several months. When islands are flooded, DWR may need to drastically decrease or even cease SWP Delta exports to evaluate damage caused by salinity in the Delta (Department of Water Resources, The State Water Project Final Delivery Capability Report 2015, July 2015).

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, 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

Local groundwater is pumped from three production wells within the Basin, the Idaho Street Well, the La Bonita Well, and the Portola Well. The Idaho Street Well has a capacity of 4.45 cubic feet per sec (cfs) but is regulated at 3.34 cfs. Water pumped from the Idaho Street Well requires treatment before entering into the distribution system. Treatment of this raw groundwater consists of chlorination, air-stripping to remove ammonia and hydrogen sulfide, and addition of sodium hexametaphosphate to sequester iron and manganese. The capacity of La Bonita Well and Portola Well is 1.89 cfs and 2.67 cfs respectively. Water from both these wells is chlorinated and blended with water purchased from the CDWC in a 250,000 gallon forebay to reduce the concentration of minerals prior to entering into the City's distribution system (La Habra, Groundwater Study, August 2014).

3.3.1 La Habra Groundwater Basin

The Basin covers parts of Los Angeles County and Orange County and is part of both the Coastal Plan of Los Angeles, Central Basin, and the Coastal Plain of Orange County, Orange County Basin. A portion of the Basin is located within Central Basin as well as the northern tip of the Orange County Basin. La Habra's Groundwater Management Plan only focuses on the portion of the Basin located outside of both Central Basin and Orange County Basin. The Basin lies entirely within the Coyote Creek Watershed. The Basin area is shown on Figure 3-3.

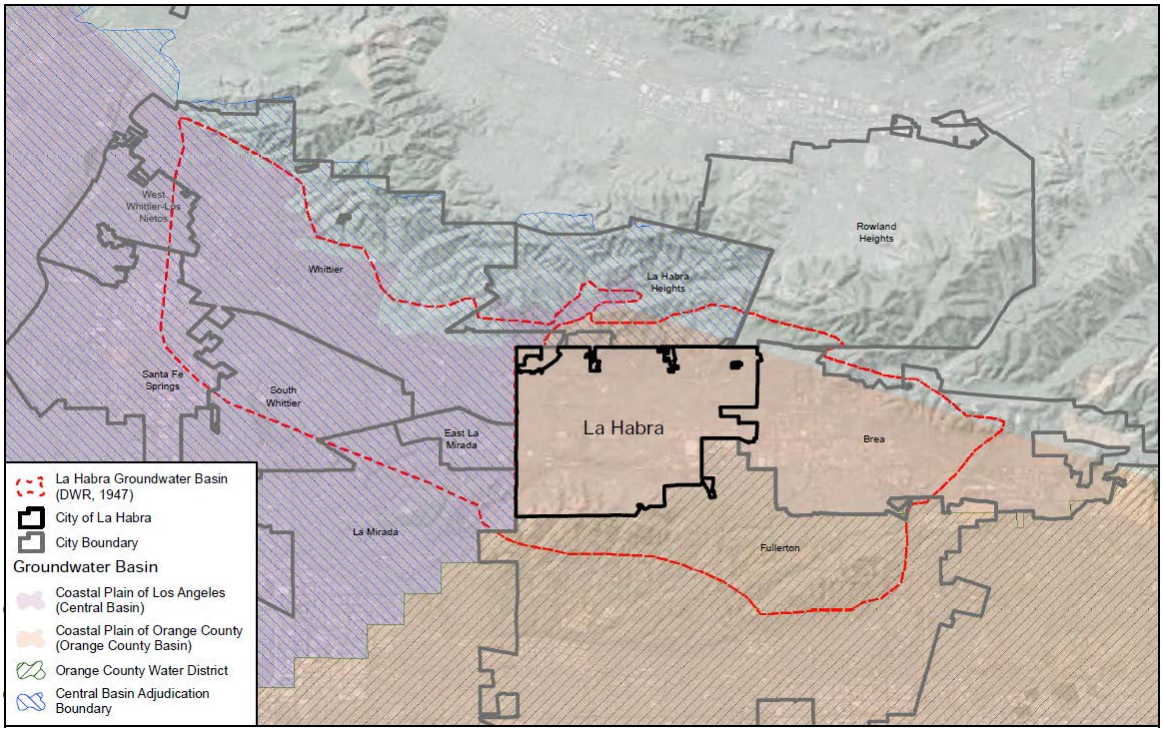

Figure 3-3: La Habra Groundwater Basin

From a structural geology standpoint, the Basin area is dominated by the northwest trending La Habra Syncline (a U–shaped down–fold) which is bounded on the north by the Puente Hills and on the south by the Coyote Hills. The fold is a naturally occurring trough, or valley, where significant quantities of groundwater have accumulated over the past 150,000 years. The Basin consists of three water-bearing zones: 1) the Alluvium, 2) the La Habra Formation (including the Coyote Hills Formation), and 3) the San Pedro Formation.

The Alluvium is comprised of young and old alluvium. The deposits are found along the surface stream courses and is composed of unconsolidated silt, clay, sand, and gravel. Alluvium thickness ranges from a few feet to over 100 feet. Generally the La Habra Formation lies below the Alluvium, consisting of the La Habra and Coyote Hills Formations. However in the Coyote Hill and Puente Hills, the Alluvium is uplifted and exposed. The La Habra Formation consists of non-marine mudstone, siltstone, sandstone, and conglomerate. It ranges in thickness from 300 to nearly 1,200 feet. Water levels of wells in the La Habra Formation have been measured between 100 and 200 feet below ground surface across the Basin.

Underneath the La Habra Formation lies the San Pedro Formation. As the deepest water bearing unit, the San Pedro Formation is comprised of sand, gravel, sandstone, conglomerate, and shale. The San Pedro Formation ranges between 200 and 400 feet in thickness and produces the best quality groundwater of all the water bearing zones. Pressure levels of confined groundwater in wells of the San Pedro aquifer zone range from about 100 to 200 feet below ground surface (La Habra, Groundwater Study, August 2014).

3.3.1.1 Basin Safe Yield

The Basin is not adjudicated. Instead, the City follows a “safe yield” which is used for the management and future planning of the Basin for sustained beneficial use. The safe yield is the volume of groundwater that can be pumped without depleting the aquifer to a point where it cannot recover through natural recharge over a reasonable period of time.

The safe yield for the Basin was estimated to be approximately 4,500 AFY. This safe yield was determined through an average from two separate studies that took into account natural groundwater recharge and natural groundwater discharge (La Habra, Groundwater Study, August 2014).

3.3.2 Basin Management Objectives

The Basin Management Objectives (BMO) are locally developed flexible guidelines for groundwater development of a particular basin. The City has four proposed BMOs:

- BMO No. 1 is to reduce the City’s dependence on imported water. Currently, approximately 62 percent of the City’s demand is met with imported water. This BMO intends for the City to use more local groundwater to meet its demands in order to increase reliability. The City’s compliance with the 20x2020 program will help meet this BMO as its total water demand will decrease.
- BMO No. 2 is to maintain groundwater sustainability within the Basin. The City can meet this objective through the coordination of groundwater production within the estimated safe yield of the Basin.
- BMO No. 3 is to protect and enhance the water quality of the Basin. The City may meet this objective through continuing and supplementing its existing water quality monitoring program.
- BMO No. 4 is to improve the understanding of the Basin’s hydrogeology, groundwater elevations, and basin yields. The City can use and supplement its existing groundwater elevation monitoring program to review general trends in groundwater elevations in the Basin. The City will also evaluate the need for additional monitoring.

3.3.3 Groundwater Historical Extraction

From 1922 to the early 1940’s water levels in the Basin declined markedly because of increased water extraction and deficient rainfall. Water levels rose in the mid 1940’s and then declined again in the late 1940’s reaching the lowest recorded levels in the middle to late 1950’s. From 1960 to 1977, water levels increased in elevation because of a significant decrease in water extraction. Based upon recorded stream runoff yields, it is estimated that approximately 2,100 AF of water would percolate during the average year. For direct percolation of rainfall and resulting runoff within the valley itself, it is estimated that an average of 1,600 AFY would percolate. Thus, the groundwater recharge is estimated at approximately 3,700 AFY. Subsurface flow estimates are about 5,500 AFY. Therefore, it is estimated that the average long–term supply that can be extracted without severe or sustained changes in the amount of groundwater in storage, is approximately 4,500 AFY (an average of the two values).

A summary of the volume of historical groundwater 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	La Habra Groundwater Basin	1,849	1,865	3,073	4,094	3,630
	TOTAL	1,849	1,865	3,073	4,094	3,630
NOTES:						

3.3.4 Groundwater Overdraft

Groundwater elevations within the Basin have risen approximately 100 feet from the 1940s through 2014 with an overall rising trend of 50 to 60 feet between 1970 and 2007. This increase in groundwater elevations demonstrates the Basin is not currently in an overdraft conditions. However, the City will continue monitoring groundwater elevation trends of the Basin and will review its groundwater operations should groundwater elevations show any signs of decline (La Habra, Groundwater Study, August 2014).

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	La Habra Groundwater Basin	3,630	Drinking Water
Purchased or Imported Water	CDWC	5,722	Drinking Water
Purchased or Imported Water	MWDOC	232	Drinking Water
	Total	9,584	
NOTES:			

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)

Retail: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply				
		2020	2025	2030	2035	2040
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Groundwater	La Habra Groundwater Basin	4,200	4,200	4,200	4,200	4,200
Purchased or Imported Water	CDWC	3,976	4,494	4,507	4,523	4,500
Purchased or Imported Water	MWDOC	430	458	458	459	458
	Total	8,606	9,152	9,165	9,182	9,158
NOTES:						

3.5 Recycled Water

The City does not currently use recycled water to meet water demands. However, the potential exists for direct non-potable reuse within its service area in the future. More information concerning potential recycled water usage is described 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 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 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 Metropolitan

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 to keep the reservoir free from Quagga mussels.

3.6.2.3.2 Main San Gabriel Groundwater Basin

A number of contaminants in limited parts of the Main San Gabriel Basin require careful monitoring and treatment before the water can be supplied to customers. The primary contaminants of concerns in the Main San Gabriel Basin include volatile organic compounds (VOC) and nitrates, perchlorate, NDMA, trichloropropane (1,2,3-TCP), and hexavalent chromium (Cr VI).

VOCs and nitrates are the most prevalent contaminants found in the Main San Gabriel Basin. As a result, the location and treatment methods are generally well understood. During FY 2014 to 2015, 30 treatment plants treated approximately 78,300 AF of water from the Main San Gabriel Basin. VOC and nitrate levels throughout the Main San Gabriel Basin are shown on Figures 3-4 and 3-5 respectively.

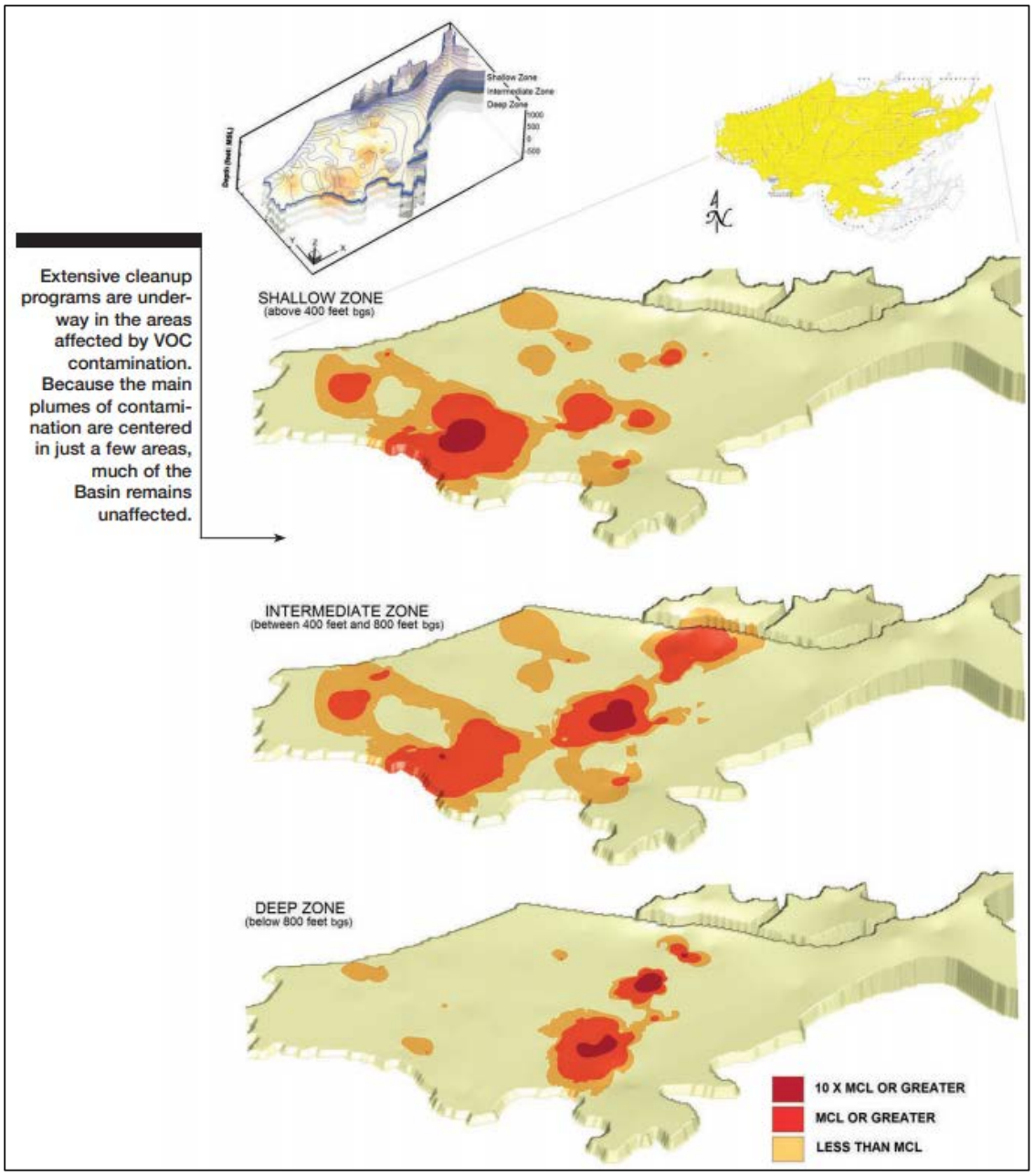

Figure 3-4: VOC levels through the Main San Gabriel Basin

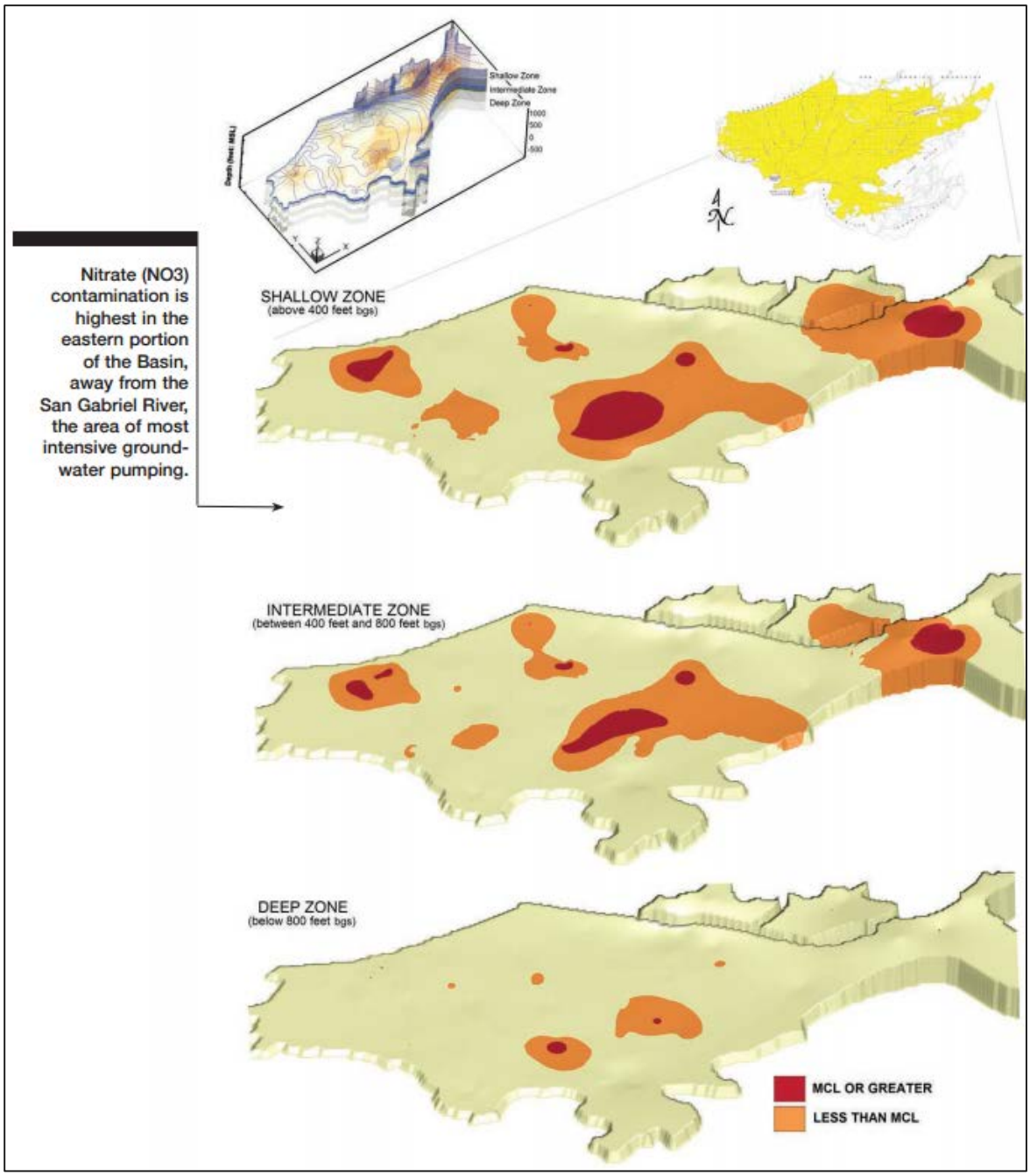

Figure 3-5: Nitrate levels throughout the Main San Gabriel Basin

The Division of Drinking water (DDW) lowered the notification level of perchlorate from 18 to 4 parts per billion (ppb) in January 2002. Subsequently, a total of 22 wells from the Main San Gabriel Basin were removed from service due to unacceptable levels of perchlorate. In October 2007, the DDW established a maximum contaminant level (MCL) of 6 ppb. Efforts to treat perchlorate by the Watermaster resulted in

ion-exchange technology treatment facilities at five sites in the Baldwin Park Operable Unit (BPOU) and at two facilities in other parts of the Main San Gabriel Basin during FY 2014 to 2015.

During 1998, local eight local wells within the Main San Gabriel Basin were had levels of NDMA above the notification level. Three of the wells were taken off-line as a direct result of NDMA levels above notification level. The Watermaster played a key role in the construction of NDMA treatment facilities within the Main San Gabriel Basin. Five facilities were operational during FY 2014 to 2015.

1,2,3-TCP is a degreasing agent that has been detected in the BPOU during the winter of 2006. Its presence delayed the use of one treatment facility for potable purposes. The DDW determined 1,2,3-TCP is best treated through liquid phase granular activated carbon. Facilities to treat 1,2,3-TCP were operational during FY 2014-2015.

Cr VI is a naturally occurring substance that has been detected in drinking water wells through the Main San Gabriel Basin. Cr VI is also associated with industrial sources of contamination, such as metal plating. In July 1, 2014, the DDW established a new MCL for Cr VI of 10 ppb. Currently, Cr VI concentrations in all active wells are below the MCL (Main San Gabriel Basin Watermaster, Five-Year Water Quality and Supply Plan, 2015).

3.6.2.3.3 La Habra Groundwater Basin

The Basin has water quality concerns that require treatment or blending with higher quality water to meet the State's health standards. TDS, hydrogen sulfide, iron, and manganese impair the Basin water supply. The quality of Idaho Street Well raw water requires treatment before entering the distribution system. The treatment system includes chlorination, air-stripping to remove hydrogen sulfide and ammonia that may be present, and the addition of sodium hexametaphosphate to sequester iron and manganese. Water from the La Bonita Well and the Portola Well is chlorinated and then blended with CDWC purchased water in a 250,000-gallon forebay to reduce mineral concentration (La Habra, Groundwater Study, August 2014).

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.

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

For the 2015 UWMP, the normal year was taken from the Bump Methodology as the report created a statistical model to understand the historic variation of water demand over the years of 1990 to 2014. The

explanatory variables of population, temperature, precipitation, unemployment rate, drought restrictions, and conservation measures were used to create the statistical model. The model had high correlation and good significance in explanatory values for the county as well as the Brea/La Habra area as defined in the report. The accuracy of the model establishes the average of the years of 1990-2014 as the normal year for the City (CDM Smith, Final Technical Memorandum #1 of Orange County Reliability Study, April 2016).

3.6.4 Single-Dry Year Reliability Comparison

A single-dry year is defined as a single year of no to minimal rainfall within a period that average precipitation is expected to occur. The 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 using FY 2013-14 as the single dry-year. The FY2013-2014 was chosen as the single dry year by MWDOC in their Bump Methodology. The six percent was determined by isolating each explanatory variable from the report's model that was previously mentioned. The Bump Methodology is included in Appendix G.

3.6.5 Multiple-Dry Year Period Reliability Comparison

Multiple-dry years are defined as three or more years with minimal rainfall within a period of average precipitation. The 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, taken from the Bump Methodology, using FY 2011-12 through FY 2013-14 as the driest years. MWDOC chose the highest average demand over a three year period for the multi-dry year demand increase. This value was repeated over the three year span as a conservative assumption where demand would increase significantly in a prolonged drought and would remain constant through the years. The basis of the water year is displayed in Table 3-5.

Table 3-5: Retail: Basis of Water Year Data (AF)

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

3.7 Supply and Demand Assessment

A comparison between the supply and the 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	8,606	9,152	9,165	9,182	9,158
Demand totals	8,606	9,152	9,165	9,182	9,158
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	9,122	9,701	9,715	9,733	9,707
Demand totals	9,122	9,701	9,715	9,733	9,707
Difference	0	0	0	0	0
NOTES:					

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

Table 3-8: 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	9,122	9,701	9,715	9,733	9,707
	Demand totals	9,122	9,701	9,715	9,733	9,707
	Difference	0	0	0	0	0
Second year	Supply totals	9,122	9,701	9,715	9,733	9,707
	Demand totals	9,122	9,701	9,715	9,733	9,707
	Difference	0	0	0	0	0
Third year	Supply totals	9,122	9,701	9,715	9,733	9,707
	Demand totals	9,122	9,701	9,715	9,733	9,707
	Difference	0	0	0	0	0
NOTES:						

4 DEMAND MANAGEMENT MEASURES

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

4.1 Water Waste Prevention Ordinances

The City passed Ordinance No. 1384 on May 1, 1990, entitled "Emergency Water Management Program". This ordinance identifies water waste prohibitions, as well as stages of action to conserve water and penalties for non–compliance. More recently in September 2008, the City adopted a Water Conservation and Water Supply Shortage Program Ordinance (Ordinance no.1703) under the City Municipal Code 13.40.070. The ordinance establishes 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:

- Limits on watering hours
- Limit on watering duration
- No excessive water flow or runoff
- No washing down hard or paved surfaces
- Obligation to fix leaks, break, or malfunctions
- Re-circulating water required for water fountains and decorative water features
- Limits on washing vehicles
- Drinking water served upon request only
- Commercial lodging establishments must provide guests option to decline daily linen services
- No installation of single pass cooling systems
- No installation of non-recirculating water systems in commercial car wash and laundry systems
- Restaurants required to use water conserving dish wash spray valves

In an event of a water supply shortage, the ordinance further establishes four levels of water supply shortage response actions to be implemented during times of declared water shortage or declared water shortage emergency, with increasing restrictions on water use in response to worsening drought or emergency conditions and decreasing supplies. 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.

In August 2014, the City declared and implemented a Stage 2 Water Supply Shortage Condition with an emphasis on reducing/eliminating water waste relating to irrigation systems. Staff and contract service providers inspect neighborhoods, speak with residents, issue notices of violation, and provide follow up to the notices. Greater emphasis has been placed on public awareness and implemented with informational booths at local community events, message boards, and median signs. Utility bills and the City's annual consumer confidence reports are used to convey conservation messaging. The City website has been updated to provide information for current watering restrictions and provide a means for residents to anonymously report violators. The website also provides useful links for water rebates and conservation methods.

4.2 Metering

Metering with commodity rates by wholesale and retail agencies has been an industry standard throughout Orange County for many years, including in the City. Meters are required for all new connections.

Landscape accounts are required to have dedicated landscape meters and are used within the City at irrigation systems for commercial, industrial, institutional, and multi-family complexes.

The City has been replacing aged water meters over the past five years. A pilot Advanced Metering Infrastructure (AMI) fixed network meter reading system has been implemented. The City will continue to expand this program with the intent to automate the entire system within the next six years.

4.3 Conservation Pricing

The City provides water and sewer service. The City began metering with commodity rates in 1950, with the inception of the water system. All utility water accounts are metered and billed monthly based on commodity rates. The utility billing rate structure contains a fixed rate and a commodity charge based on the volume of water used. Residential rates are charged based on a minimum monthly fixed charge based upon the size of the meter and usage charge of $2.78 per 100 cubic feet, effective January 1, 2016. The sewer fee is charged based on a minimum monthly fixed charge based upon the size of the meter and a usage charge of $0.20 per 100 cubic feet. This pricing structure applies to all accounts and account types even though the City now has a method for performing individual meter billings by customer class.

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) as well as a social media presence on Facebook, Twitter and Instagram. MWDOC's Facebook page has more than 1,200 followers. The social media channels are used to educate the public about water-efficiency, rates and other water-related issues.

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

School Education Programs

- MWDOC school education programs reach more than 100,000 students per year. The program is broken into elementary and high school components.
- Elementary School Program reaches 60,000 students throughout Orange County through assemblies hosted by the Discovery Science Center. MWDOC holds a $220,000 contract with the Discovery Science Center, funded proportionally by the participating MWDOC retail agencies.

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

Value of Water Communication Program

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

Quarterly Water Policy Dinners

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

Annual Water Summit

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

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 Orange County residents and leaders to attend. MWDOC staff also attends each trip. In the past year, MWDOC participated in a dozen trips, each taking an average of 30 residents. MWDOC also works with Metropolitan on special trips to educate County Grand Jurors 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 volume from own sources, water imported, and customer meter inaccuracies. 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 FY 2014-15 was 1,061 AF which is a significant volume and presents opportunities for improvement. The City completes a system water audit to calculate water losses on an annual basis.

The City is currently conducting a water system audit with results pending. Further action may be needed dependent on preliminary results. The last complete audit of this program was conducted in 1986. Due to the City's commitment to repairing detected leaks in a timely manner, it is projected that the average unaccounted water will remain around five to six percent. If the value for unaccounted water losses falls outside of this range, the City will look into implementing a formal water audit leak detection and repair program. Approximately two miles of pipe are replaced or repaired each year saving the City $20,000 in water losses annually.

4.6 Water Conservation Program Coordination and Staffing Support

The City employs a Water/Sewer Manager and a Management Analyst that take an active role in promoting conservation and are responsible for coordinating all conservation program activities and act as a liaison with MWDOC, Metropolitan, CUWCC, and others. Approximately, five percent of the Water/Sewer Manager's time and 25 percent of the Management Analyst's time is devoted to water conservation coordination work. Additionally, MWDOC employs Water Conservation Coordinators to direct conservation for all of its member agencies. Water conservation programs are supported through water rates.

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. In addition, the City has plans to conduct a pressure management pilot program in select pressure zones.

4.7.1 Residential Programs

Water Smart Home Survey Program

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

High Efficiency Clothes Washer Rebate Program

The High Efficiency Clothes Washer (HECW) Rebate Program provides residential customers with rebates for purchasing and installing WaterSense labeled HECWs. HECWs use 35-50 percent less water than standard washer models, with savings of approximately 9,000 gallons per year, per device. Devices must have a water factor of 4.0 or less, and a listing of qualified products can be found at ocwatersmart.com. There is a maximum of one rebate per home.

High Efficiency Toilet Rebate Program

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

4.7.2 CII Programs

Water Smart Hotel Program

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

Socal Water$mart Rebate Program for CII

The 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 in January 2014 and signed the 2014 Executive Order that directs urban water suppliers to implement drought response plans to limit outdoor irrigation and wasteful water practices if they are not already in place. Pursuant to California Water Code Section 106, it is the declared policy of the state that domestic water use is the highest use of water and the next highest use is irrigation. This section describes the water supply shortage policies Metropolitan and the 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 Diamond Valley Lake (DVL) and in SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage.

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

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

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

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

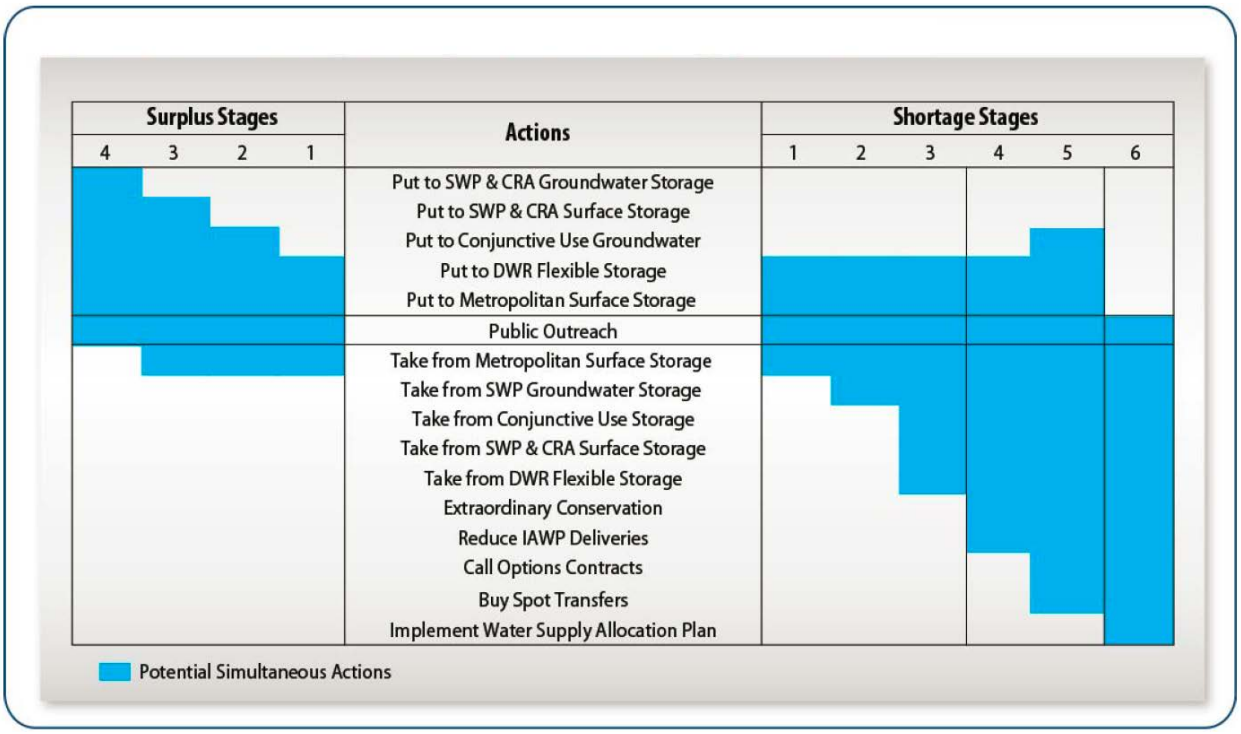

Figure 5-1: Resource Stages, Anticipated Actions, and Supply Declarations

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

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

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 Water Supply Allocation Plan (WSAP) (Metropolitan, 2015 UWMP, March 2016).

5.2.2 Metropolitan Water Supply Allocation Plan

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

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

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

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

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

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

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

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

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

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

in Metropolitan needing to implement its WSAP to preserve dry-year storage and curtail demands (Metropolitan, 2015 UWMP, March 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 La Habra

City Council adopted Water Conservation Program Ordinance No. 1703 on August 4, 2009, 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 (La Habra, Ordinance Number 1703 August 2009).

Table 5-1: Stages of Water Shortage Contingency Plan

Retail Stages of Water Shortage Contingency Plan		
Stage	Percent Supply Reduction	Water Supply Condition
1	0% to 10%	The City notifies its water users that due to drought or other supply reductions, a consumer demand reduction is necessary to make more efficient use of water and respond to existing conditions.
2	10% to 20%	The City notifies its water users that due to drought or other supply reductions, a consumer demand reduction is necessary to make more efficient use of water and respond to existing conditions.
3	20% to 30%	The City notifies its water users that due to drought or other supply reductions, a consumer demand reduction is necessary to make more efficient use of water and respond to existing conditions.
4	Up to 40% or more	The City declares a shortage emergency condition pursuant to California Water Code Section 350 and notifies its residents and businesses a consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection.
NOTES:		

5.3 Three-Year Minimum Water Supply

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

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

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

MWDOC has adopted a shortage allocation plan and accompanying allocation model that estimates firm demands on MWDOC. Assuming MWDOC would not be imposing mandatory restrictions if Metropolitan is not, the estimate of firm demands in MWDOC's latest allocation model has been used to estimate the minimum imported supplies available to each of MWDOC's retail agencies for 2015-2018. Thus, the estimate of the minimum imported supplies available to the City is 9,890 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	9,890	9,890	9,890
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 La Habra

The City could experience a catastrophic interruption in the water supply as a result of a regional power outage, earthquake, terrorism, or other event. A successful recovery plan is dependent upon an in depth understanding of the vulnerability of each source of supply, delivery system, and distribution system to potential catastrophes. Possible catastrophes and preparation actions being taken to reduce the severity of each event are listed and discussed below.

- ***Regional Power Outage:*** The City has back-up diesel generators at the Idaho Well, Portola Well, and the La Bonita Pump Station to allow pumping during regional power outages.
- ***Earthquake:*** The City has a comprehensive Emergency Response Plan to address the specific responses to earthquakes, damage assessments, evacuations, and major line breaks. The Emergency Response Plan also identifies agency and mutual aid contacts to help restore the City's critical water system infrastructure.
- ***Terrorism:*** The City completed a Security Vulnerability Assessment to identify and propose mitigation solutions to prevent deliberately induced events. The City has enhanced its security such as installing registered key locks, which provide access only to the City Water Maintenance personnel, and installing a reinforced reservoir ladder and access hatch to prevent security breaches. The City conducts reservoir inspections twice daily and has increased security awareness.

The City has five emergency interconnections of which four are for export only, one is for import only, and one is a two way connection. These interconnections are with the City of Brea, City of Fullerton, and Suburban Water Systems (La Habra, Water Master Plan, 2015).

5.5 Prohibitions, Penalties and Consumption Reduction Methods

5.5.1 Prohibitions

The Water Conservation and Water Supply Shortage Program Ordinance No. 1703 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, and enable implementation of the City's Water Shortage Contingency Measures. The list of prohibitions is displayed in Table 5-3 (La Habra, Ordinance No. 1703, August 2009).

Table 5-3: Restrictions and Prohibitions on End Uses

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
Permanent Year-Round	Landscape - Limit landscape irrigation to specific times	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 10 a.m. and 4 p.m. Pacific Standard Time on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.	Yes
Permanent Year-Round	Landscape - Other landscape restriction or prohibition	Watering or irrigating of lawn, landscape, or other vegetated area with potable water using a landscape irrigation system or a watering device that is not continuously attended is limited to no more than 15 minutes watering per day per station. This does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems when no emitter produces more than 2 gallons of water per hour and weather based controllers or stream rotor sprinklers that meet a 70 percent efficiency standard.	Yes
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation	Watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter or ditch 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?
Permanent Year-Round	Other - Prohibit use of potable water for washing hard 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 or a low-volume, high-pressure cleaning machine equipped to recycle any water used.	Yes
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than five days of receiving notice from the City, is prohibited.	Yes
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 unless a waiver has been obtained.	Yes
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Using water to wash or clean a vehicle, including, but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device. This does not apply to any commercial car washing facility.	Yes
Permanent Year-Round	CII - Restaurants may only serve water upon request	-	Yes

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service	-	Yes
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service.	Yes
Permanent Year-Round	Other	Installation of non-recirculating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	Yes
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves	Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.	Yes
1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to 3 days per week on a schedule established and posted by the city. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than 1 day per week on a schedule established and posted by the city. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.	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?
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within 72 hours of notification by the City unless other arrangements are made with the City.	Yes
2	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to 2 days per week on a schedule established and posted by the city. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than 1 day per week on a schedule established and posted by the city. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within 48 hours of notification by the City unless other arrangements are made with the City.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a supply shortage stage.	Yes

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
2	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Using water to wash or clean a vehicle, including but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not, is prohibited except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, by high pressure/low volume wash systems, or at a commercial car washing facility that utilizes a recirculating water system to capture or reuse water.	Yes
2	Other water feature or swimming pool restriction	Refilling of more than one foot and initial filling of residential swimming pools or outdoor spas with potable water is prohibited.	Yes
3	Landscape - Prohibit all landscape irrigation	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited, except as approved by the City.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within 24 hours of notification by the City unless other arrangements are made with the City.	Yes

Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
3	Other	No new potable water service will be provided, no new temporary meters or permanent meters will be provided, and no statement of immediate ability to serve or provide potable water service (such as, will serve letters, certificates, or letters of availability) will be issued, except under the following circumstances: a valid, unexpired building permit has been issued for the project, the project is necessary to protect public health, safety, and welfare, or the applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the City. This does not preclude the resetting or turn-on of meters to provide continuation of water service or the restoration of service that has been interrupted for a period of one year or less.	Yes
3	Other	The City, in its sole discretion, may discontinue service to consumers who willfully violate any of these provisions.	Yes
4	Other	The City may reduce water allocations in all categories to meet the available water supply.	Yes
4	Other	The City may shut off all nonessential water uses.	Yes
Notes:			

5.5.2 Penalties

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

The first violation will result in a written warning. The second, third, and fourth and subsequent violations will result in a fine not to exceed one hundred dollars, two hundred and fifty dollars, and five hundred

dollars respectively. In addition to any fines, the City may require the installation of a water flow restrictor device of approximately one gallon per minute. The City may also disconnect and/or terminate a customer's water service. The person in violation of any provision will be responsible for payment of the City's charges for disconnecting and/or reconnecting service per the City's schedule of charges then in effect (La Habra, Ordinance No. 1703, August 2009).

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 Supply Shortage Measures
2	Other	Stage 2 Water Supply Shortage Measures
3	Other	Stage 3 Water Supply Shortage Measures
4	Other	Stage 4 Water Supply Shortage - Emergency Conditions 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 full revenue impact analysis is shown in Table 5-5.

Table 5-5: Revenue Impact

Demand	Baseline	10%	25%	50%
Water Produced (AF)	9,584	8,625	7,188	4,792
Imported Water (AF)	5,954	5,359	4,465	2,977
Local Sources (AF)	3,630	3,267	2,722	1,815
Water Produced (HCF)	4,174,642	3,757,178	3,130,982	2,087,321
Imported Water (HCF)	2,593,554	2,334,198	1,945,165	1,296,777
MWDOC (AF)	232	208	174	116
Cal Domestic (AF)	5,722	5,150	4,292	2,861
Local Sources (HCF)	1,581,089	1,422,980	1,185,816	790,544
Water Losses (HCF)	282,164	253,932	211,610	141,073

Demand	Baseline	10%	25%	50%
Water Sales (HCF)	3,892,495	3,503,246	2,919,372	1,946,248
Tier 1 - (%)	97.9%	97.9%	97.9%	97.9%
Tier 2 - (%)	2.1%	2.1%	2.1%	2.1%
Tier 1 (HCF)	3,812,513	3,431,261	2,859,385	1,906,256
Tier 2 (HCF)	79,983	71,985	59,987	39,991
Total	3,892,495	3,503,246	2,919,372	1,946,248
Revenue				
Tier 1 - Regular ($/HCF)	$2.67	$2.67	$2.67	$2.67
Tier 2 - Surcharge ($/HCF)	$2.89	2.89	2.89	2.89
Tier 1 Revenue	$10,179,409	$9,161,468	$7,634,557	$5,089,704
Tier 2 Revenue	$231,150	$208,035	$173,363	$115,575
Total	$10,410,559	$9,369,503	$7,807,919	$5,205,280
Fixed Monthly/Bimonthly Charge Revenue	$3,071,759	$3,071,759	$3,071,759	$3,071,759
Total Rate Revenue	$13,482,318	$12,441,262	$10,879,679	$8,277,039
Revenue Lost		**($1,041,056)**	**($2,602,640)**	**($5,205,280)**
Variable Costs				
Imported Water ($/HCF)	$3,203,497	2,883,147	2,402,622	1,601,748
MWDOC	$509,056.80	458,151	381,793	254,528
Cal Domestic	$2,694,439.85	2,424,996	2,020,830	1,347,220
Local Sources				
Electricity	$538,344	$484,510	$403,758	$ 269,172
Chemicals	$29,069	$26,162	$21,802	$14,535
Unit Costs ($/AF)				
Purchased Water	$538.04	$2,669	$2,669	$2,669
MWDOC	$2,198	$2,198	$2,198	$2,198
Cal Domestic	$471	$471	$471	$ 471
Local Sources				
Electricity	$56.17	$56.17	$56.17	$56.17
Chemicals	$3.03	$3.03	$3.03	$3.03

Demand	Baseline	10%	25%	50%
Avoided Costs		**$320,350**	**$800,874**	**$1,601,748**
Net Revenue Change		**($720,706)**	**($1,801,766)**	**$$3,603,531)**
Rate Revenue Increase Required		**5.65%**	**15.43%**	**36.48%**

The following measures can be implemented by the City to overcome each reduction in water sales scenario outlined above depending on anticipated short-term and long-term financial impacts.

- The City can draw needed funds from its emergency operation and maintenance fund.
- The City can defer non-mission critical capital improvement projects and reallocate the funds to cover the cost of operations and critical maintenance.

The City Manager can recommend the City Council to declare a water shortage and implement the City's Water Shortage Contingency Plan. Depending on the severity of the shortage and impact on revenue, the City Council may increase water rates, by an amount necessary as determined by the City Council. The subsequent rate increases enacted will remain in effect until such time the City Council declares a water shortage no longer exists.

5.7 Reduction Measuring Mechanism

The City monitors the projected supply and demand for water by its customers on a daily basis. An analysis of the daily production meter readings will provide values for actual reductions in water use. The City Manager is responsible for determining the extent of the conservation required through the implementation and/or termination of particular conservation stages for various water supply scenarios in order to properly plan for its customers.

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 the Orange County Sanitation District (OCSD) for treatment and disposal through ocean outfall or beneficial reuse by other agencies. The City relies on local groundwater for the majority of its water supply along with a small portion of imported water.

6.2 Wastewater Description and Disposal

The City operates and maintains the local sewer collection pipes that feed into the OCSD's trunk sewer system to convey wastewater to OCSD's treatment plants. The City's sewer system includes approximately 125 miles of gravity sewers ranging from 6 inches to 24 inches in diameter and 2,680 manholes and cleanouts. 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 Orange County Water District’s (OCWD) Groundwater Replenishment System (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 wastewater collected by the City 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.

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

Retail: Wastewater Collected Within Service Area in 2015					
Wastewater Collection			Recipient of Collected Wastewater		
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected in 2015	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?
City of La Habra	Estimated	6,230	OCSD	Plant No. 1 / Plant No. 2	No
Total Wastewater Collected from Service Area in 2015:		6,230			
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 and GAP.

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 does not have the potential for indirect potable reuse within its service area at this time.

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 indirect potable reuse 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 systems. Imported water is obtained through two Metropolitan connections: OC-4 and OC-45. These connections have a combined capacity of 40 cubic feet per second and feed the City's distribution system through flow control valves. The City adjusts the control valves to meet the City's system demands. With increased supply from groundwater and CDWC, the connections have become a backup source of supply which are typically not used under normal operating conditions.

The City has 17 interconnections with CDWC that supply water from two different hydraulic grade systems. The City has five emergency interconnections with the City of Brea, City of Fullerton, and Suburban Water Systems (SWS). The City has two emergency interconnections with the City of Brea that are export only connections. These emergency interconnections take water from the City's 20-inch transmission main that is connected to the Metropolitan OC-4 imported water connection. The emergency interconnection with the City of Fullerton is an import only connection. There are two interconnections with SWS, the first is a two-way connection and the second is an export only connection.

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 the following projects planned for design and construction:

Foothill Zone Consolidation Project - pressure zone consolidation project that will create one or two pressure zones from multiple pressure zones in the northern foothill portions of the City. The project will improve fire flows, water circulation/quality, and reduce the number of pressure reducing stations. The conceptual design report has been completed and detailed design and construction expect to be completed in FY 2017-18.

Metering Pilot Program - pilot program for automated meter reading to be in place by March of 2016.

Additional water connections - take over CDWC service islands within the City. Los Angeles County Local Agency Formation Commission (LAFCO) has consented and their service islands have been taken over, but the City is still working with Orange County LAFCO for islands within their area.

7.4 Desalination Opportunities

In 2001, Metropolitan developed a Seawater Desalination Program (SDP) to provide incentives for developing new seawater desalination projects in Metropolitan's service area. In 2014, Metropolitan modified the provisions of their Local Resources Program (LRP) to include incentives for locally produced seawater desalination projects that reduce the need for imported supplies. To qualify for the incentive, proposed projects must replace an existing demand or prevent new demand on Metropolitan's imported water supplies. In return, Metropolitan offers two incentive formulas under the program:

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

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

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

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

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

7.4.1 Groundwater

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

7.4.2 Ocean Water

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

Over the past several years, Poseidon has been working with OCWD on the general terms and conditions for selling the water to OCWD. OCWD and MWDOC have proposed a few distribution options to agencies in Orange County. The northern option proposes the water be distributed to the northern agencies closer

to the plant within OCWD's service area with the possibility of recharging/injecting a portion of the product water into the Orange County Groundwater Basin. The southern option builds on the northern option by delivering a portion of the product water through the existing OC-44 pipeline for conveyance to the south Orange County water agencies. A third option is also being explored that includes all of the product water to be recharged into the Orange County Groundwater Basin. Currently, a combination of these options could be pursued.

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

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

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

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

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

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

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

- Preliminary Design Report and Cost Estimate
- Brine Outfall Analysis
- Environmental Impact Report (EIR) Process
- Environmental Permitting Approvals

- Public Outreach
- Project Funding
- Project Delivery Method
- Economic Analysis

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

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

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

8 UWMP ADOPTION PROCESS

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, the 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)	5/16/16	Appendix E
Notified city or county within supplier's service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing)	3/2/16	Appendix E
Held public hearing	5/16/16	Appendix E
Adopted UWMP	5/16/16	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 (no later than 30 days after adoption)	6/16/16	-
Made UWMP available for public review (no later than 30 days after filing with DWR)	8/1/16	-

This UWMP was adopted by the City Council on May 16, 2016. A copy of the adopted resolution is provided in Appendix F.

A change from the 2004 legislative session to the 2009 legislative session required the 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 2, 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	☑	☑
NOTES:		

8.1 Public Participation

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

8.2 Agency Coordination

All of 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 imported groundwater from CDWC, a mutual water company that owns rights to and supplies water from the Main San Gabriel Groundwater Basin, an adjudicated basin. Therefore, development of this plan has been coordinated with the involved parties at various levels of contribution.

8.3 UWMP Submittal

8.3.1 Review of Implementation of 2010 UWMP

As required by California Water Code, the City summarizes the implementation of the Water Conservation Programs to date, and compares the implementation to those as planned in its 2010 UWMP.

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

The City recognizes the importance of water conservation and has made water use efficiency an integral part of water use planning. The City is not a California Urban Water Conservation Council (CUWCC) signatory; however, it is currently implementing all 6 DMMs described in the Act. DMMs as defined by the

Act correspond to the CUWCC's Best Management Practices (BMP). For the City's specific achievements in the area of conservation, please see Section 4 of this Plan.

8.3.3 Filing of 2015 UWMP

The City Council reviewed the Final Draft Plan on May 16, 2016. The five-member City Council approved the 2015 UWMP on May 16, 2016. See Appendix F for the resolution approving the Plan.

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

REFERENCES

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CDM Smith, 2016. Final Technical Memorandum #1 of Orange County Reliability Study.

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Metropolitan Water District of Southern California, 2016. Metropolitan Urban Water Management Plan 2015.

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San Diego County Water Authority, 2003. Quantification Settlement Agreement.

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U.S. Department of the Interior Bureau of Reclamation, 2012. Colorado River Basin Study.

Urban Water Management Planning Act, California Water Code § 10610-10656 (2010).

Water Conservation Act of 2009, California Senate SB x7-7, 7th 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 eitherchecklist. This will support DWR in its review of these UWMPs. The completed form can be included with the UWMP.

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

Checklist Arranged by Subject

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

	compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.			
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	**Section 2.5.2.2**
10608.24(a)	Retail suppliers shall meet their interim target by December 31, 2015.	Baselines and Targets	Section 5.8 and App E	**Section 2.5.2.2**
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.8.2	**Section 2.5.2.2**
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	**N/A**
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	**Section 2.5.2.2**
10631(b)	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.	System Supplies	Chapter 6	**Section 3.4**
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	**Section 3.3**
10631(b)(1)	Indicate whether a groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	**Section 3.3.1 and Appendix C**
10631(b)(2)	Describe the groundwater basin.	System Supplies	Section 6.2.1	**Section 3.3.1**
10631(b)(2)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	**Section 3.3.1.1**
10631(b)(2)	For unadjudicated basins, indicate whether or not the department has identified the basin as overdrafted, or projected to become overdrafted. Describe efforts by the supplier to eliminate the long-term overdraft condition.	System Supplies	Section 6.2.3	**Section 3.3.4**
10631(b)(3)	Provide a detailed description and analysis of the location, amount, and sufficiency of	System Supplies	Section 6.2.4	**Section 3.3.3**

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

	comparison to uses previously projected.			
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5	**Section 6.4**
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5	**Section 6.5**
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	**Section 3.3, 4.5, 4.6, 6.4**
10631(c)(1)	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.	Water Supply Reliability Assessment	Section 7.1	**Section 3.6**
10631(c)(1)	Provide data for an average water year, a single dry water year, and multiple dry water years	Water Supply Reliability Assessment	Section 7.2	**Section 3.6.5**
10631(c)(2)	For any water source that may not be available at a consistent level of use, describe plans to supplement or replace that source.	Water Supply Reliability Assessment	Section 7.1	**Section 3.2.3, 3.3, 3.6, 4**
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1	**Section 3.6.2.3**
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	**Section 3.7**
10632(a) and 10632(a)(1)	Provide an urban water shortage contingency analysis that specifies stages of action and an outline of specific water supply conditions at each stage.	Water Shortage Contingency Planning	Section 8.1	**Section 5.2**
10632(a)(2)	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency.	Water Shortage Contingency Planning	Section 8.9	**Section 5.3**
10632(a)(3)	Identify actions to be undertaken by the urban water supplier in case of a catastrophic interruption of water supplies.	Water Shortage Contingency Planning	Section 8.8	**Section 5.4**
10632(a)(4)	Identify mandatory prohibitions against specific water use practices during water shortages.	Water Shortage Contingency Planning	Section 8.2	**Section 5.5.1**
10632(a)(5)	Specify consumption reduction methods in the most restrictive stages.	Water Shortage Contingency Planning	Section 8.4	**Section 5.5.3**
10632(a)(6)	Indicated penalties or charges for excessive	Water Shortage Contingency	Section 8.3	**Section**

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

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

APPENDIX B

Standardized Tables

Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
CA3010018	City of La Habra	12,548	9,584
	TOTAL	12,548	9,584
NOTES:			

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

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

Table 2-4 Retail: Water Supplier Information Exchange
The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
MWDOC
NOTES:

Table 3-1 Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	61,843	64,552	65,859	67,144	68,012	68,159
NOTES: MWDOC Retail Agency Population Projections						

Table 4-1 Retail: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Use Drop down list *May select each use multiple times* *These are the only Use Types that will be recognized by the WUEdata online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Single Family		Drinking Water	5,763
Multi-Family		Drinking Water	1,574
Institutional/Governmental		Drinking Water	258
Commercial	Includes Industrial	Drinking Water	1,211
Landscape		Drinking Water	778
		TOTAL	9,584
NOTES:			

Table 4-2 Retail: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Use Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool*		2020	2025	2030	2035	2040
Single Family		5,175	5,503	5,511	5,521	5,507
Multi-Family		1,413	1,503	1,505	1,508	1,504
Institutional/Governmental		232	246	247	247	247
Commercial	Includes Industrial	1,087	1,156	1,158	1,160	1,157
Landscape		699	743	744	745	743
TOTAL		8,606	9,152	9,165	9,182	9,158
NOTES:						

Table 4-3 Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water *From Tables 4-1 and 4-2*	9,584	8,606	9,152	9,165	9,182	9,158
Recycled Water Demand* *From Table 6-4*	0	0	0	0	0	0
TOTAL WATER DEMAND	9,584	8,606	9,152	9,165	9,182	9,158
NOTES:						

Table 4-4 Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
07/2014	1,061
NOTES:	

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

Table 5-1 Baselines and Targets Summary

Retail Agency or Regional Alliance Only

Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*1996*	*2005*	*161*	*151*	*142*
5 Year	*2004*	*2008*	*158*		

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

NOTES:

Table 3-2: 2015 Compliance

*Retail Agency or Regional Alliance Only**

Actual 2015 GPCD*	2015 Interim Target GPCD*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
138	151	Yes

**All values are in Gallons per Capita per*

NOTES:

Table 6-1 Retail: Groundwater Volume Pumped						
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	La Habra Groundwater Basin	1,849	1,865	3,073	4,094	3,630
	TOTAL	1,849	1,865	3,073	4,094	3,630
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? *Drop Down List*	Volume of Wastewater Collected in 2015	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*
City of La Habra	Estimated	6,230	OCSD	Plant No. 1 / Plant No. 2	No
Total Wastewater Collected from Service Area in 2015:		6,230			
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	
☑	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.

Table 6-7 Retail: Expected Future Water Supply Projects or Programs	
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.
Section 7.3	Provide page location of narrative in the UWMP

Table 6-8 Retail: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	2015	
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Actual Volume	Water Quality *Drop Down List*
Groundwater	La Habra Groundwater Basin	3,630	Drinking Water
Purchased or Imported Water	CDWC	5,722	Drinking Water
Purchased or Imported Water	MWDOC	232	Drinking Water
	Total	9,584	
NOTES:			

Table 6-9 Retail: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*				
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		**2020**	**2025**	**2030**	**2035**	**2040**
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Groundwater	La Habra Groundwater Basin	4,200	4,200	4,200	4,200	4,200
Purchased or Imported Water	CDWC	3,976	4,494	4,507	4,523	4,500
Purchased or Imported Water	MWDOC	430	458	458	459	458
	Total	8,606	9,152	9,165	9,182	9,158
NOTES:						

Table 7-1 Retail: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available	**% of Average Supply**
Average Year	1990-2014		100%
Single-Dry Year	2014		106%
Multiple-Dry Years 1st Year	2012		106%
Multiple-Dry Years 2nd Year	2013		106%
Multiple-Dry Years 3rd Year	2014		106%

Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals *(autofill from Table 6-9)*	8,606	9,152	9,165	9,182	9,158
Demand totals *(autofill from Table 4-3)*	8,606	9,152	9,165	9,182	9,158
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	9,122	9,701	9,715	9,733	9,707
Demand totals	9,122	9,701	9,715	9,733	9,707
Difference	0	0	0	0	0
NOTES:					

Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First year	Supply totals	9,122	9,701	9,715	9,733	9,707
	Demand totals	9,122	9,701	9,715	9,733	9,707
	Difference	0	0	0	0	0
Second year	Supply totals	9,122	9,701	9,715	9,733	9,707
	Demand totals	9,122	9,701	9,715	9,733	9,707
	Difference	0	0	0	0	0
Third year	Supply totals	9,122	9,701	9,715	9,733	9,707
	Demand totals	9,122	9,701	9,715	9,733	9,707
	Difference	0	0	0	0	0
NOTES:						

Table 8-1 Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction[1] *Numerical value as a percent*	Water Supply Condition (*Narrative description)*
1	0% to 10%	The City notifies its water users that due to drought or other supply reductions, a consumer demand reduction is necessary to make more efficient use of water and respond to existing conditions.
2	10% to 20%	The City notifies its water users that due to drought or other supply reductions, a consumer demand reduction is necessary to make more efficient use of water and respond to existing conditions.
3	20% to 30%	The City notifies its water users that due to drought or other supply reductions, a consumer demand reduction is necessary to make more efficient use of water and respond to existing conditions.
4	Up to 40% or more	The City declares a shortage emergency condition pursuant to California Water Code Section 350 and notifies its residents and businesses a consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection.
[1] *One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.*		
NOTES:		

Table 8-2 Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? *Drop Down List*
Permanent Year-Round	Landscape - Limit landscape irrigation to specific times	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited between the hours of 10 a.m. and 4 p.m. Pacific Standard Time on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.	Yes
Permanent Year-Round	Landscape - Other landscape restriction or prohibition	Watering or irrigating of lawn, landscape, or other vegetated area with potable water using a landscape irrigation system or a watering device that is not continuously attended is limited to no more than 15 minutes watering per day per station. This does not apply to landscape irrigation systems that exclusively use very low-flow drip type irrigation systems when no emitter produces more than 2 gallons of water per hour and weather based controllers or stream rotor sprinklers that meet a 70 percent efficiency standard.	Yes
Permanent Year-Round	Landscape - Restrict or prohibit runoff from landscape irrigation	Watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, gutter or ditch is prohibited.	Yes
Permanent Year-Round	Other - Prohibit use of potable water for washing hard 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 or a low-volume, high-pressure cleaning machine equipped to recycle any water used.	Yes
Permanent Year-Round	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than five days of receiving notice from the City, is prohibited.	Yes
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 unless a waiver has been obtained.	Yes
Permanent Year-Round	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Using water to wash or clean a vehicle, including, but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device. This does not apply to any commercial car washing facility.	Yes
Permanent Year-Round	CII - Restaurants may only serve water upon request		Yes
Permanent Year-Round	CII - Lodging establishment must offer opt out of linen service		Yes
Permanent Year-Round	Other	Installation of single pass cooling systems is prohibited in buildings requesting new water service.	Yes

Permanent Year-Round	Other	Installation of non-recirculating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.	Yes
Permanent Year-Round	CII - Commercial kitchens required to use pre-rinse spray valves	Food preparation establishments, such as restaurants or cafes, are prohibited from using non-water conserving dish wash spray valves.	Yes
1	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to 3 days per week on a schedule established and posted by the city. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than 1 day per week on a schedule established and posted by the city. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within 72 hours of notification by the City unless other arrangements are made with the City.	Yes
2	Landscape - Limit landscape irrigation to specific days	Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to 2 days per week on a schedule established and posted by the city. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than 1 day per week on a schedule established and posted by the city. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within 48 hours of notification by the City unless other arrangements are made with the City.	Yes
2	Other water feature or swimming pool restriction	Filling or refilling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a supply shortage stage.	Yes
2	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	Using water to wash or clean a vehicle, including but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not, is prohibited except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, by high pressure/low volume wash systems, or at a commercial car washing facility that utilizes a recirculating water system to capture or reuse water.	Yes

2	Other water feature or swimming pool restriction	Refilling of more than one foot and initial filling of residential swimming pools or outdoor spas with potable water is prohibited.	Yes
3	Landscape - Prohibit all landscape irrigation	Watering or irrigating of lawn, landscape, or other vegetated area with potable water is prohibited, except as approved by the City.	Yes
3	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within 24 hours of notification by the City unless other arrangements are made with the City.	Yes
3	Other	No new potable water service will be provided, no new temporary meters or permanent meters will be provided, and no statement of immediate ability to serve or provide potable water service (such as, will serve letters, certificates, or letters of availability) will be issued, except under the following circumstances: a valid, unexpired building permit has been issued for the project, the project is necessary to protect public health, safety, and welfare, or the applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the City. This does not preclude the resetting or turn-on of meters to provide continuation of water service or the restoration of service that has been interrupted for a period of one year or less	Yes
3	Other	The City, in its sole discretion, may discontinue service to consumers who willfully violate any of these provisions.	Yes
4	Other	The City may reduce water allocations in all categories to meet the available water supply.	Yes
4	Other	The City may shut off all nonessential water uses.	Yes
Notes:			

Table 8-3 Retail Only: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*
1	Other	Stage 1 Water Supply Shortage Measures
2	Other	Stage 2 Water Supply Shortage Measures
3	Other	Stage 3 Water Supply Shortage Measures
4	Other	Stage 4 Water Supply Shortage - Emergency Conditions Measures
NOTES:		

Table 8-4 Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	9,890	9,890	9,890
NOTES:			

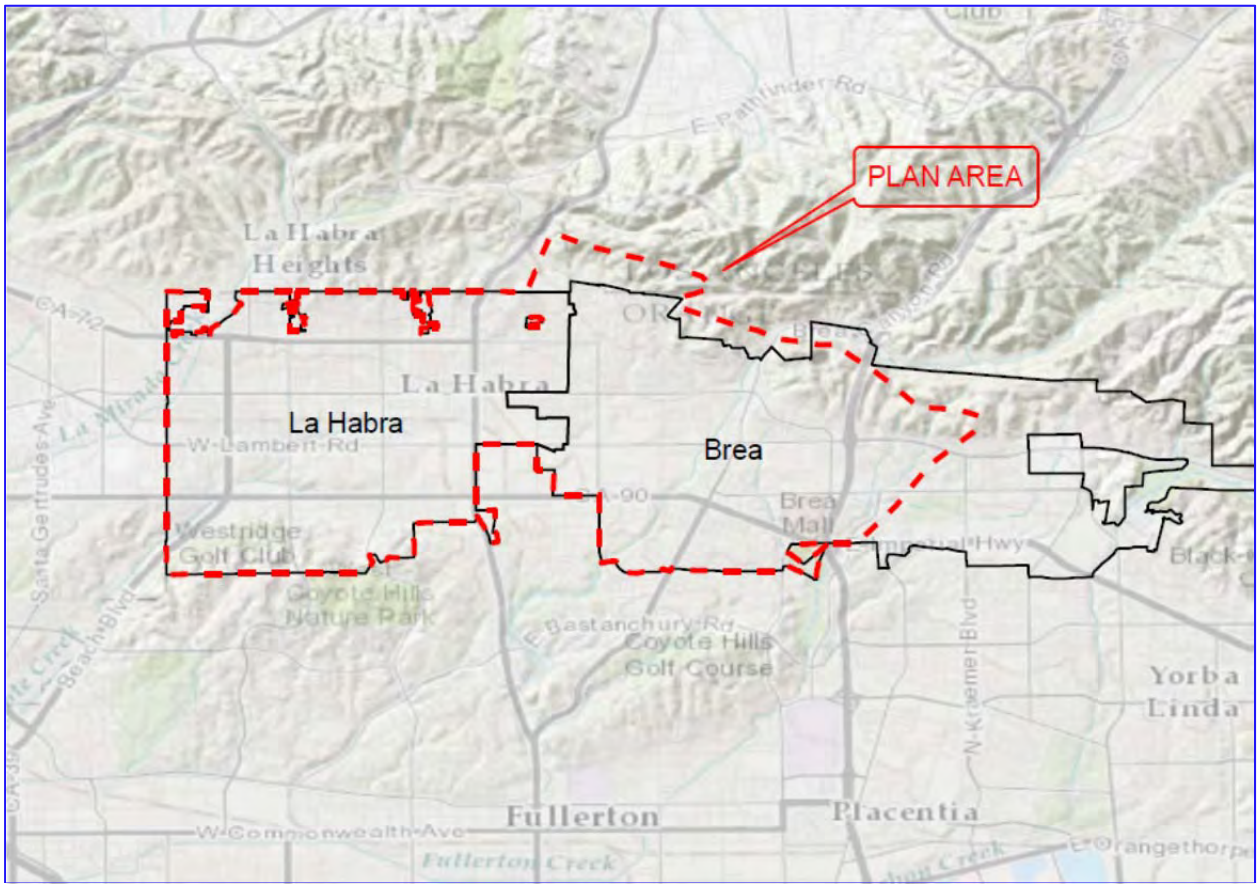
Table 10-1 Retail: Notification to Cities and Counties		
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Orange County	☑	☑
NOTES:		

APPENDIX C

Groundwater Management Study

DRAFT
Groundwater Study

Prepared For:
City of La Habra, California



STETSON
ENGINEERS INC.

August 25, 2014

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ACRONYM AND ABBREVIATION LIST

AF ..... acre-feet
AFY ..... acre-feet per year
BMO ..... Basin Management Objective
CDWC ..... California Domestic Water Company
City ..... City of La Habra
DWR ..... California Department of Water Resources
GMP ..... Groundwater Management Plan
gpd/ft ..... gallons per day per foot
gpm ..... gallons per minute
mg/L ..... milligrams per liter
MWD ..... Metropolitan Water District of Southern California
MWDOC ..... Municipal Water District of Southern California
OCSD ..... Orange County Sanitation District
OCWD ..... Orange County Water District
Orange County Basin ..... Coastal Plain of Orange County Groundwater Basin
TDS ..... Total Dissolved Solids
UWMP ..... Urban Water Management Plan

1.0 INTRODUCTION

This Groundwater Management Plan (Plan or GMP) for the portion of the La Habra Basin underlying the City of La Habra and the City of Brea, the only producers of groundwater in the basin, was prepared to enhance the long-term stability and water quality of the basin. The Plan was developed by the City of La Habra in coordination with the City of Brea, a major stakeholder in the basin. This Plan was prepared in accordance with the requirements under Assembly Bill 3030 (AB 3030) [California Water Code 10750 et seq.] and Senate Bill 1938 (SB 1938) which amended Sections 10753 and 10795 of the California Water Code. This Plan also addresses the recommended components for a Groundwater Management Plan as described in Appendix C of the California Department of Water Resources (DWR) Bulletin 118 (2003 Updated).

1.1 Overview of the City of La Habra

The City of La Habra (City) is located in the northwestern corner of Orange County (Figure 1). The City serves a population of approximately 63,000 throughout its 7.3 square-mile service area. Los Angeles County borders the City on the north and west, the City of Brea on the east, and the City of Fullerton on the south and southeast.

The major land use within the City is low-density residential with pockets of medium-density residential areas. The southeastern corner of the City consists of commercial and light industry land uses. The City expects minimal changes in land use over the next 25 years as described it its 2010 Urban Water Management Plan (UWMP) (Malcolm Pirnie, 2011a).

La Habra's climate is characteristic of a Mediterranean climate which can be described as a semi-arid coastal climate typical for southern California with hot, dry summers and mild, wet winters. Temperatures generally range between 58° in January and 74° Fahrenheit in August (Malcolm Pirnie, 2011a).

1.1.1 Existing and Future Demand and Supply

The City receives water from three sources: **imported groundwater** from the Main San Gabriel Basin through the California Domestic Water Company (CDWC), **treated imported surface water** from the Metropolitan Water District of Southern California (MWD) through the Municipal Water District of Orange County (MWDOC), and **local groundwater** pumped from three production wells within the La Habra Basin. The City's 2010 water demand was 9,803 AF, of which, 2,291 AF (23%) was met with local groundwater from the La Habra Basin (Malcolm Pirnie, 2011a). As of 2014, 43% of the City's demand is met with local groundwater, 47% with imported groundwater, and 10% with treated imported surface water (La Habra, 2014).

La Habra does not own or operate wastewater treatment facilities and sends all collected wastewater to the Orange County Sanitation District (OCSD) for treatment and disposal or reuse.

Currently, the City does not use recycled water to meet water demands but it has been determined that the potential exists for direct non-potable reuse within its service area in the future (Malcolm Pirnie, 2011a).

1.1.2 Groundwater Production Facilities

The City began a local groundwater exploratory program in 1977 in which three test wells were drilled and evaluated. Of these three wells, only Well No. 1 was considered satisfactory for groundwater production. It was placed into service in 1984 and continued service until it collapsed in 1997 (Malcolm Pirnie, 2011a). In 1997, the City approved construction of the Idaho Street Well, located 30 feet southwest of Well No. 1.

The capacity of the Idaho Street Well is 2,000 gallons per minute (gpm) but is regulated to a capacity of 1,500 gpm (Malcolm Pirnie, 2011a). The quality of the raw groundwater from the Idaho Street Well requires treatment by the City prior to entering the distribution system. This treatment consists of chlorination, air-stripping to remove ammonia and hydrogen sulfide, and the addition of sodium hexametaphosphate to sequester iron and manganese (Malcolm Pirnie, 2011a).

La Habra began groundwater production in August 2012 from its La Bonita Well located within La Bonita Park. The capacity of the La Bonita Well is 850 gpm (Geoscience, 2011). In May 2013, the City began groundwater production at its third production well, the Portola Well, located behind Portola Park. The capacity of the well is 1,200 gpm (Geoscience, 2013). Water from the La Bonita and Portola Wells is chlorinated and then blended with water purchased from the CDWC in a 250,000-gallon forebay to reduce the concentration of minerals prior to entering the City's distribution system (La Habra, 2014)

1.2 Overview of the City of Brea

The City of Brea is located in the northwestern corner of Orange County (Figure 1). The City serves a population of approximately 40,377 throughout its 10.7 square-mile service area. Similar to the City of La Habra, Brea receives water from three sources: imported groundwater from the Main San Gabriel Basin through CDWC, treated imported surface water from MWD through MWDOC, and local groundwater pumped from one irrigation well within the La Habra Basin (Malcolm Pirnie, 2011b).

Brea's 2010 total water demand was 9,713 AFY, of which, 99 AFY (1%) was met with local groundwater from the La Habra Basin. Brea estimates that pumping from its irrigation well will increase to 110 AFY, assuming production at the well's maximum capacity of 450 gpm. The irrigation well is located at the Brea Creek Golf Course and serves the golf course. This well is strictly used for irrigation purposes as the groundwater beneath the city has poor water quality and would require extensive treatment and blending with higher quality water to meet public health standards (Malcolm Pirnie, 2011b).

1.3 Existing Groundwater Studies

A summary of existing groundwater studies regarding the La Habra Basin is provided below:

South Coastal Basin Investigation: Geology and Ground Water Storage Capacity of Valley Fill. 1934. California Department of Public Works. Bulletin No. 45. Within this bulletin, the geology and storage capacities within the South Coastal Basin are examined. Features of the La Habra Basin are discussed in Chapter 7 including the general characteristics, specific yields, storage changes, and groundwater movement of each water-bearing zone.

South Coastal Basin Investigation: Overdraft on Ground Water Basins. 1947. California Division of Water Resources. Bulletin No. 53. Within this bulletin, overdraft conditions within the South Coastal Basin are examined. Chapter 34 discusses conditions in the La Habra Basin. Inflows, imports, consumptive use, exports, surface outflows, subsurface outflows, and overdraft assessments are discussed for the basin.

La Habra Basin Groundwater Study. 1977. James M. Montgomery, Consulting Engineers Inc. This report summarizes Montgomery's review and analyses of the geologic, hydrologic, and water quality characteristics in the La Habra Valley area. In addition to summarizing the existing conditions, Montgomery determined the groundwater recharge condition, inflow and outflow of the La Habra Basin as well as determined an estimate for the probable long-term groundwater yield of the basin. Locations for subsurface exploratory test drilling and production well construction were recommended.

Exploratory Drilling in the La Habra Groundwater Basin, Summary Report and Evaluation. 1979. James M. Montgomery, Consulting Engineers Inc. This report was prepared as "Phase II" of the *La Habra Basin Groundwater Study* and summarizes the activities conducted during drilling, construction, testing, and evaluation of a test production well and two monitoring wells. This report recommended two production wells be constructed where the two monitoring wells were constructed.

Letter summarizing the results of drilling and testing new La Habra Wells No. 1 and 2. 1981. James M. Montgomery, Consulting Engineers Inc. This letter summarizes the drilling and testing activities for La Habra Wells Nos. 1 and 2 as recommended by the Phase II Montgomery report (1979). The letter recommended that the City goes ahead with groundwater production at Well No. 2 despite odor issues.

Preliminary Geohydrologic Evaluation of the La Habra Basin. 2009. GeoScience. This technical memorandum was prepared to provide an opinion of basin characteristics, groundwater resources, and recommend potential new well locations within the La Habra Basin.

Re-Evaluation of Basin Safe Yield. 2013. Stetson Engineers. This draft technical report re-evaluates the safe yield analysis of the La Habra Groundwater Basin performed by Montgomery Consulting Engineers in 1977.

Hydrogeologic Investigation of the La Habra Groundwater Basin. 2014. Stetson Engineers. The extents of the La Habra Basin were determined in this draft technical memorandum.

1.4 Goals and Objectives of this Study

This Plan documents existing and planned groundwater management efforts by the City in the La Habra Groundwater Basin. The goal of preparing this groundwater study is to provide a framework that will enhance the long-term stability and water quality of the La Habra Basin in order for the basin to continue to provide the City of La Habra and the City of Brea a reliable, local source of water for the future. As discussed in Section 1.1, the City of La Habra currently relies on the La Habra Basin to meet approximately 43% of its water demands. In addition, the City of Brea relies on the La Habra Basin to irrigate the Brea Creek Golf Course.

1.5 Authority to Prepare Study

In 1992, the California Legislature passed AB 3030 which provides local agencies increased management authority over their groundwater resources, including a groundwater basin or a portion of a groundwater basin within its service area. In 2002, SB 1938 expanded AB 3030 by requiring groundwater management plans to include specific components in order to be eligible for state funding of groundwater-related projects. The City of La Habra has the authority to manage the groundwater resources of the La Habra Basin within its service area and therefore has the authority to prepare a Groundwater Management Plan.

1.6 Study Components

Each of the mandatory requirements and voluntary components described in the California Water Code Sections 10750 et seq. and Appendix C of DWR's Bulletin 118 (2003 Update) have been addressed in this GMP. The location of each requirement/component is provided in Table 1.

Table 1. Location of Groundwater Management Plan Requirements and Voluntary Components

Description	Plan Section(s)
California Water Code Mandatory Requirements (10750 et seq.)	
1. Documentation of public involvement	4.2
2. Groundwater Basin Management Objectives	3.0
3. Monitoring and management of groundwater elevations, quality, land subsidence, and surface water	5.0
4. Plan to involve other agencies located in the groundwater basin	4.1
5. Monitoring protocols	5.5
6. Map of groundwater basin and agencies overlying the basin	Figure 2
California Water Code Voluntary Components (10750 et seq.)	
7. Control of saline intrusion	6.3

8. Identification and management of wellhead protection and recharge areas	6.2
9. Regulation of the migration of contaminated groundwater	6.4
10. Administration of well abandonment and well destruction program	6.1
11. Mitigation of overdraft conditions	7.1
12. Replenishment of groundwater extracted by water users	7.2
13. Monitoring of groundwater levels and storage	5.0
14. Facilitating conjunctive use operations	7.3
15. Identification of well construction policies	6.2
16. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction policies	3.1, 6.4, 7.2, 7.4
17. Development of relationships with state and federal regulatory agencies	4.3
18. Review of land use plans and coordination with land use planning agencies	1.1
Additional Voluntary Components Recommended by DWR (Appendix C of Bulletin 118, 2003 Update)	
19. Advisory committee of stakeholders	8.3
20. Description of the area to be managed under the Plan	2.0
21. Descriptions of actions to meet management objectives and how they will improve water reliability	3.0
22. Describe the monitoring program	5.0
23. Periodic groundwater reporting	8.0
24. Periodic re-evaluation of Groundwater Management Plan	8.3

2.0 GEOLOGY AND HYDROGEOLOGY

Provided in this section of the Plan are descriptions of the geology and hydrogeology of the La Habra Basin. This plan focuses only on the portion of the La Habra Basin outside of OCWD's boundary and the Central Basin Adjudication area (as described below).

2.1 Overview of the Basin

The La Habra Basin covers approximately 40 square miles extending from Los Nietos and West Whittier in Los Angeles County and eastward to Brea in Orange County (DWR, 1947). The La Habra Basin is located in both Los Angeles and Orange Counties and is part of both the Coastal Plain of Los Angeles (Central Basin) and the Coastal Plain of Orange County (Orange County Basin) (Figure 2).

The groundwater rights in the Central Basin are adjudicated. The California Department of Water Resources (DWR) was appointed the Watermaster for the Central Basin to administer the terms of the adjudication. The portion of the La Habra Basin within the Central Basin is not a part of the groundwater basin considered by this Plan.

In addition, a portion of the La Habra Basin is currently within Orange County Water District's (OCWD) service area (in City of Fullerton area). The portion of the La Habra Basin in OCWD's service area is not part of the groundwater basin considered by this Plan.

The City of La Habra is located within the portion of the La Habra Basin which is part of Orange County Basin outside of OCWD's service boundary. (The Orange County Basin is identified as Basin No. 8-1 in the DWR's Bulletin No. 118, 2003 Update.) The La Habra Basin forms the northern tip of the Orange County Basin. This Plan focuses only on the portion of the La Habra Basin outside of the Central Basin Adjudication area and OCWD's service area.

The City of La Habra overlies about 19% of the full extent of the 40-square mile La Habra Basin and 33% of the Orange County portion of the basin (Stetson, 2014). The City of Brea also overlies this portion of the La Habra Basin. Brea overlies about 16% of the full extent of the 40-square mile La Habra Basin and about 27% of the Orange County portion of the basin (Stetson, 2014).

2.2 Hydrology

The La Habra Basin and the City of La Habra lie entirely within the Coyote Creek Watershed (Figure 3). The Coyote Creek Watershed drains approximately 165 square miles of densely populated areas of residential, commercial, and industrial areas as well as areas of open space (Atkins, 2012). Coyote Creek is a tributary to the San Gabriel River. Major Creeks within the watershed are: Coyote Creek, Brea Creek, Fullerton Creek, Carbon Creek, Moody Creek, and Los Alamitos Channel.

Coyote Creek, Brea Creek, and La Mirada Creek (a non-major creek) all flow into and drain out of the La Habra Valley. The total drainage area of these three creeks within the valley is approximately 12,950 acres (Stetson, 2013). Coyote Creek and La Mirada Creek are surface waters flowing through the boundaries of the City. Montgomery (1977) determined that about 30% of the runoff available in an average rainfall year percolates to the aquifers underlying the La Habra Valley.

Within the La Habra Valley, direct percolation of precipitation also occurs. The 40-year average rainfall (14 inches) results in a water supply from precipitation within the 10,160-acre drainage area of approximately 11,870 AFY (Stetson, 2013).

2.3 Regional Geology

The geologic structure of the La Habra Basin is dominated by the La Habra Syncline, a northwest trending, U-shaped down-fold. The syncline is deepest in the Brea area and becomes increasingly shallower towards the City of Whittier and is bounded by the Whittier Fault within the Puente Hills to the north and the Coyote Hills to the south (Montgomery, 1977). The La Habra Syncline produces the La Habra Valley, a naturally-occurring valley, where significant amounts of groundwater have accumulated over the past 150,000 years (Malcolm Pirnie, 2011a).

2.4 Hydrogeology

The La Habra Groundwater Basin consists of three water-bearing zones overlying each other: the Alluvium, La Habra Formation (including the Coyote Hills Formation), and the San Pedro Formation. These zones and their water producing characteristics are described below.

The Alluvium water-bearing zone is comprised of young and old alluvium. These deposits are located along the surface waters within the La Habra Basin and are composed of unconsolidated silt, clay, sand and gravel (Atkins, 2012). The average thickness of the Alluvium zone ranges from a few feet to 100 feet (Montgomery, 1977).

Below the Alluvium, lies the La Habra Formation which consists of the La Habra and Coyote Hills Formations. The La Habra Formation comprises of non-marine mudstone, siltstone, sandstone, and conglomerate and ranges in thickness from 300 to nearly 1,200 feet. Generally the La Habra Formation lies below the Alluvium but has uplifted and is exposed within the Coyote Hills and Puente Hills (Atkins, 2012).

Immediately underneath the La Habra Formation lies the San Pedro Formation, the deepest water-bearing zone of the La Habra Basin. This confined zone consists of sand, gravel, sandstone, conglomerate, and shale. The San Pedro Formation produces the best water quality of the three water-bearing zones and is considered to be potentially the most productive (Montgomery, 1977). The thickness of this zone averages between 200 feet and 400 feet (Atkins, 2012).

2.4.1 Aquifer Characteristics

2.4.1.1 Safe Yield

A “safe yield” is used for ongoing management and future planning of a groundwater basin for sustained beneficial use. It is generally defined as the volume of groundwater that can be pumped annually without depleting the aquifer beyond its ability to recover through natural recharge over a reasonable hydrologic period.

In 1977, Montgomery Engineers completed a groundwater study for the City of La Habra and estimated the ”probable long-term groundwater basin yield” to be 4,500 AFY for a groundwater study area of approximately 8,400 acres (13 square miles) and a watershed of 17,000 acres (27 square miles). The 1977 basin yield estimate was based on an average of two methods: (1) natural groundwater recharge, 3,650 AFY; and (2) natural groundwater discharge, 5,500 AFY.

Stetson conducted a re-evaluation of Montgomery’s (1977) safe yield analysis, which was estimated based on the recharge from precipitation that can be expected to replenish the aquifer on an average annual basis. Using the natural recharge approach (Montgomery 1977) , which estimates the safe yield based on the recharge from precipitation that can be expected to replenish the aquifer on an average annual basis, under current conditions, the safe yield of the La Habra Basin was estimated to be approximately 3,500 AFY, with a contributing watershed of 23,100 acres (Stetson, 2013The Stetson re-evaluation did not include an updated re-evaluation of the safe yield using the natural groundwater discharge method. If Stetson’s estimated safe yield of 3,500 AFY is averaged with Montgomery’s estimated safe yield using the natural groundwater discharge method of 5,500 AFY, the estimated average safe yield for the basin is 4,500 AFY

2.4.1.2 Transmissivity

The transmissivity of a groundwater basin is the rate at which groundwater flows horizontally through the aquifer. Based on Montgomery (1977), the following are the estimated transmissivities in gallons per day per foot (gpd/ft) for each of the water-bearing zones of the La Habra Basin.

- Alluvium: 200 gpd/ft to 10,000 gpd/ft
- La Habra Formation: 25,000 gpd/ft
- San Pedro Formation: 60,000 gpd/ft

2.4.1.3 Groundwater Production

Historically, all three water-bearing zones were developed for domestic and irrigation purposes, with most wells drilled between 1916 and 1940. The City originally drilled three production wells in the deeper aquifers. Groundwater production in these wells ceased in 1968 (Montgomery, 1977). Based on Montgomery (1979), the Alluvium and La Habra Formations are not considered to have groundwater development potential for the following reasons: the Alluvium is limited in thickness and extent, has low

permeability characteristics, and is of poor water quality while the La Habra Formation's permeable sand and gravel zones are thin and discontinuous. Groundwater production in the San Pedro Formation continues to this day (see Section 1.1.2). Based on Montgomery (1977), the following are expected well yields for each of the water-bearing zones of the La Habra Basin.

- Alluvium: 200 gpm
- La Habra Formation: 100 gpm to 400 gpm
- San Pedro Formation: 300 gpm to 800 gpm

2.4.2 Groundwater Flow and Elevation

Groundwater within the La Habra Basin generally flows from the Puente Hills in a south or southwesterly direction. Subsurface flow out of the basin occurs near Coyote and La Mirada Creeks into the Coastal Plain of Los Angeles and at the gap between the East and West Coyote Hills into the Coastal Plain of Orange County (Stetson, 2014). The direction of groundwater flow in the La Habra Basin is provided in Figure 4.

A groundwater level hydrograph for a well completed in the Alluvium shows water levels declining to their lowest level in the 1950s, and recovering during the 1970s. More recent data from a nearby well shows a leveling off of water levels through the 1990s. Two other wells completed in the alluvium also show relatively flat water levels from the 1970s through the 1990s (Stetson, 2014).

Wells completed in the San Pedro Formation show rising groundwater levels. The lowest groundwater levels in this aquifer were observed during the 1930s and 1940s, with water levels recovering about 60 feet through 1972. This corresponds to DWR Bulletin No. 53 (1947) stating that the La Habra Groundwater Basin was in overdraft. More recent data show an overall rising trend of 50 to 60 feet in groundwater levels from 1970 through 2007 and a slight decline during the last three years of data. There were no water levels available for the La Habra Formation.

2.4.3 Groundwater Quality

Previous investigations of water quality within the La Habra Basin determined that the quality is extremely variable. It was shown that shallow regions within the central portion of the basin as well as areas recharged by surface water along the basin boundary are of a bicarbonate and chloride character. Sulfate concentration increased with depth in the La Habra and San Pedro water-bearing zones. The historical data also shows that total dissolved solids (TDS) concentrations have remained relatively stable (Montgomery, 1977). Overall, groundwater from the San Pedro Aquifer is considered to be of fair to good quality (Montgomery, 1979).

The City's 2010 UWMP states that the La Habra Basin is impaired with TDS, hydrogen sulfide, iron, and manganese (Malcolm Pirnie, 2011a). The City treats some of its local groundwater to reduce

the concentrations of hydrogen sulfide, iron, and manganese prior to entry to its distribution system (see Section 1.1.2).

3.0 BASIN MANAGEMENT OBJECTIVES

Basin Management Objectives (BMOs) are required under Section 10753.7(a)(1) of the California Water Code. BMOs are locally-developed guidelines for groundwater development of a particular basin. These BMOs are designed to be more general and flexible than traditional methods of managing groundwater basins based on often difficult to define concepts such as safe yield and overdraft. BMOs allows for more generalized objectives to be established that are quantified and measureable through monitoring and management programs. At the same time, BMOs are designed to be flexible in order to adapt to increasing of knowledge as to how the groundwater basin behaves over time as more monitoring data is collected. The following BMOs are proposed for the City of La Habra:

- BMO No. 1: Reduce the City's dependence on imported water
- BMO No. 2: Maintain groundwater sustainability within the La Habra Basin
- BMO No. 3: Protect and enhance the water quality of the La Habra Basin
- BMO No. 4: Improve the understanding of the La Habra Basin's hydrogeology, groundwater elevations, and basin yields

3.1 BMO No. 1: Reduce the City's Dependence on Imported Water

Currently, about 47% of City of La Habra's demand is met with imported water. The intent of this BMO is to reduce the City's dependence on imported water by utilizing more groundwater stored locally within the La Habra Basin.

Within the last few years, the City has utilized more local groundwater with the recent construction of two new production wells and now about 40% of its demands are met with local groundwater. The City will strive to maximize local groundwater production within the estimated safe yield of the La Habra Basin through coordinated basin management with the City of Brea.

The City can meet this objective by decreasing its water demand through existing and potential conservation measures as discussed in its 2010 UWMP, the City's website, and annual Consumer Confidence Reports (CCRs). Some of these measures include rebate programs, residential plumbing retrofits, system water audits and leak detection and repair, landscape conservation education programs, and public education and outreach.

The City is also preparing for compliance with the provisions of DWR's 20x2020 Program to maximize California's water efficiency and conservation opportunities between 2009 and 2020, and beyond. The Program's goal is to achieve a 20% reduction in per capita water use statewide by 2020. SBX 7-7, the Water Conservation Act of 2009, was signed into law in November 2009 as part of the 20x2020 program. This bill requires each urban retailer (including the City) to develop urban water use

targets to help meet the 20% reduction goal by 2020 and an interim 10% reduction goal by 2015. The bill also requires reporting in the 2010, 2015, and 2020 UWMPs. The City's 2010 UWMP includes a section regarding SBX 7-7 and plans to include similar sections in its future UWMPs. The City's compliance with the 20x2020 program will help meet this BMO as its total water demand shall decrease and reduce its reliance on imported water.

Although the City current does not utilize recycled water, the City has evaluated the potential to use recycled water in the past, including a study conducted with MWDOC to determine the feasibility of a recycled water system in North Orange County. The study determined that the City could treat a portion of its sewage with a small wastewater treatment plant (2.0 million gallons per day). A small distribution system could deliver 750 AFY to golf courses, parks, school yards, and homeowner association landscaping areas (Malcolm Pirnie, 2011a). The City will continue to evaluate opportunities to economically use recycled water in the future to reduce potable water demands.

3.2 BMO No. 2: Maintain Groundwater Sustainability within the La Habra Basin

The intent of this BMO is to sustain a safe, reliable local groundwater supply for existing and future groundwater uses within the City. The City can meet this objective by maintaining and coordinating groundwater production within the estimated safe yield of the La Habra Basin.

The condition of the basin can be verified through a periodic review of groundwater elevations within the basin. The City can utilize and supplement its existing groundwater elevation monitoring program to review general trends in groundwater elevations in the Basin. Since 2008, the City measures non-pumping and pumping groundwater elevations at its production wells. In addition, DWR reports water level measurements for some monitoring wells in the La Habra Basin. Groundwater levels reported by DWR for wells 3/10-9G1, 3/10-8B2, and 3/10-18C1 (as shown in Figure 4) will also be included in the periodic review of the condition of the basin.

The City will evaluate the need for additional monitoring above its current groundwater elevation program. The need for standard and multi-level monitoring wells to monitor the three aquifers of the basin will be investigated. Characterization of the conditions of the basin using the City's existing groundwater elevation data from its production wells may not reflect steady state conditions because the wells pump frequently and groundwater within the well does not have enough time to fully recover to obtain a static elevation before the well is put into production once more. Static elevations may be recorded through the use of monitoring wells where no pumping is performed and the well is constantly in a static condition.

In addition to monitoring groundwater elevations within the basin, the City may perform a basin replenishment study that identifies potential recharge areas such as the aquifer outcrops in the Foothills and measures to protect these areas. A further discussion of potential groundwater recharge locations is provided in Section 7.2.

3.3 BMO No. 3: Protect and Enhance the Water Quality of the La Habra Basin

The intent of this BMO is to protect and enhance the groundwater quality of the La Habra Basin. This can be achieved through groundwater quality programs, understanding the quality of surface waters and subsurface water that naturally recharge the basin, and implementing measures to protect potential recharge areas.

The City may meet this objective by continuing and supplementing its existing water quality monitoring program. Currently, the City samples for constituents at its production wells pursuant to Title 22 of the California Code of Regulations (Title 22). Under Title 22, the City monitors and reports groundwater quality for constituents that are regulated by the State Water Resources Control Board Division of Drinking Water pertaining to maximum contaminant levels (MCLs). If the City were to choose to construct monitoring wells for groundwater elevations, these wells can also be sampled for water quality.

The La Habra Basin is recharged through surface runoff and streamflow recharge as well as mountain front recharge (Stetson, 2013). Understanding the quality of the surface and subsurface water that recharges the La Habra Basin is important in protecting and enhancing the water quality of the groundwater basin as the groundwater within the basin originates from these waters. Although the City currently does not have a surface water quality monitoring program for the Coyote Creek Watershed, the City will investigate any existing programs for the watershed including regulations set forth for the watershed by the local Regional Water Quality Control Board (Coyote Creek is shown on the Clean Water Act's 303(d) list of impaired waters). The City will consider developing and implementing its own surface and subsurface inflow quality monitoring programs for the local watershed in the future.

To protect the water quality of the Basin, the City will continue to monitor and review areas of contamination within the City, as described in its Drinking Water Source Assessments provided to the California Department of Public Health (CDPH) for its production wells. The City will continue to review and comment on documents regarding these areas within the City limits as well as be aware of any areas outside of its jurisdiction that may affect the water quality of the Basin through surface or subsurface flow.

In addition to monitoring groundwater quality within the basin, the City may perform a basin replenishment study that identifies potential recharge areas such as the aquifer outcrops in the Foothills and measures to protect these areas. A further discussion of potential groundwater recharge locations is provided in Section 7.2.

3.4 BMO No. 4: Improve the Understanding of the La Habra Basin's Hydrogeology, Groundwater Elevations, and Basin Yields

A solid understanding of groundwater elevations, seasonal fluctuations and response to pumping, existing basin yield, and how groundwater is stored and transmitted through the basin is critical for meeting the other three BMOs outline in this section. The City has performed an extensive well log search for wells constructed within the Basin in 2014. The City will to continue to monitor for new well construction as well as well destruction/abandonments within the basin.

The City can utilize and supplement its existing groundwater elevation monitoring program to review general trends in groundwater elevations in the Basin. Since 2008, the City measures non-pumping and pumping groundwater elevations at its production wells. In addition, DWR reports water level measurements for some monitoring wells in the La Habra Basin. Groundwater levels reported by DWR for wells 3/10-9G1, 3/10-8B2, and 3/10-18C1 (as shown in Figure 4) will also be included in the periodic review of the condition of the basin.

The City will evaluate the need for additional monitoring above its current groundwater elevation program. The need for standard and multi-level monitoring wells to monitor the three aquifers of the basin will be investigated. As discussed previously, characterization of the conditions of the basin using the City's existing groundwater elevation data from its production wells may not reflect steady state condition because the wells pump frequently and groundwater within the well does not have enough time to fully recover to obtain a static elevation before the well is put into production once more. Static elevations may be recorded through the use of monitoring wells where no pumping is performed and the well is constantly in a static condition. If the City constructs a monitoring or production well in the future, the City will perform aquifer tests to determine the hydrologic properties of each aquifer.

No known desktop flow model exists for the La Habra Basin. As such, the City will consider developing a desktop flow model for the Basin in the future once a sufficient amount of data are collected (as additional monitoring wells are constructed and monitored, for example). Groundwater models are used to represent natural flow conditions of an aquifer and can predict the effects of hydrological changes (such as pumping and replenishment) on the behavior of the aquifer.

If the City chooses to expand its groundwater monitoring program in the future, the City will prepare basin management reports on a periodic basis (every two to five years) using the results of the monitoring program. These informative reports will be used to review whether groundwater production is within the safe yield of the basin, plan future groundwater projects, develop new groundwater policies, and identify any new concerns within the basin.

4.0 STAKEHOLDER INVOLVEMENT

Multiple water agencies overlie the 40-acre La Habra Groundwater Basin (Figure 1). Potential agencies that may have a stake in the successful management of the basin include:

- **City of La Habra**: unadjudicated Orange County portion
- **City of Brea**: unadjudicated Orange County portion
- **Central Basin Watermaster (DWR)**: adjudicated Central Basin (Los Angeles)
- **OCWD**: actively managed Orange County portion
- **City of Fullerton**: included in OCWD's service area within the La Habra Basin

4.1 Interface with Other Agencies

As the City of Brea is a direct stakeholder in the Orange County portion of the La Habra Basin outside of OCWD's service area, Brea was included in the preparation of this plan. A finalized listing of stakeholders will be completed after consultation with other agencies.

While the Central Basin Watermaster, OCWD, and the City of Fullerton do not have direct stake within the Orange County portion of the La Habra Basin outside of OCWD's service area that is the focus of this Plan, the portions of the La Habra Basin underlying these entities are hydrologically connected to the portion of the basin that is the subject of this Plan. As such these entities were informed that the City was preparing this Plan and comments from these entities were accommodated in the preparation of this plan.

4.2 Interface with the General Public

The City will strive to involve the public in groundwater management decisions The Groundwater Management Plan was developed after approval of a resolution of intention to adopt a groundwater management plan and adoption of the Plan by the City Council following a public hearing. In the future, the City plans to provide copies of the periodic groundwater reports that will be prepared to the public at their request and publish information on groundwater management accomplishments on the City's website.

4.3 Developing Relationships with Local, State, and Federal Regulatory Agencies

Working relationships between the City of La Habra and local, state, and federal regulatory agencies are critical in developing and implementing the various management strategies detailed in the BMOs described in Section 3.0. The City will work toward further establishing points of contact with the agencies responsible for resource management within the entire La Habra Basin and the Coyote Creek Watershed area. The City will continue to pursue grant and loan opportunities to help fund

improvements and programs to better manage its groundwater resources through programs offered by these agencies. These relationships also will help the City identify those who can inform the City of new commercial, agricultural, or development projects in watershed, enabling the City to review and comment on these projects.

5.0 GROUNDWATER MONITORING PROGRAM

This section describes the monitoring of groundwater elevations, groundwater quality, surface water, and land surface subsidence. Monitoring of the groundwater basin is crucial for future groundwater management decisions and the City's groundwater monitoring program is intended to assist in: future water resources decision making, developing long-term trends in groundwater characteristics, and providing warning sign of potential problems within the basin.

5.1 Groundwater Elevation Monitoring

5.1.1 Existing Activities

Since 2008, the City has measured non-pumping and pumping groundwater elevations at its production wells to review general trends in groundwater elevations in the Basin.

5.1.2 Future Activities

The City will supplement its existing groundwater elevation monitoring program by including water level measurements reported by DWR for three monitoring wells in the La Habra Basin. Groundwater elevations are reported by DWR for wells 3/10-9G1, 3/10-8B2, and 3/10-18C1 (as shown in Figure 4).

The City will also evaluate the need for standard and multi-level monitoring wells to monitor the three aquifers of the basin. A characterization of the steady-state conditions cannot be determined using the City's existing groundwater elevation data from its production wells since the wells pump frequently and groundwater within the well does not have enough time to fully recover to obtain a static elevation before the well is put into production once more. Static elevations may be recorded through the use of monitoring wells where no pumping is performed and the well is constantly in a static condition. With the installation of new monitoring wells equipped with dataloggers, the City can develop long-term trends in groundwater elevations of the basin.

5.2 Groundwater Quality Monitoring

5.2.1 Existing Activities

Currently, the City samples its production wells for Title 22 constituents. The City also monitors areas of contamination within the City, as described in its Drinking Water Source Assessments provided to CDPH for its production wells. The City plans to continue to review and comment on documents regarding these areas within the City limits as well as be aware of any areas outside of its jurisdiction that may affect the water quality of the Basin through surface or subsurface flow.

5.2.2 Future Activities

The City plans to continue its existing groundwater water quality monitoring program and will evaluate the need for additional monitoring above its current program in the future.

5.3 Surface Water Quality Monitoring

5.3.1 Existing activities

Currently the City does not perform any surface water quality monitoring.

5.3.2 Future Activities

Although the City currently does not have a surface water quality monitoring program for the Coyote Creek Watershed, the City will investigate any existing programs for the watershed including regulations set forth for the watershed by the local Regional Water Quality Control Board (Coyote Creek is shown on the Clean Water Act's 303(d) list of impaired waters). The City will consider developing and implementing its own surface and subsurface inflow quality monitoring programs for the local watershed in the future.

5.4 Land Surface Subsidence Monitoring

Based on Orange County Water District's 2009 Update to its Groundwater Management Plan, there is no evidence that the observed minimal land surface changes in portions of Orange County has caused, or are likely to cause, any structural damage within the area (OCWD, 2009). As long as groundwater elevations and storage within the basin are maintained within their historical operating ranges, the potential for problematic land subsidence is reduced. There are no plans to develop a formal program to monitor and measure the rate of land surface subsidence by the City. The need for land surface subsidence monitoring will be considered on an annual basis.

5.5 Groundwater Monitoring Protocols

Monitoring protocols are necessary to ensure consistency and accuracy in monitoring efforts and are required for monitoring assessments to be valid. Consistency should be reflected in factors such as the locations of the sampling points, frequency and seasonality of measurements, sampling procedures, and testing procedures. Accordingly, the City will undertake uniform data gathering procedures to ensure comparable measurements of groundwater are taken.

5.5.1 Groundwater Elevation Protocols

The following protocols will be followed for future groundwater elevation measurements:

- Document the time, date, location, and name of the technician for each measurement.

- Document the reference point, measuring device, and calibration date for the measuring device for each measurement.

- Annual measurements should be performed at the same time each year.

- When taking measurements for multiple wells, measurements should be taken in as short a period as possible.

- Measure the groundwater elevation twice, or more if necessary, until consistent results are obtained.

- If groundwater contamination is suspected, decontaminate the measuring equipment. In general, measurements should be performed from the least contaminated to most contaminated wells.

5.5.2 Groundwater Quality Protocols

The following protocols will be followed for future groundwater quality sampling:

- Annual sampling should be performed at the same time each year.

- Sampling should be performed during periods of both low and high groundwater production from the basin.

- Pump the well for an adequate period of time prior to sampling and document the stabilized parameters.

- Use proper containers, preservatives, and holding times.

- Use proper handling procedures (gloves, ice coolers, etc.).

- Document the time, date, location, and name of the technician on each sample container.

- Document any field notes regarding the condition of the well, sample, etc. if necessary.

- Use secure chain-of-custody procedures.

- Use the same laboratory for all testing, when possible. Select a laboratory that is accredited and state-certified that use proper quality control and quality assurance procedures.

- Include spiked, duplicates, and field-blank samples for comparison to genuine samples.

6.0 GROUNDWATER RESOURCES PROTECTION

Groundwater resources protection is considered a critical component for safeguarding the long-term sustainability of the La Habra Basin. Groundwater resources protection includes well construction, abandonment, and destruction policies, wellhead protection, and the control of the migration and remediation of contaminated, poor quality, or saline water.

6.1 Well Construction, Abandonment, and Destruction Policies

The policies that govern well construction, abandonment, and destruction are designed specifically to protect groundwater quality. The administration of these policies has been delegated to individual counties by California legislature. As stated in Orange County Ordnance No. 2607, all well activity within Orange County will comply with the standards set in DWR Bulletin 74, Chapter 2. These standards are enforced by the Orange County Health Care Agency. The City will properly construct and abandon its wells pursuant to Orange County Ordnance No. 2607.

6.2 Wellhead Protection Measures

Wellhead protection is a way to prevent drinking water from being contaminated by managing sources of potential contamination within the vicinity of a production well. Surface contaminants can enter a well through the outside edge of the well casing or directly through opening in the well head. These contaminants can travel in two directions: to the groundwater aquifer or to the distribution system. As defined in the Safe Drinking Water Act Amendments of 1986, a wellhead protection area is "*the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field*."

The City will design and construct wells in accordance with the measures described in DWR Bulletin 74 so that the wellhead is protected from contamination. Important wellhead protection measures described in Bulletin 74 include: methods for sealing the well from intrusion from surface contaminants, site grading to assure drainage is away from the wellhead, and set-back requirements from known pollution sources.

6.3 Control of Saline Water Intrusion

Raised salinity is a significant water quality problem in many parts of the southwestern United States and southern California, including Orange County. Elevated salinity is of concern as it can limit the implementation of recycling water projects and potentially require water purveyors to perform additional treatment on their water supplies.

The level of salinity is sometimes measured based on TDS concentrations. TDS concentrations were measured recently by the City in the Idaho Street Well (December 2011) and the La Bonita Well

(October 2012). The TDS concentrations in the Idaho Street Well and the La Bonita Well were 790 mg/L and 920 mg/L, respectively (La Habra, 2013a). The TDS concentrations are naturally occurring and it is not believed that current activities in the basin significantly contribute to the TDS loading in the basin. The TDS concentrations are not a result of saline water intrusion. The TDS concentrations in the City's wells are below the secondary Maximum Contaminant Level (MCL) of 1,000 mg/L (La Habra, 2013b). TDS is listed as a secondary constituent as it does not directly cause harm to consumers but can affect the aesthetic quality of the water, including taste.

The City will monitor salinity through its water quality monitoring program. If saline intrusion becomes a concern in the future, the City will develop an approach to address the problem.

6.4 Control of the Migration and Remediation of Contaminated Groundwater

Groundwater can become contaminated naturally or through human activity. Based on a 2010 drinking water assessment performed by the City, sources of potential groundwater contamination to the La Habra Basin include: car repair and bodywork shops, gas stations, machine and metalwork shops, and sewer collection systems (La Habra, 2013b).

The City has previously taken the position that oil and gas mining operations in or up gradient of the basin have the potential to release chemicals that could contamination groundwater, particularly during fracking activities.

The City will monitor the migration of contaminants through its water quality monitoring program and will also monitor nearby oil and gas mining operations. This will allow the City to identify point and non-point pollution sources. If contamination becomes a concern in the future, the City will develop an approach to address the problem.

7.0 GROUNDWATER SUSTAINABILITY

As the City currently depends on local groundwater to meet approximately 40% of its water consumption, preserving the sustainability of the La Habra Basin is essential for the well-being of the City. Described below are ways the City can maintain the sustainability of the local groundwater basin.

7.1 Overdraft Triggers and Mitigation

Based on a review of groundwater elevations performed in January 2014, groundwater elevations in the San Pedro aquifer of the La Habra Basin appear to have risen about 100 feet from the 1940s to the present with an overall rising trend of 50 to 60 feet between 1970 and 2007 (Stetson, 2014). Therefore, it appears that the basin is not currently in an overdraft condition.

Through its existing groundwater elevation monitoring program and the proposed periodic reporting of the condition of the La Habra Basin, the City will monitor groundwater elevation trends of the basin. If elevations appear to be trending downward, the City will then review its operations and determine what changes would be necessary to stop the declination of groundwater elevations within the basin. One potential method to mitigate overdraft, if it should occur, is groundwater recharge, which is discussed in the following section.

7.2 Groundwater Recharge, Storage, and Extraction Projects

The City currently does not operate any groundwater recharge or storage projects. In the future, the City may perform a basin replenishment study that identifies potential recharge areas and measures to protect these areas. Two areas where a groundwater recharge project could be studied for implementation are shown in Figure 5. The San Pedro Formation is naturally recharged directly through aquifer outcrops (exposed formation sediments) in the Los Coyote Hills (south of the intersection of Beach Boulevard and Imperial Highway) and in the Puente Hills (along the foothills north of Whittier Boulevard) [Montgomery, 1977]. The San Pedro Formation could also be indirectly recharged through the uplifted and exposed San Pedro beds that lie just below a thin layer of alluvium along the Coyote Creek valley (Montgomery, 1977).

As discussed in Section 2.2, the City of La Habra is located in the Coyote Creek Watershed. The Coyote Creek Watershed is included in the Municipal Separate Storm Sewer System (MS4) Permit for the Orange County Santa Ana Region. The City is implementing new water quality control programs to meet the requirements of the MS4 permit for discharges from storm drains. The programs include Low Impact Development measures to address water quality on residential and commercial properties, new inspection activities, and potential retention and recharge of stormwater runoff. Recharge activities associated with MS4 compliance are anticipated to occur outside of the City of La Habra.

Potential Conjunctive Use Projects

The City currently does not operate any conjunctive use projects. The City may study the feasibility of conjunctive use projects in the future.

7.3 Water Conservation and Education

The City strong promotes conservation as a means to preserve water supplies. The City has a section on its website dedicated to water conservation in addition to including conservation guidance as part of its annual Consumer Confidence Report distributed to residents. As agricultural irrigation no longer exists with the La Habra Basin, commonly suggested conservation measures and incentives for growers are not applicable within this basin.

8.0 STUDY IMPLEMENTATION

This section includes a discussion of the approach, reporting, and funding information to support the implementation of this Plan.

8.1 Prioritized List of Proposed Actions and Implementation Schedule

Provided in Table 8-1 is a summary of the proposed actions, or strategies, that the City will consider in order to meet its BMOs for the La Habra Basin as discussed in Section 3.0.

Table 8-1. Proposed Actions to Meet BMOs

Proposed Actions	To Meet BMO No.
Implement additional water conservation measures identified in the 2010 UWMP	1
Comply with provisions of DWR's 20x2020 Program (including SBX 7x7)	1
Continue to investigate potential recycled water use opportunities	1
Supplement existing groundwater elevation monitoring program with existing and/or new monitoring wells	2, 4
Investigate the need to construct City-managed monitoring wells	2, 4
Perform a groundwater basin replenishment study	2, 3
Investigate the need for additional groundwater quality monitoring	3
Perform investigation of the quality of surface and subsurface flows into the basin	3
Determine whether a City-managed surface water quality program is needed	3
Create a groundwater desktop flow model	4
Prepare periodic groundwater basin management reports	4

The City of La Habra will evaluate any proposed actions for the La Habra Basin pursuant to the Groundwater Management Plan in cooperation with the City of Brea, including: (1) coordination; (2) development; and (3) implementation.

8.2 Periodic Reporting

The City plans on preparing a summary report of the current conditions of the La Habra Basin ideally every two to five years using the results from the monitoring program (see Section 5.0). These

informative reports will be used to plan future groundwater projects, develop new groundwater policies, and identify any new concerns with the basin.

8.3 Periodic Review and Update of the Groundwater Study

A Groundwater Advisory Committee that will be established by the City will be responsible for monitoring the progress in implementing the BMOs of this groundwater study. The Committee will meet once every five years to evaluate and discuss the current conditions of the La Habra Basin and the effectiveness of this groundwater study. This study will be amended to reflect any new policies or practices relevant to the management of the basin. It will also be updated to reflect changes in groundwater conditions as necessary.

8.4 Funding Sources

The following funding sources are available to the City to finance groundwater projects. These sources are briefly described below.

Grants and Loans from State and Federal Agencies: The City has the option to pursue funding opportunities from DWR and other governmental agencies.

Local Groundwater Assistance Program: Under AB 303 (the Local Groundwater Assistance Program), grants are awarded to public agencies with up to $250,000 to conduct groundwater studies or carry out groundwater monitoring and management programs.

Capital Improvement Fees: The City has the authority to collect repayment charges from beneficial parties of capital improvement projects such as a groundwater recharge or banking project.

Water User Fees and Assessments: The City has the authority to fund groundwater projects through water use fees and assessments collected regularly from City residents and businesses.

9.0 REFERENCES

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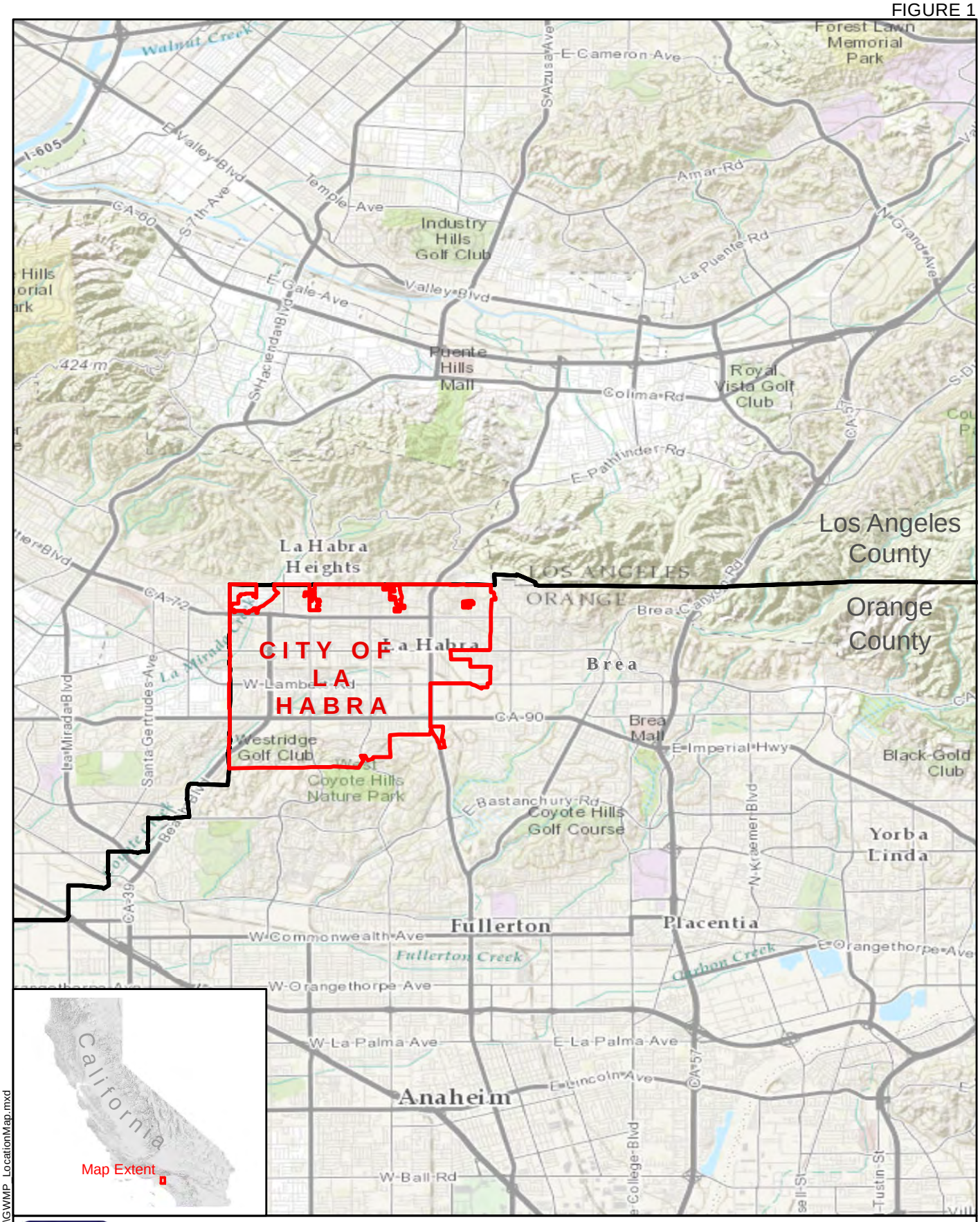
FIGURE 1



City Boundary

Source:
U.S. Census Bureau
ESRI Topographic Basemap

STETSON ENGINEERS INC.

LOCATION MAP
CITY OF LA HABRA

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N

0 1 2 Miles

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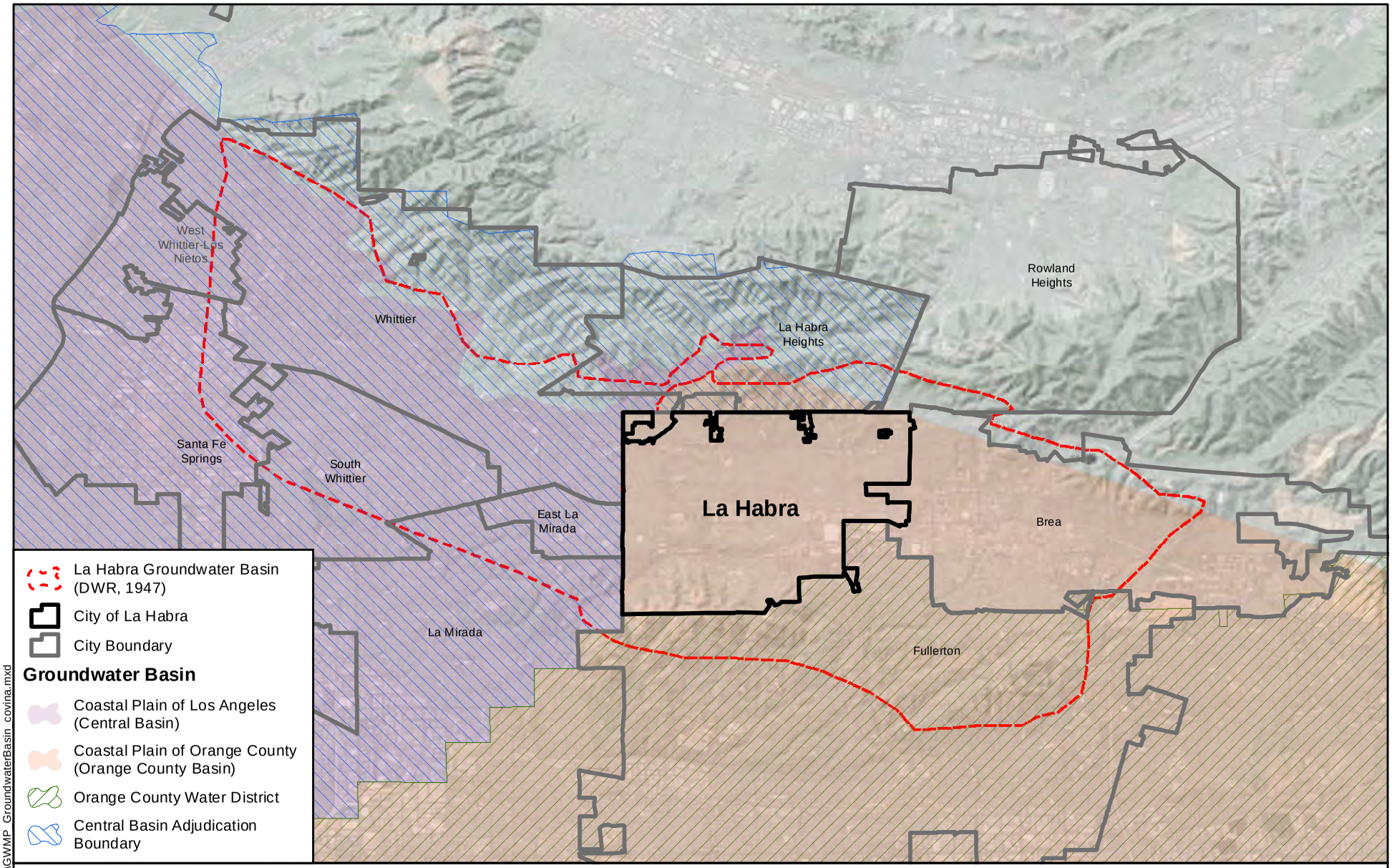

STETSON ENGINEERS INC.

Sources:
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DWR. 2003. California's Groundwater 2003 Update
ESRI 2010 Aerial Basemap

LA HABRA GROUNDWATER BASIN (DWR, 1947)

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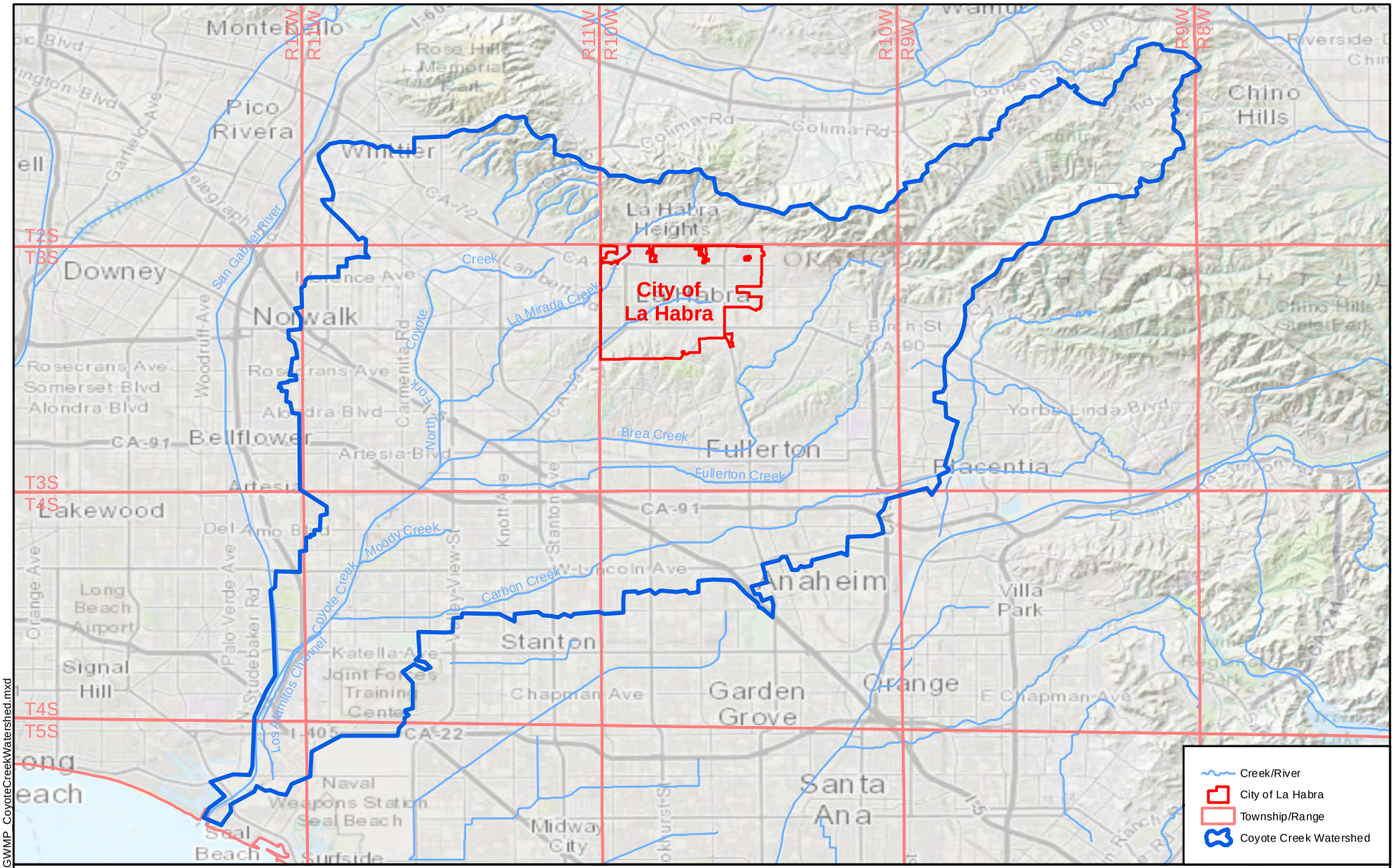
N

0 1 2 Miles

FIGURE 2

Document Path: J:\lin2452\GWMP_GroundwaterBasin_covina.mxd



Document Path: J:\lin2452\GWMP_CoyoteCreekWatershed.mxd

STETSON ENGINEERS INC.

Source:
ESRI Topo Basemap
2007 Coyote Creek Watershed Management Plan, Fig. 1-1 (OCDPW)
National Hydrolodic Database (NHD)

COYOTE CREEK WATERSHED

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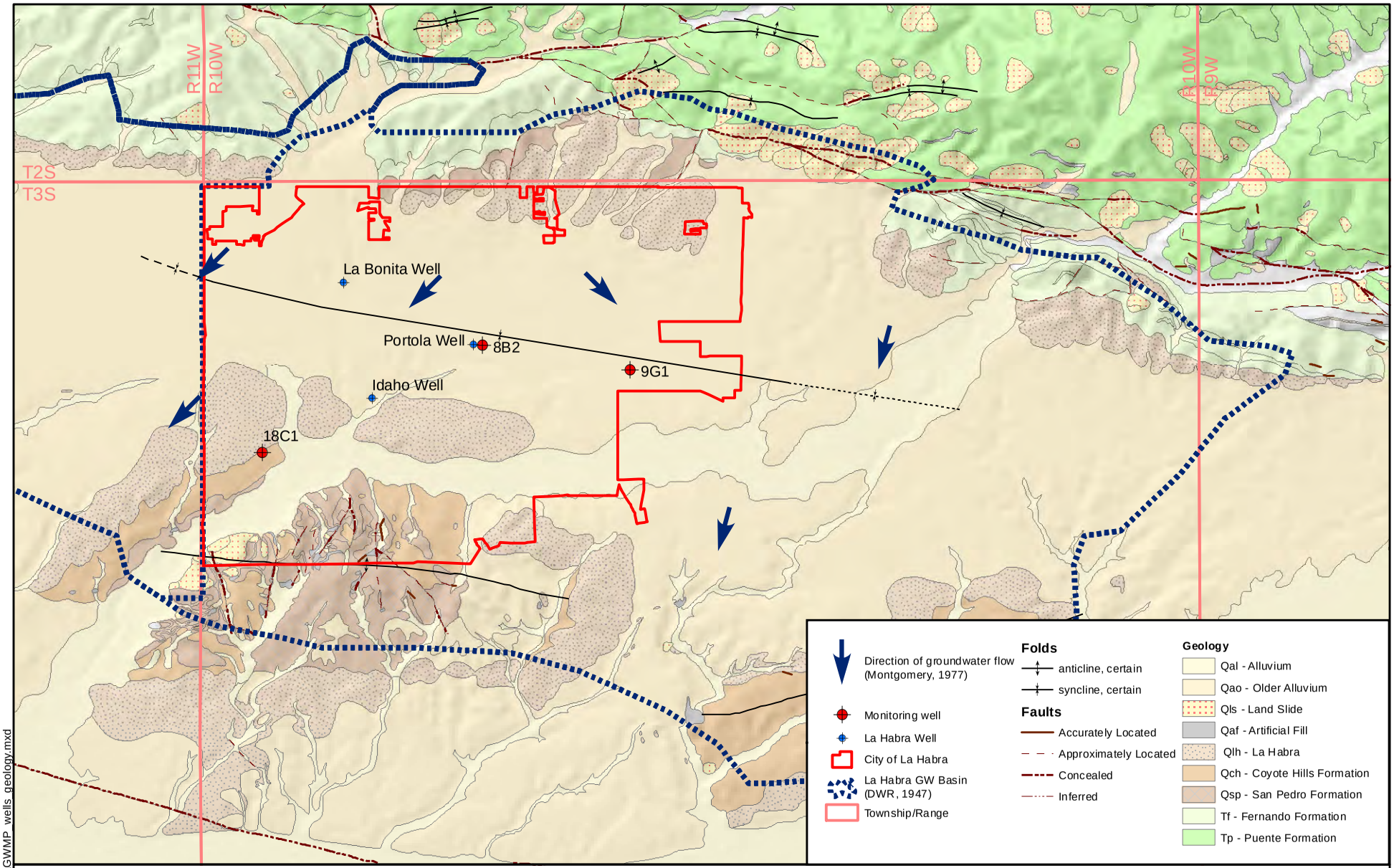
0 1 2 Miles

FIGURE 3



LA HABRA BASIN GEOLOGY AND GROUNDWATER LEVEL MONITORING WELLS

DRAFT

N

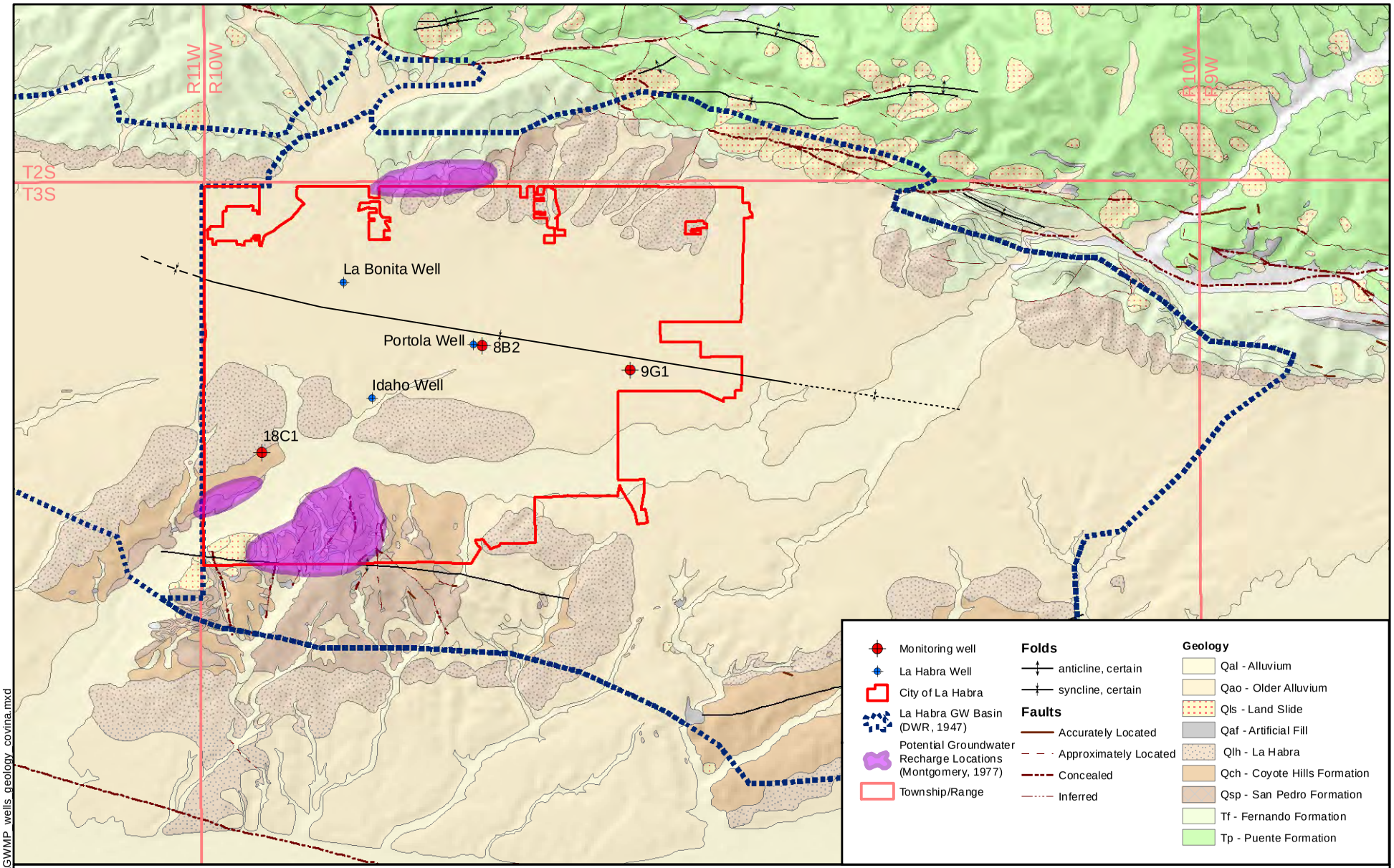
0 0.5 1 Miles

STETSON ENGINEERS INC.

Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California
Compiled by Douglas M. Morton and Fred K. Miller
Digital preparation by Pamela M. Cossette and Kelly R. Bovard, 2006

Document Path: J:\in2452\GWMP_wells_geology.mxd

FIGURE 4



POTENTIAL GROUNDWATER RECHARGE LOCATIONS

DRAFT

N

0 0.5 1 Miles

STETSON ENGINEERS INC.

Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California
Compiled by Douglas M. Morton and Fred K. Miller
Digital preparation by Pamela M. Cossette and Kelly R. Bovard, 2006

Document Path: J:\in2452\GWMP_wells_geology_covina.mxd

FIGURE 5

APPENDIX D

City Ordinance

La Habra Municipal Code

Title 13 PUBLIC SERVICES

Chapter 13.40 WATER CONSERVATION AND WATER SUPPLY SHORTAGE PROGRAM

13.40.010 Title.

This chapter will be known as the Water Conservation and Water Supply Shortage Program. (Ord. 1703 § 2, 2009)

13.40.020 Findings.

A. A reliable minimum supply of potable water is essential to the public health, safety and welfare of the people and economy of the southern California region.

B. Southern California is a semi-arid region and is largely dependent upon imported water supplies. A growing population, climate, environmental concerns, and other factors in other parts of the state and western United States, make the re-

gion highly susceptible to water supply reliability issues.

C. Careful water management that includes active water conservation measures not only in times of drought, but at all times, is essential to ensure a reliable minimum supply of water to meet current and future water supply needs.

D. Article XI, Section 7 of the California Constitution declares that a city or county may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws.

E. Article X, Section 2 of the California Constitution declares that the general welfare requires that water resources be put to beneficial use, waste or unreasonable use or unreasonable method of use of water be prevented, and conservation of water be fully exercised with a view to the reasonable and beneficial use thereof.

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

G. The adoption and enforcement of a water conservation and supply shortage program is necessary to manage the city's potable water supply in the short and long-term and to avoid or minimize the effects of drought and shortage within the city. Such program is essential to ensure a reliable and sustainable minimum supply of water for the public health, safety and welfare. (Ord. 1703 § 3, 2009)

13.40.030—13.40.050

13.40.030 Declaration of purpose and intent.

A. The purpose of this chapter is to establish a water conservation and supply shortage program that will reduce 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 to avoid and minimize the effect and hardship of water shortage to the greatest extent possible.

B. This chapter establishes permanent water conservation standards intended to alter behavior related to water use efficiency for nonshortage conditions and further establishes four stages of water supply shortage response actions to be implemented during times of declared water shortage or declared water shortage emergency, with increasing restrictions on water use in response to worsening drought or emergency conditions and decreasing supplies. (Ord. 1703 § 4, 2009)

13.40.040 Definitions.

The following words and phrases whenever used in this chapter have the meaning defined in this section:

"Billing unit" means the unit of water used to apply water rates for purposes of calculating water charges for a person's water usage and equals seven hundred forty-eight gallons of water.

"City" means the city of La Habra.

"Landscape irrigation system" means an irrigation system with pipes, hoses, spray heads, or sprinkling devices that are operated by hand or through an automated system.

"Large landscape areas" means a lawn, landscape, or other vegetated area, or combination thereof, equal to more than one acre of irrigable land.

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

"Potable water" means water which is suitable for drinking.

"Recycled water" means the reclamation and reuse of nonpotable water for beneficial use.

"Single pass cooling systems" means equipment where water is circulated only once to cool equipment before being disposed. (Ord. 1703 § 5, 2009)

13.40.050 Application.

A. The provisions of this chapter apply to any person in the use of any potable water provided by the city.

B. The provisions of this chapter do not apply to uses of water necessary to protect public health and safety or for essential government ser

vices, such as police, fire and other similar emergency services.

C. The provisions of this chapter do not apply to the use of recycled water, with the exception of Section 13.40.070(A).

D. The provisions of this chapter do not apply to the use of water by commercial nurseries and commercial growers to sustain plants, trees, shrubs, crops or other vegetation intended for commercial sale.

E. This chapter is intended solely to further the conservation of water. It is not intended to implement any provision of federal, state, or local statutes, ordinances, or regulations relating to protection of water quality or control of drainage or runoff. Refer to the local jurisdiction or Regional Water Quality Control Board for information on any stormwater ordinances and stormwater management plans. (Ord. 1703 § 6, 2009)

13.40.060 Permanent water conservation requirements—Prohibition against waste.

The following water conservation requirements are effective at all times 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 ten a.m. and four p.m. Pacific Standard Time on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

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 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 gallons of water per hour and weather based controllers or stream rotor sprinklers that meet a seventy percent efficiency standard.

C. No Excessive Water Flow or Runoff. Watering or irrigating of any lawn, landscape or other vegetated area in a manner that causes or allows excessive 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 or a low-volume, high-pressure cleaning machine equipped to recycle any water used.

E. Obligation to Fix Leaks, Breaks or Malfunctions. Excessive use, loss or escape of water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected and in no event more than five days of receiving notice from the city, is prohibited.

F. Recirculating Water Required for Water Fountains and Decorative Water Features. Operating a water fountain or other decorative water feature that does not use recirculated water is prohibited unless a waiver has been obtained.

G. Limits on Washing Vehicles. Using water to wash or clean a vehicle, including, but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not is prohibited, except by use of a hand-held bucket or similar container or a hand-held hose equipped with a positive self-closing water shut-off nozzle or device. This subsection does not apply to any commercial car washing facility.

H. Drinking Water Served Upon Request Only. Eating or drinking establishments, including, but not limited to, a restaurant, hotel, cafe, cafeteria, bar, club or other public place where food or drinks are sold, served, or offered for sale, are prohibited from providing drinking water to any person unless expressly requested.

I. Commercial Lodging Establishments Must Provide Option to Not Launder Linen Daily. Hotels, motels and other commercial lodging establishments must provide customers the option of not having towels and linen laundered daily. Commercial lodging establishments must prominently display notice of this option in each bathroom using clear and easily understood language.

J. No Installation of Single Pass Cooling Systems. Installation of single pass cooling systems is prohibited in buildings requesting new water service.

K. Recirculating Water Systems Required in Commercial Car Wash and Laundry Systems. Installation of nonrecirculating water systems is prohibited in new commercial conveyor car wash and new commercial laundry systems.

L. Restaurants Required to Use Water Conserving Dish Wash Spray Valves. Food preparation establishments, such as restaurants or cafés, are prohibited from using nonwater conserving dish wash spray valves. (Ord. 1703 § 7, 2009)

13.40.070—13.40.080

13.40.070 Stage 1 water supply shortage.

A. A Stage 1 water supply shortage condition exists when the city notifies its water users that due to drought or other supply reductions, a consumer demand reduction of up to ten percent is necessary to make more efficient use of water and respond to existing water conditions. Upon the declaration of a Stage 1 water supply shortage condition, the city shall implement the mandatory Stage 1 conservation measures identified in this chapter. The type of event that may prompt the city to declare a Stage 1 water supply shortage may include, among other factors, a finding that its wholesale water provider calls for extraordinary water conservation.

B. Additional Water Conservation Measures. In addition to the prohibited uses of water identified in Section 13.40.060, the following water conservation requirements apply during a declared Stage 1 water supply shortage:

1. Limits on Watering Days. Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to three days per week on a schedule established and posted by the city. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than one day per week on a schedule established and posted by the city. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

2. Obligation to Fix Leaks, Breaks or Malfunctions. All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within seventy-two hours of notification by the city unless other arrangements are made with the city.

3. Other Prohibited Uses. The city may implement other prohibited water uses as determined by the city, after notice to customers as set forth in Section 13.40.110. (Ord. 1703 § 8, 2009)

13.40.080 Stage 2 water supply shortage.

A. A Stage 2 water supply shortage condition exists when the city notifies its water users that due to drought or other supply reductions, a consumer demand reduction of up to twenty percent is necessary to make more efficient use of water and respond to existing water conditions. Upon declaration of a Stage 2 water supply shortage condition, the city shall implement the mandatory Stage 2 conservation measures identified in this chapter.

B. Additional Conservation Measures. In addition to the prohibited uses of water identified in Sections 13.40.060 and 13.40.070, the following additional water conservation requirements apply during a declared Stage 2 water supply shortage:

1. Water Allocations. The city will establish a water allocation for property served by the city using a method that does not penalize persons for the implementation of conservation methods or the installation of water saving devices. The city must provide notice of the allocation by including it in the regular billing statement for the fee or charge or by any other mailing to the address to which the city customarily mails the billing statement for fees or charges for on-going water service. A water allocation will be effective on the fifth day following the date of mailing or at such later date as specified in the notice.

Following the effective date of the water allocation as established by the city, any person that uses water in excess of the allocation will be subject to a penalty in the amount of five dollars for each billing unit of water in excess of the allocation. The penalty for excess water usage will be cumulative to any other remedy or penalty that may be imposed for violation of this chapter.

2. Watering Days. Watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to two days per week on a schedule established and posted by the city. During the months of November through March, watering or irrigating of lawn, landscape or other vegetated area with potable water is limited to no more than one day per week on a schedule established and posted by the city. This provision does not apply to landscape irrigation zones that exclusively use very low flow drip type irrigation systems when no emitter produces more than two gallons of water per hour. This provision also does not apply to watering or irrigating by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

3. Obligation to Fix Leaks, Breaks or Malfunctions. All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within forty-eight hours of notification by the city unless other arrangements are made with the city.

4. Limits on Filling Ornamental Lakes or Ponds. Filling or refilling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a supply shortage stage under this chapter.

5. Limits on Washing Vehicles. Using water to wash or clean a vehicle, including but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not, is prohibited except by use of a hand-held bucket or similar container, a hand-held hose equipped with a positive self-closing water shut-off nozzle or device, by high pressure/low volume wash systems, or at a commercial car washing facility that utilizes a recirculating water system to capture or reuse water.

6. Limits on Filling Residential Swimming Pools and Spas. Refilling of more than one foot and initial filling of residential swimming pools or outdoor spas with potable water is prohibited.

7. Other Prohibited Uses. The city may implement other prohibitions on water uses as determined by the city, after notice to customers as set forth in Section 13.40.110. (Ord. 1703 § 9, 2009)

13.40.090 Stage 3 water supply shortage.

A. A Stage 3 water supply shortage emergency exists when the city declares a water shortage emergency condition pursuant to California Water Code Section 350 and notifies its residents and businesses that up to thirty percent consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation and fire protection. The city must declare a water supply shortage emergency in the manner and on the grounds provided in California Water Code Section 350.

B. Additional Conservation Measures. In addition to the prohibited uses of water identified in Sections 13.40.060 through 13.40.080, the following water conservation requirements apply during a declared Stage 3 water supply shortage emergency:

1. No Watering or Irrigating. Watering or irrigating of lawn, landscape or other vegetated area with potable water is prohibited, except as approved by the city.

2. Obligation to Fix Leaks, Breaks or Malfunctions. All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system must be repaired promptly upon discovery by the owner or within twenty-four hours of notification by the city unless other arrangements are made with the city.

3. No New Potable Water Service. Upon declaration of a Stage 3 water supply shortage emergency condition, no new potable water service will be provided, no new temporary meters or permanent meters will be provided, and no statements of immediate ability to serve or provide potable water service (such as, will serve letters, certificates, or letters of availability) will be issued, except under the following circumstances:

a. A valid, unexpired building permit has been issued for the project; or

b. The project is necessary to protect public health, safety, and welfare; or

c. The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the city.

This provision does not preclude the resetting or turn-on of meters to provide continuation of water service or the restoration of service that has been interrupted for a period of one year or less.

4. Discontinue Service. The city, in its sole discretion, may discontinue service to consumers who willfully violate provisions of this section.

5. Other Prohibited Uses. The city may implement other prohibited water uses as determined by the city, after notice to customers as set forth in Section 13.40.110. (Ord. 1703 § 10, 2009)

13.40.100 Stage 4 water supply shortage—Emergency condition.

A. A Stage 4 water supply shortage emergency exists when the city declares a water shortage emergency condition pursuant to California Water Code Section 350 and notifies its residents and businesses that up to forty percent or more consumer demand reduction is required to ensure sufficient supplies for human consumption, sanitation and fire protection. The city must declare a water supply shortage emergency in the manner and on the grounds provided in California Water Code Section 350.

B. Additional Conservation Measures. In addition to the prohibited uses of water identified in Sections 13.40.060 through 13.40.090, the following water conservation requirements apply during a declared Stage 4 water supply shortage emergency:

1. The city may reduce water allocations in all categories to meet the available water supply;

2. The city may shut off all nonessential water uses;

3. Other Prohibited Uses. The city may implement other prohibited water uses as determined by the city, after notice to customers as set forth in Section 13.40.110. (Ord. 1703 § 11, 2009)

13.40.110 Procedures for determination/notification of water supply shortage.

A. Declaration and Notification of Stage 1 and 2 Water Supply Shortage. The existence of Stage 1 and Stage 2 water supply shortage conditions may be declared by resolution of the city adopted at a regular or special public meeting held in accordance with state law. The mandatory conservation requirements applicable to Stage 1 or Stage 2 conditions will take effect on the tenth day after the date the shortage stage is declared. Within five days following the declaration of the shortage stage, the city must publish a copy of the resolution in a newspaper used for publication of official notices. If the city establishes a water allocation, it must provide notice of the allocation by including it in the regular billing statement or by any other mailing to the address to which the city customarily mails the billing statement for fees or charges for on-going water service. A water allocation will be effective on the fifth day following the date of mailing or at such later date as specified in the notice.

B. Declaration and Notification of Stage 3 Water Supply Shortage. The existence of a Stage 3 water supply shortage emergency condition may be declared in accordance with the procedures specified in Water Code Sections 351 and 352. The mandatory conservation requirements applicable to the Stage 3 conditions will take effect on the tenth day after the date the shortage stage is declared. Within five days following the declaration of the shortage stage, the city must publish a copy of the resolution in a newspaper used for the publication of official notices. If the city establishes a water allocation, it will provide notice of the allocation by including it in the regular billing statement or by any other mailing to the address to which the city customarily mails the billing statement for fees or charges for on-going water service. A water allocation will be effective on the fifth day following the date of mailing or at such later date as specified in the notice.

C. Declaration and Notification of Stage 4 Water Supply Shortage. The existence of a Stage 4 water supply shortage emergency condition may be declared in accordance with the procedures specified in Water Code Sections 351 and 352. The mandatory conservation requirements applicable to the Stage 4 conditions will take effect on the tenth day after the date the shortage stage is declared. Within five days following the declaration of the shortage stage, the city must publish a copy of the resolution in a newspaper used for the publication of official notices. If the city establishes a water allocation, it will provide notice of the allocation by including it in the regular billing statement or by any other mailing to the address to which the city customarily mails the billing statement for fees or charges for on-going water service. A water allocation will be effective on the fifth day following the date of mailing or at such later date as specified in the notice. (Ord. 1703 § 12, 2009)

13.40.120 Other provisions.

A. Limits on Building Permits. The city may limit or withhold the issuance of building permits which require new or expanded water service, except to protect the public health, safety and welfare, or in cases which meet the city's adopted conservation offset requirements.

B. Customer Water Conservation Reports. The city may, by written request, require all commercial, residential and industrial customers using twenty-five thousand or more billing units per year to submit a water conservation plan and to submit quarterly progress reports on such plan. The conservation plan must include recommendations for increased water savings, separation of uses including increased water recycling based on feasibility, and the reports must include progress to date on implementation of such recommendations.

C. Reporting Mechanism—Hotline. The city may establish a water waste hotline for residents to report violations of this chapter. (Ord. 1703 § 13, 2009)

13.40.130 Hardship waiver.

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

B. Written Finding. The waiver may be granted or conditionally granted only upon a written finding of the existence of facts demonstrating an undue hardship to a person using water or to property upon which water is used, that is disproportionate to the impacts to water users generally or to similar property or classes of water use due to specific and unique circumstances of the user or the user's property.

1. Application. Application for a waiver must be on a form prescribed by the city and accompanied by a non-refundable processing fee in an amount set by city council resolution.

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

3. Required Findings for Waiver. An application for a waiver will be denied unless the city manager finds, based on the information provided in the application supporting documents, or such additional information as may be requested by the city, and on water use information for the

property as shown by the records of the city or its agent, all of the following:

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

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

c. That the grant of such waiver will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the city to effectuate the purpose of this chapter and will not be detrimental to the public interest; and

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

4. Approval Authority. The city manager or designee must act upon any completed application no later than ten days after submittal and may approve, conditionally approve, or deny the waiver. The applicant requesting the waiver must be promptly notified in writing of any action taken. Unless specified otherwise at the time a waiver is approved, the waiver will apply to the subject property during the period of the mandatory water supply shortage condition. The decision of the city manager will be final. (Ord. 1703 § 14, 2009)

13.40.140 Penalties and violations.

A. Misdemeanor. Any violation of this chapter may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty days, or by a fine not exceeding one thousand dollars, or by both.

B. Civil Penalties. Civil penalties for failure to comply with any provisions of this chapter are as follows:

1. First Violation. The city will issue a written warning and deliver a copy of this chapter by mail.

2. Second Violation. A second violation within the preceding twelve calendar months is punishable by a fine not to exceed one hundred dollars.

3. Third Violation. A third violation within the preceding twelve calendar months is punishable by a fine not to exceed two hundred and fifty dollars.

4. Fourth and Subsequent Violations. A fourth and any subsequent violation is punishable by a fine not to exceed five hundred dollars.

a. Water Flow Restrictor Device. In addition to any fines, the city may require the installation of a water flow restrictor device of approximately one gallon per minute.

b. Termination of Service. In addition to any fines, the city may disconnect and/or terminate a customer’s water service.

C. Cost of Installing Flow Restrictor or Disconnecting Service. A person or entity that violates this chapter is responsible for payment of the city’s charges for disconnecting and/or reconnecting service per the city’s schedule of charges then in effect. Nonpayment will be subject to the same remedies as nonpayment of basic water rates.

D. Separate Offenses. Each day that a violation of this chapter occurs is a separate offense.

E. Notice and Hearing.

1. The city will issue notice of violations pursuant to Chapter 1.20. A customer may appeal the notice of violation by complying with the requirements set forth in Chapter 1.20.

2. Pending receipt of a written appeal or pending a hearing pursuant to an appeal, the city may take appropriate steps to prevent the unauthorized use of water as appropriate to the nature and extent of the violations and the current declared water stage condition. (Ord. 1703 § 15, 2009)

APPENDIX E

Notification of Public and Service Area Suppliers

City of La Habra

"A Caring Community"

PUBLIC WORKS

621 W. Lambert Road
Post Office Box 337
La Habra, CA 90633-0337
Office: (562) 383-4170
Fax: (562) 383-4497

March 2, 2016

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

Attention: Tom Daly, Clerk Recorder and Alisa Drakodaidis, Deputy CEO, OC Infrastructure

Re: The City of La Habra 2015 Urban Water Management Plan Update

Dear Mr. Daly,

The City of La Habra (the 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.

A draft of La Habra's 2015 UWMP will be available for review prior to the public hearing, which is tentatively scheduled for May 16, 2016. Please, contact us if you would like a copy of the draft.

If you would like more information or have any questions, please contact Brian Jones at 562-383-4170 or via email at bjones@lahabraca.gov.

Sincerely,

Brian Jones
Water and Sewer Manager
City of La Habra Utility Authority

AFFIDAVIT OF PUBLICATION

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

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

05/02, 05/09/2016

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

Executed at Santa Ana, Orange County, California, on

Date: May 09, 2016

Sandra Campos

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

PROOF OF PUBLICATION

LEGAL NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the City Council of the City of La Habra will hold a duly noticed public hearing on Monday, May 16, 2016, at 6:30 p.m. in the City Council Chambers, Administration Building, 201 E. La Habra Boulevard, La Habra, California to provide opportunity for public input on the draft update of La Habra's 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 customers is require to prepare an UWMP every five years.

All interested persons are invited to attend the above public hearing and be heard at the time and place specified above.

A copy of the draft UWMP is on file in the Office of the City Clerk, located at the above address for public review. Please call 562-383-4170 for information.

LA HABRA CITY COUNCIL
Tamara Mason, MMC, City Clerk

Publish: May 2 and 9, 2016
OC Register R- 10159448

APPENDIX F

Adopted UWMP Resolution

RESOLUTION NO. 5742

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LA HABRA ADOPTING, DIRECTING, FILING AND IMPLEMENTING THE 2015 URBAN WATER MANAGEMENT PLAN UPDATE

The City Council of the City of La Habra does hereby resolve as follows:
SECTION I:

WHEREAS, the California Legislature enacted Assembly Bill 797 during the 1983-84 Regular Session of the California Legislature (Water Code Section 10610) et Seq.), known as the Urban Water Management Planning Act (AB 797), which mandates that every urban supplier of water providing water for municipal purposes to more than 10,000 customers or more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan, the primary object of which is to plan for the conservation, drought, and efficient use of water; and

WHEREAS, AB 797 requires that said plan be adopted by August 31, 2016, after public review and hearing, and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS, the City of La Habra did prepare and file said plan with the California Department of Water Resources in August 2016, updated in 1990, 1995, 2000, 2005, 2011, and May 2016; and

WHEREAS, AB 797 requires that said plan be periodically reviewed at least once every five years, and that the urban water supplier shall make any amendments or changes to its plan which are indicated by the review; and

WHEREAS, the City of La Habra is an urban supplier of water in excess of 10,000 customers and/or supplies more than 3,000 acre-feet annually, and has therefore, prepared for public review, a Draft Urban Water Management Plan Update, in compliance with the requirements of AB 797, and properly noticed a public hearing regarding the Draft Plan Update that was held by the La Habra Utility Authority of the City of La Habra on May 2, 2016 and continued to May 16, 2016.

SECTION II:
NOW, THEREFORE, BE IT RESOLVED by the La Habra City Council as follows:

1. The 2015 Urban Water Management Plan Update is hereby adopted and ordered filed by the City Clerk; and

2. The Director of Public Works is hereby authorized and directed to file the 2015 Urban Water Management Plan Update with the California Department of Water Resources in accordance with AB 797.

PASSED, APPROVED AND ADOPTED THIS 16th day of May, 2016.

JAMES GOMEZ, MAYOR

ATTEST:

Tamara D. Mason, MMC, City Clerk

STATE OF CALIFORNIA)
COUNTY OF ORANGE) ss.
CITY OF LA HABRA)

I, Tamara D. Mason, City Clerk for the City of La Habra, do hereby certify that the above and foregoing is a true and correct copy of Resolution No. 5742 introduced and adopted at a regular meeting of the City Council of the City of La Habra held on the 16th day of May, 2016 by the following vote:

AYES:	COUNCILMEMBERS:	BEAMISH, SHAW, ESPINOZA, GOMEZ
NOES:	COUNCILMEMBERS:	NONE
ABSENT:	COUNCILMEMBERS:	BLAZEY
ABSTAIN:	COUNCILMEMBERS:	NONE

Witness my hand and the official seal of the City of La Habra this 16th day of May, 2016.

Tamara D. Mason

Tamara D Mason, MMC, 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).

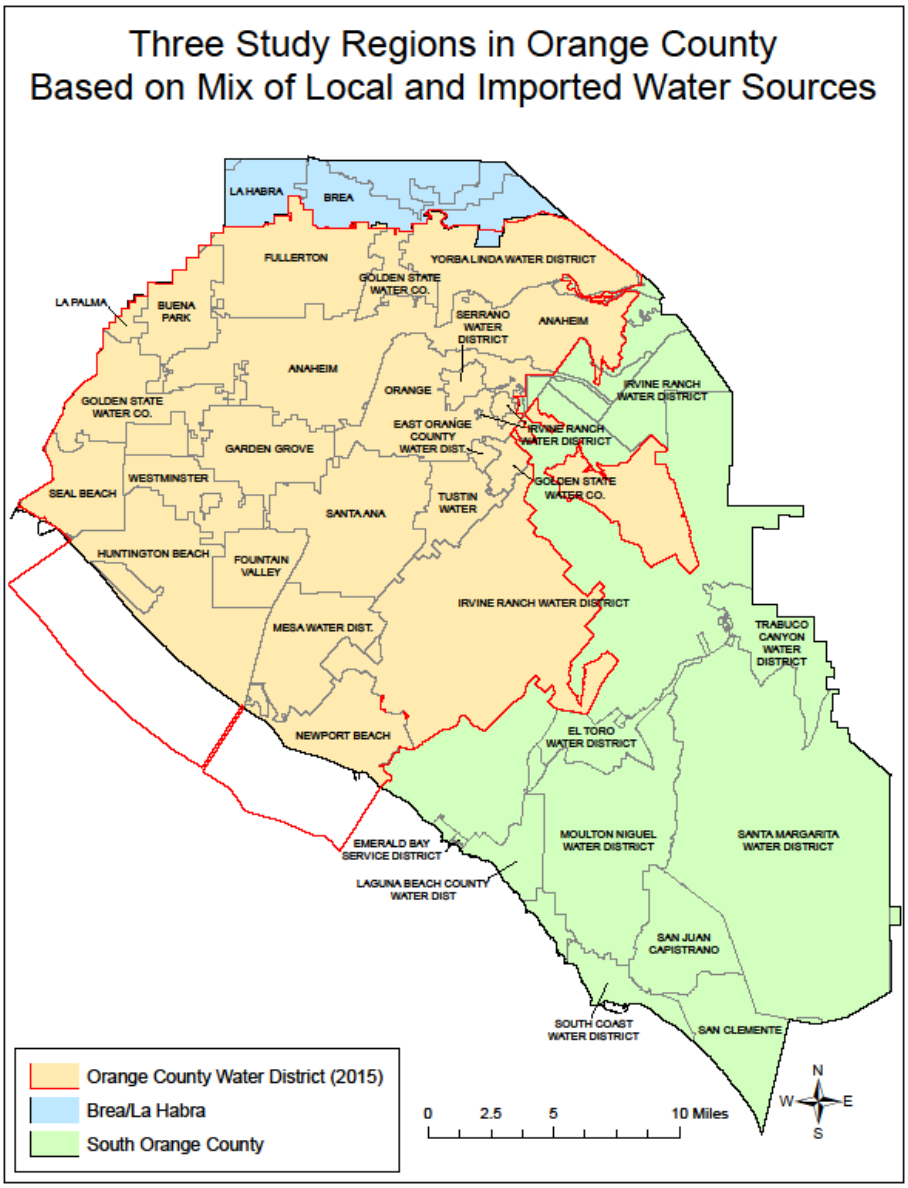


Figure 1. Geographic Areas for OC Study

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.

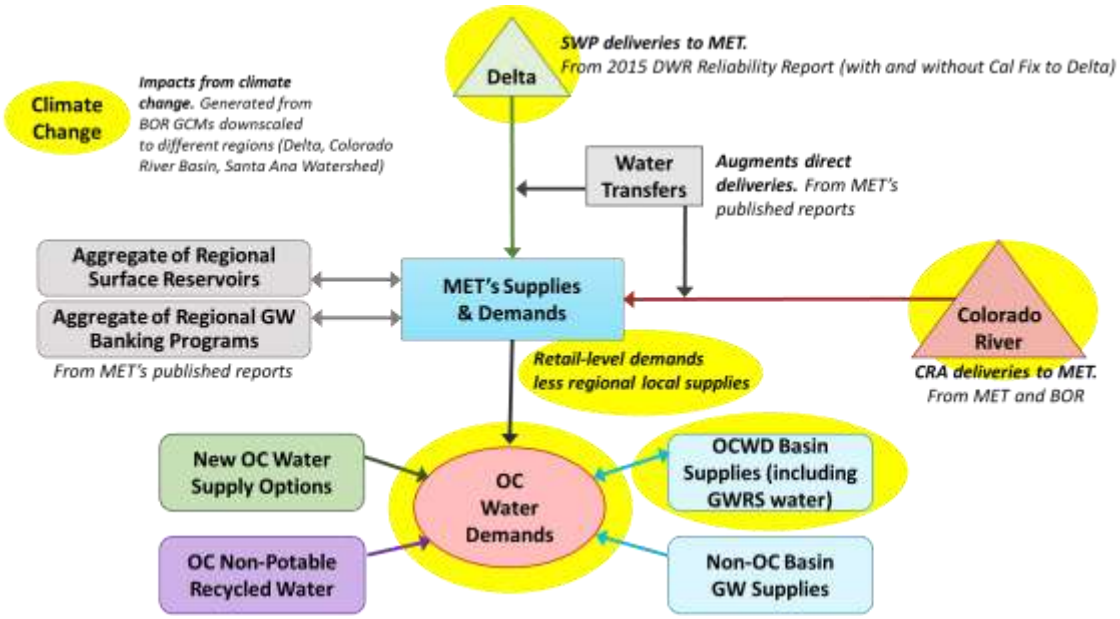


Figure 2. Overall Schematic for OC Model

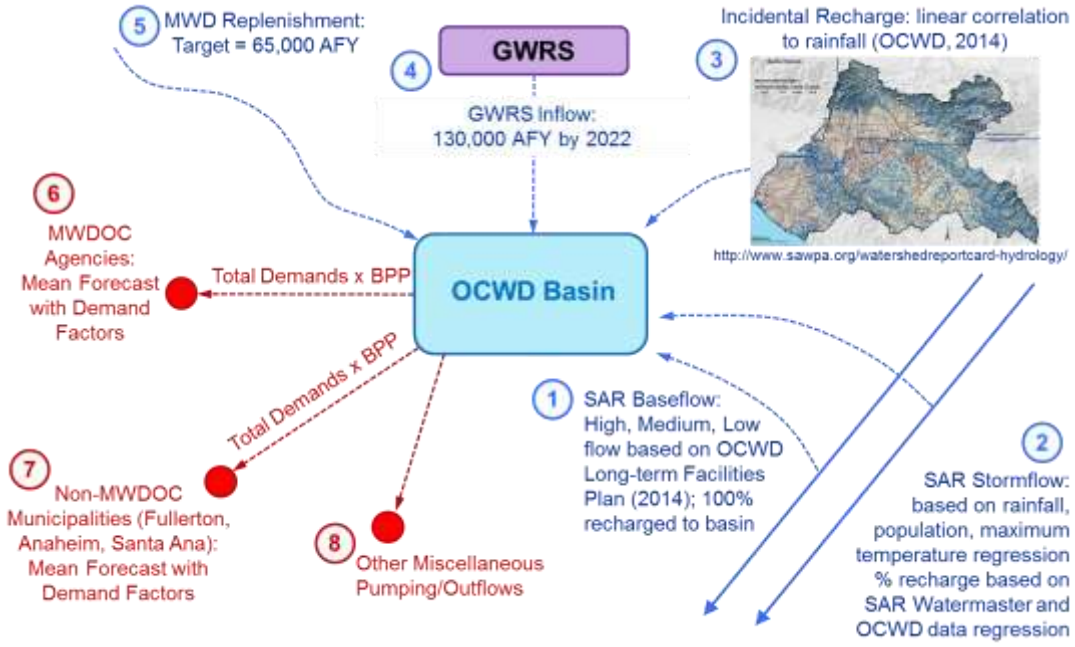


Figure 3. Inflows and Pumping Variables for OC Basin Component of OC Model

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

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

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

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

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

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

* Adjusted R^2 greater than 0.70 considered good overall correlation.
** Standard Errors less than 0.10 considered good overall predictive models.
*** Explanatory Variables are considered statistically significant (valid) at the 0.05 level or less.

Figure 4. Results of Statistical Regression of Monthly Water Production

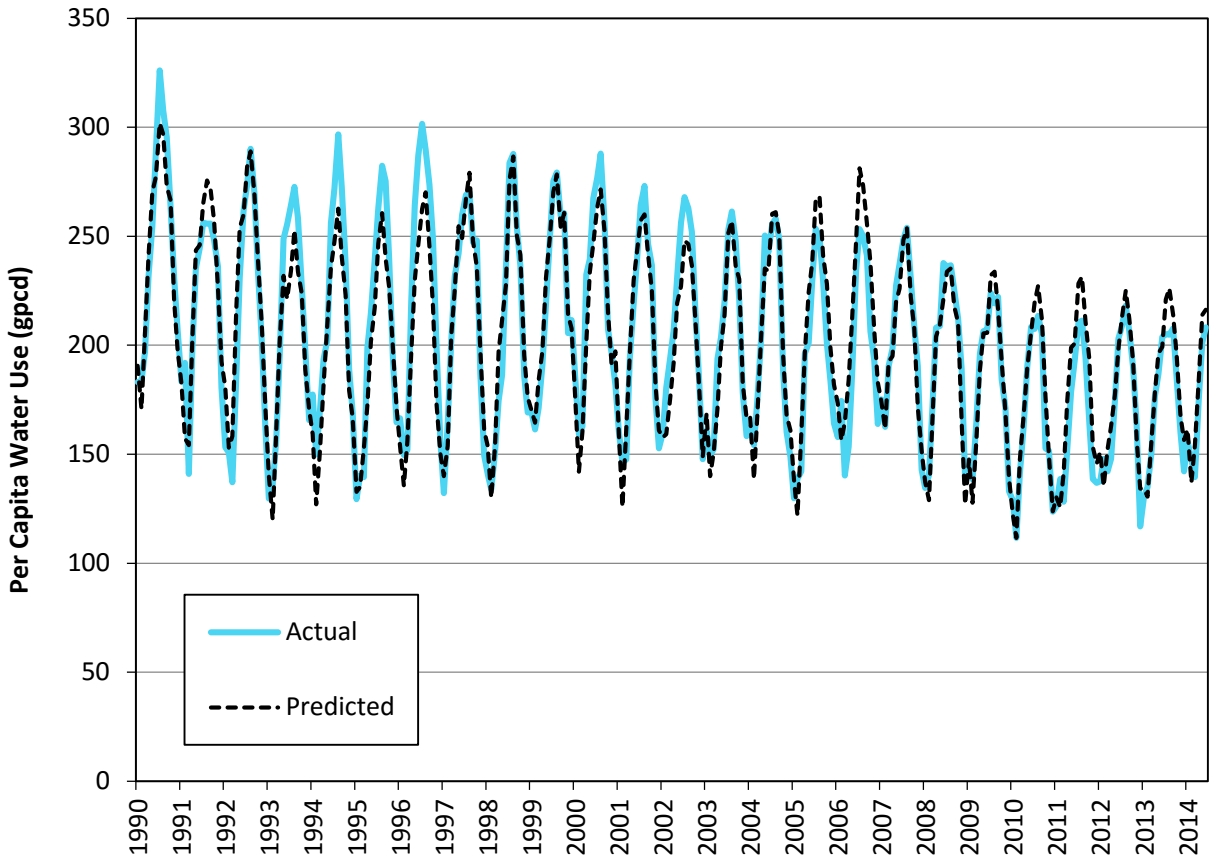


Figure 5. Verification of Statistical Water Use Model

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

*FY 2013-14 for Hot/Dry Weather, relative to average (1990-2014).
**FY 1997-98 for Cool/Wet Weather, relative to average (1990-2014).
*** Comparing unemployment for FY 2009-10 to average (1990-2014).

Figure 6. Impacts of Key Variables on Water Use

2.1 Base Demand Forecast (No Additional Conservation post 2014)

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

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

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

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

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

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

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

Table 3. Demographic Projections

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

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

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

Brea / La Habra

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

South County

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

OC Basin

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

Total Orange County

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

2.2 Future Passive and Baseline Active Water Conservation

2.2.1 Future Passive Water Conservation

The following future passive water conservation estimates were made:

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

High Efficiency Toilets

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

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

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

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

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

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

High Efficiency Clothes Washers

It was assumed that all new clothes washers sold after 2015 would be high efficiency and roughly save 0.033 afy per washer[1]. These savings would only apply to new homes (post 2015), and only for the single-family sector.

Model Water Efficient Landscape Ordinance (2015)

The new California Model Water Efficient Landscape Ordinance (MWELO) will take place in 2016. For single-family and multifamily homes it will require that 75 percent of the irrigable area be California Friendly landscaping with high efficiency irrigation systems, with an allowance that the remaining 25 percent can be turf (high water using landscape). For non-residential establishments it will require 100 percent of the irrigable area to be California Friendly landscaping with high efficiency irrigation systems (and no turf areas). There are exemptions for non-potable recycled water systems and for parks and open space. To calculate the savings from this ordinance a parcel database provided by MWDOC was analyzed. This database had the total irrigable area and turf area delineated for current parcels. For each parcel, a target water savings was set depending on the sector. For residential parcels, 25 percent of the total irrigable area was assumed to be turf and the savings from a non-compliant parcel was estimated. For each square feet of turf conversion the estimate savings is 0.00013 afy[1]. Table 6 summarizes the per parcel savings for the total county using this method.

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

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

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

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

2.2.2 Future Baseline Active Water Conservation

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

[1] Per MET's SoCal Water$mart conservation estimates, table provided by MWDOC (2015).

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

2.2.3 Total Future Water Conservation Savings

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

Table 7. Future Passive and Baseline Active Water Conservation Savings

Brea/La Habra Area

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	Toilets	Active	Total
2020	186	32	78	8	304	11	51	5	67	63	32	17	112
2025	169	33	131	15	348	13	85	10	108	79	52	34	166
2030	166	34	163	30	394	16	106	20	142	91	67	68	226
2035	156	34	186	61	437	21	127	40	188	101	77	136	314
2040	149	34	203	79	465	21	137	53	211	108	85	177	370

OC Basin

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	Toilets	Active	Total
2020	272	148	1,435	221	2,076	61	1,217	171	1,449	759	641	556	1,956
2025	430	260	2,610	441	3,742	96	2,165	342	2,603	1,199	1,083	1,112	3,394
2030	542	347	3,312	883	5,084	118	2,738	684	3,540	1,542	1,404	2,224	5,170
2035	557	379	3,806	1,766	6,509	139	3,182	1,369	4,690	1,801	1,635	4,447	7,883
2040	544	395	4,159	2,472	7,570	162	3,537	1,916	5,615	2,026	1,808	6,226	10,059

South County

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	Toilets	Active	Total
2020	558	251	507	116	1,432	11	335	160	506	582	119	329	1,029
2025	812	406	877	232	2,326	22	599	321	942	960	202	657	1,819
2030	972	514	1,148	463	3,097	25	761	642	1,428	1,133	257	1,314	2,704
2035	990	556	1,332	927	3,805	27	876	1,283	2,187	1,275	298	2,628	4,201
2040	967	580	1,480	1,112	4,139	29	969	1,540	2,537	1,376	327	3,154	4,857

Total County

	Single-Family Savings (AFY)					Multifamily Savings (AFY)				Non-Residential Savings (AFY)			
	MWELO	HEC Pass	Toilets	Active	Total	MWELO	Toilets	Active	Total	MWELO	Toilets	Active	Total
2020	1,017	431	2,020	344	3,812	83	1,602	337	2,022	1,404	792	901	3,097
2025	1,411	698	3,618	688	6,416	132	2,848	673	3,653	2,238	1,337	1,803	5,378
2030	1,680	895	4,624	1,377	8,575	159	3,606	1,346	5,111	2,766	1,728	3,606	8,100
2035	1,704	969	5,325	2,754	10,752	188	4,185	2,692	7,065	3,177	2,010	7,212	12,399
2040	1,660	1,009	5,842	3,663	12,175	212	4,643	3,509	8,363	3,510	2,219	9,557	15,286

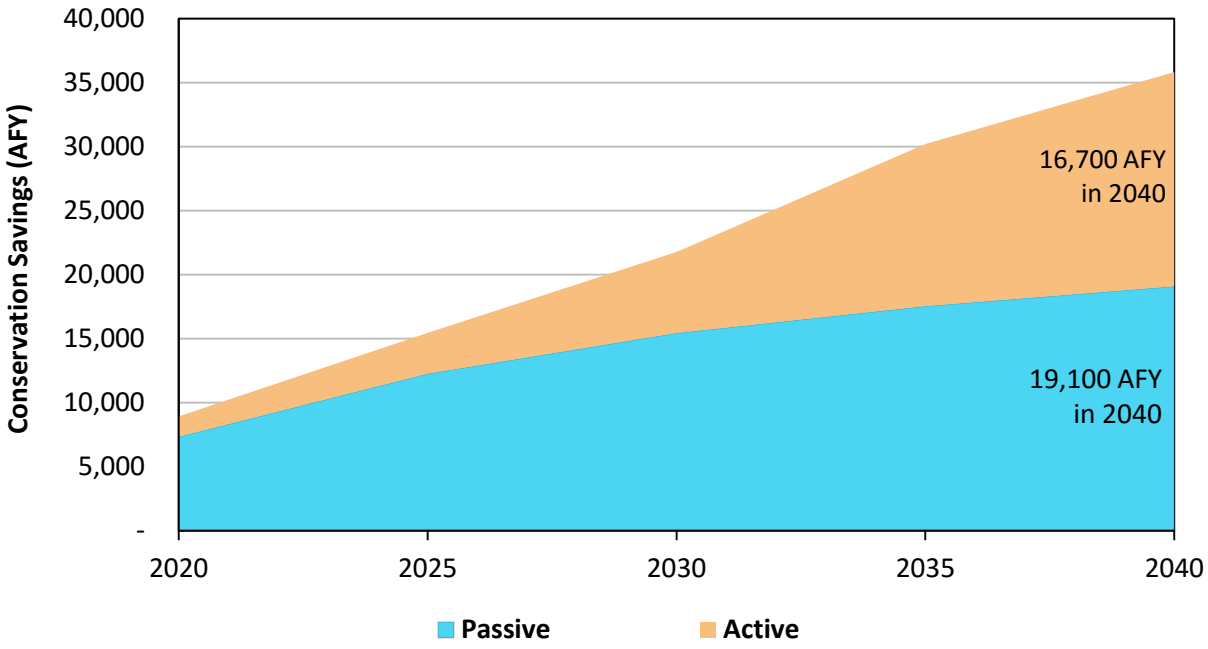


Figure 7. Total Water Conservation in Orange County

1.3 With Conservation Demand Forecast

Subtracting the future water conservation savings shown in Table 7 from the base water demand forecast shown in Table 4 results in the water demand forecast with conservation that is used to model potential water supply gaps for the OC Study. Table 8 presents the demand forecast by area and total Orange County, while Figure 8 presents the historical and forecasted water demands for total Orange County.

Note: Price elasticity of water demand reflects the impact that changes in retail cost of water has on water use. Theory states that if price goes up, customers respond by reducing water use. A price elasticity value of -0.2 implies that if the real price of water increases by 10%, water use would decrease by 2%. Price elasticity is estimated by detailed econometric water demand models, where price can be isolated from all other explanatory variables. Many times price is correlated with other variables making it difficult to estimate a significant statistical value. In addition, there is a potential for double counting reduction in water demand if estimates of future conservation from active programs are included in a demand forecast because customers who respond to price take advantage of utility-provided incentives for conservation. MET's 2015 IRP considers the impact of price elasticity in their future water demand scenarios, but does not include future active conservation in its demand forecast. The OC Study included future estimates of water conservation from active conservation, and thus did not include a price elasticity variable in its statistical modeling of water demand. Including both price elasticity and active conservation would have resulted in "double counting" of the future water savings.

Table 7. Water Demand Forecast with Conservation

Brea / La Habra

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	8,094	2,925	6,368	1,043	18,429
2025	8,546	3,154	6,789	1,109	19,598
2030	8,519	3,200	6,796	1,111	19,626
2035	8,475	3,313	6,762	1,113	19,663
2040	8,454	3,302	6,745	1,110	19,611

OC Basin

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	148,902	89,733	136,077	26,230	400,941
2025	157,528	97,180	147,532	28,157	430,396
2030	157,284	98,240	149,476	28,350	433,350
2035	156,263	99,076	149,552	28,342	433,233
2040	155,399	100,275	149,797	28,383	433,854

South County

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	49,212	23,793	37,326	6,620	116,951
2025	53,186	26,250	40,624	7,204	127,263
2030	53,735	26,135	40,575	7,227	127,672
2035	53,545	25,697	39,769	7,141	126,151
2040	53,496	25,509	39,602	7,116	125,725

Total Orange County

	With Conservation Demand				
	SF AFY	MF AFY	CII AFY	Non Rev AFY	Total AFY
2020	206,207	116,451	179,770	33,893	536,321
2025	219,260	126,583	194,945	36,470	577,257
2030	219,537	127,575	196,848	36,688	580,647
2035	218,283	128,086	196,082	36,596	579,047
2040	217,349	129,087	196,144	36,610	579,189

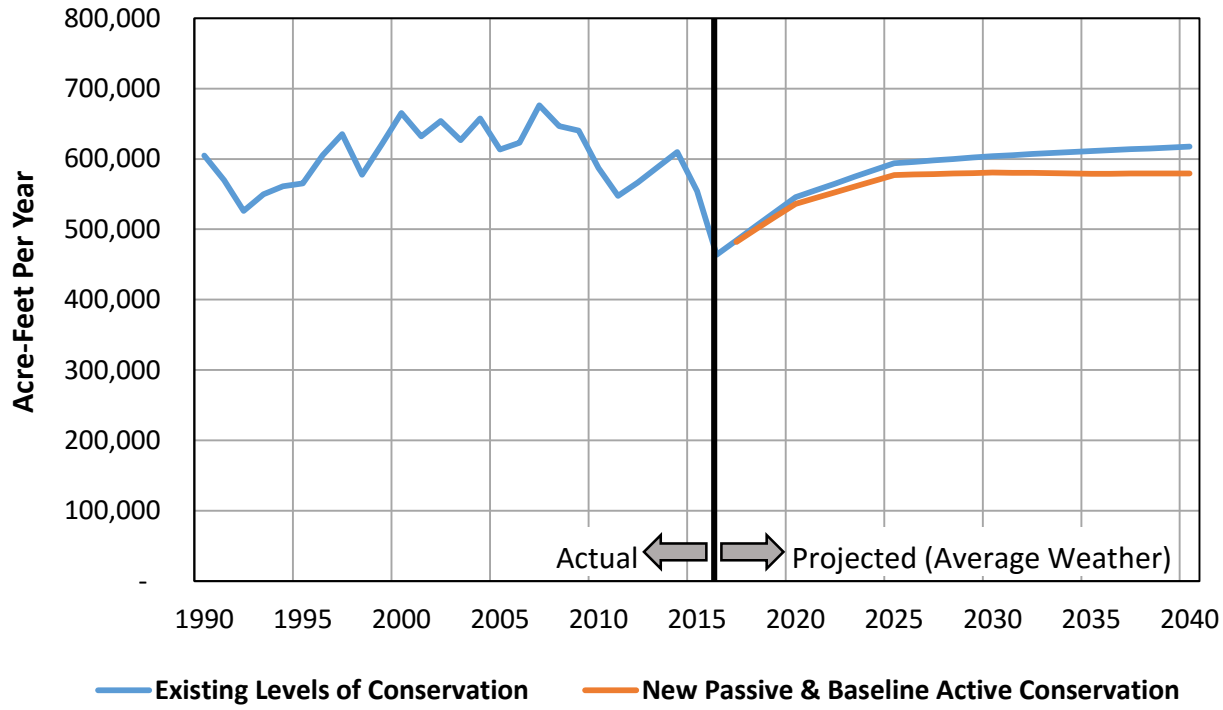


Figure 8. Water Demand Forecast for Total Orange County

3.0 Planning Scenarios

At the start of the Orange County Water Reliability Study, a workgroup was formed made up of representatives from Orange County water agencies. This OC Workgroup met 13 times during the

12-month Phase 1 of the study. During the first four meetings of the OC Workgroup, three basic planning scenarios emerged, each with and without a California WaterFix to the Delta—thus resulting in six scenarios in total. While there was discussion on assigning probabilities or weights to these planning scenarios, consensus was not reached on which scenario was more probable than the others. Assignment of the likelihood that one scenario is more probable than the others will be revisited in Phase 2 of the Orange County Reliability Study. There was, however, general agreement that all of the scenarios represent plausible future outcomes and thus all scenarios should be evaluated in terms of assessing potential water supply gaps (difference between forecasted water demands and existing water supplies). It is important to note that the purpose of estimating the water supply gaps for Orange County is to determine what additional MET and Orange County water supply investments are needed for future reliability planning. Thus, other than the California WaterFix to the Delta, all planning scenarios assume no new additional regional or Orange County water supply investments, with a couple of exceptions. In Orange County, it was assumed that existing and planned non-potable recycling projects would build additional supplies out into the future. It was also assumed that the OCWD GWRS Phase 3 expansion project would be implemented by 2022 to increase the recycled supplies for groundwater replenishment from 100,000 afy to 130,000 afy.

To develop the planning scenarios, the OC Workgroup considered the following parameters:

- California WaterFix to Sacramento-San Joaquin Delta (Cal Fix), which impacts the reliability of the State Water Project.
- Regional MET water demands and supplies, which impacts the availability of water from MET and supply reliability for Orange County.
- Orange County water demands, which impacts the supply reliability for Orange County.
- Santa Ana River baseflows, which impacts the replenishment of the OC Basin and the supply reliability for the water agencies within the OC Basin.
- Climate variability impacts on regional and local water demands and supplies, which impacts the availability of water from MET and the supply reliability for Orange County.

The definition of the six scenarios are:

- **Scenario 1a - Planned Conditions, No Cal Fix:** Essentially represents MET's IRP planning assumptions, with very little climate variability impacts (only impacting Delta supplies and not through 2040), no California Fix to the Delta, and no new regional or OC water supply investments.
- **Scenario 1b - Planned Conditions, with Cal Fix:** Same as Scenario 1a, but with new supply from the California Fix to the Delta beginning in 2030.

- **Scenario 2a - Moderately Stressed Conditions, No Cal Fix:** Moderate levels of climate variability impacts (affecting Delta, Colorado River, and Santa Ana watershed), slightly lower regional local supplies than MET assumes in IRP, 4% higher demand growth reflecting climate impacts and higher demographic growth, no California Fix to the Delta, and no new regional or OC water supply investments. The higher demand growth and fewer local supplies reflects potential future impacts if our existing demographics are low and if local supplies become more challenged, a continuation of the trend in recent times.

- **Scenario 2b - Moderately Stressed Conditions, with Cal Fix:** Same as 2a, but with new supply from California Fix to the Delta beginning in 2030.

- **Scenario 3a - Significantly Stressed Conditions, No Cal Fix:** Significant levels of climate variability impacts (affecting Delta, Colorado River, and Santa Ana watershed), 8% higher demand growth reflecting climate impacts and higher demographic growth, no California Fix to the Delta, and no new regional or OC water supply investments.

- **Scenario 3b - Significantly Stressed Conditions, with Cal Fix:** Same as 3a, but with new supply from California Fix to the Delta beginning in 2030.

All of these scenarios were deemed plausible and likely carry about the same likelihood of occurring. While no attempt was made to specifically assign the probability of any one of the six scenarios occurring over the others, some might postulate that Scenario 2 would be the most likely to occur given that most climate experts believe we are already seeing evidence of climate variability impacts today. But even with this postulation, assigning a probability to the success of the Cal Fix would be difficult at this time.

4.0 Water Supply Gap

To plan for future water supply reliability, a gap between forecasted water demands and existing supplies (plus planned projects that are a certainty) should be estimated. In past planning efforts, this gap is often done for average conditions or at best, using one reference drought condition. However, due to recent droughts and environmental restrictions in the Delta, a more sophisticated approach to estimating the potential water supply gap is needed. The OC Model, described in detail in TM #2: Development of OC Supply Simulation Model, uses "indexed-sequential" simulation to evaluate regional water demands and supplies, and Orange County water demands and supplies. All model demands and supply sources are referenced to the same hydrologic index—meaning that if a repeat of the year 1991 occurred, the OC Model would represent the availability of Delta water supplies in 1991 to MET, the availability of Colorado River water supplies in 1991 to MET, and the local Santa Ana watershed conditions in 1991. The OC Model also preserves the historical sequence of the hydrologic years. This is necessary because the source of availability of Delta and Colorado River water supplies are hydrologic models run by California Department of Water Resources (DWR) and the Bureau of Reclamation (BOR). These hydrologic models incorporate water rights (or contract rights) and storage conditions that are run using a specific sequence of hydrologic conditions. Both MET IRP and OC modeling of water supply maintain these sequences in order to

preserve the accuracy of the DWR and BOR model inputs. The hydrologic period used by the OC Model is 1922 to 2014 (which differs from MET's IRP which is 1922 to 2012). The forecast period is 2015 to 2040. Thus, in the OC Model there are 93 25-year sequences that are mapped to the forecast period. When the year 2014 is reached in any of the sequences, the next year wraps back around starting in 1922. Table 8 illustrates how the indexed-sequential method works.

Table 8. Illustration of Indexed-Sequential Supply Simulation

Forecast Year	Hydrologic Simulation Year – Sequence 1	Hydrologic Simulation Year – Sequence 2	. . .	Hydrologic Simulation Year – Sequence 93
2015	1922	1923		2014
2016	1923	1924		1922
⋮	⋮	⋮		⋮
2040	1947	1948		1946

Using the SWP system as an index, approximately 12 of the 93 historical hydrologic years (13 percent) are considered critically dry; 20 years (22 percent) are considered very wet; and the remaining 61 years (65 percent) are along the below-normal, normal, and above-normal spectrum.

4.1 Assumptions for Supply Gap Analysis

Figure 9 presents the overall assumptions for the water supply gap analysis. Figure 10 presents more specific assumptions regarding groundwater in the OC Basin. In addition to these assumptions, the following summarizes some of the differences between the MET IRP and the supply gap analysis for the OC Study:

- **Simulation Period:** MET IRP uses a historical hydrology from 1922 to 2012; while the OC Study uses a historical hydrology from 1922 to 2014—capturing the recent drought.
- **Cal Fix:** When the Cal Fix is included, MET IRP assumes that new supply from Cal Fix begins in 2020, based on the assumption that a "commitment" to move forward with the Cal Fix project will result in regulatory relief, beginning in 2020; while the OC Study assumes that supplies from Cal Fix begins when project is fully operational in 2030.
- **Water Conservation:** MET IRP only includes new passive conservation in their demand forecast (with new active conservation being reserved as a new supply option); while the OC Study assumes new passive and baseline new active conservation for water demands in Orange County (additional new active conservation will be evaluated in Phase 2 of the OC Study).

- **Climate Variability:** MET IRP only includes minimal impacts of climate variability for Delta water supplies through 2030; while the OC Study includes a range of climate scenario impacts on water supplies from Delta, Colorado River and Santa Ana Watershed through 2040.

Water Demands (AFY)	FY 2014 Actual	FY 2015 Actual	2025 Projected	2040 Projected
MET Demands*	2,300,000	1,850,000	1,920,000	2,028,000
OCWD Basin Demands**	453,000	410,000	425,000	434,000
OC Total Demands**	610,000	554,000	565,000	579,000

* With future passive conservation only ** With future passive and baseline new active conservation

OC Groundwater (AFY)	Brea/La Habra	Net OC Basin	South County	Total
Groundwater Supply	15,000*	188,500**	10,000	213,500

* Based on firm yield from La Habra Basin and groundwater purchases from Main San Gabriel Basin.
** Includes GWRS, SAR baseflows, SAR stormflows, incidental recharge, MET replenishment, and miscellaneous pumping.

OC Non-Potable Recycled Water (AFY)	2015	2040
OC Basin Recycled Water	22,000	27,700
South County Recycled Water	23,900	41,800
Total	45,900	69,500

Note: Irvine Ranch Water District (IRWD) is split between the Basin and South County

Figure 9. Overall Assumptions for Water Supply Gap Analysis

OC Basin Groundwater (AFY)	Near-Term	Long-Term	Range Within Model
Groundwater Replenishment System (GWRS)	100,000	130,000	100,000 to 130,000
SAR Baseflow (mid level assumption)	53,000	53,000	34,000 to 53,000
SAR Stormflow (average of all hydrologies)	53,000	53,000	6,000 to 150,000
SAR Incidental Recharge (average of all hydrologies)	59,000	59,000	20,000 to 140,000
MET Replenishment (average of all hydrologies)*	54,000	34,000	0 to 65,000
BEA Outflows	-22,000	-9,000	-22,000 to -9,000
Misc. Pumping (golf courses, etc.)	-8,500	-8,500	-8,500
Net Groundwater for OC Basin Agencies	**288,500**	**311,500**	**168,000 to 455,000**

* While OCWD replenishment target is 65,000 AFY, replenishment water is not assumed to be taken during very wet years when SAR stormflows are high, and only a portion of replenishment water is available during years in which MET is in allocation of imported water.

Figure 10. Assumptions for Groundwater in OC Basin

4.2 Availability of Water from MET

Key to the assessment of water reliability for Orange County is estimating the availability of imported water from MET under a wide range of scenarios. Availability of MET water to Orange County is a function of the water demands on MET and the reliability of imported water from the Colorado River and Delta to MET, supplemented by withdrawals from various MET storage accounts.

4.2.1 Demands on MET

MET water demands represent that difference between regional retail water demands (inclusive of groundwater replenishment) and regional local supplies (which includes groundwater, Los Angeles Aqueducts, surface reservoirs, groundwater recovery, recycled water, and seawater desalination). Table 9 presents the MET demand forecast under normal/average weather conditions.

A significant challenge for MET in terms of reliability planning is it represents the "swing" water supply for the region. This compounds the variability on demands on MET due to weather and hydrology. For retail water demands, variations in weather can cause water use to change ± 5 to 9 percent in any given year due to varying demands for irrigation and cooling. In addition to retail water demand variability, local supplies can vary ± 80 percent for the Los Angeles Aqueducts and ± 55 percent for surface reservoirs. Thus, the variability for demands on MET in any given year can be ± 15 to 25 percent. This fact alone makes storage so key in assuring supply reliability for MET and the region.

Table 9. Demands on MET

Total Demand (AFY)	2020	2030	2040
Retail M&I	3,707,546	3,865,200	3,954,814
Retail Agricultural	169,822	163,121	159,537
Seawater Barrier	66,500	66,500	66,500
Replenishment	292,777	272,829	272,847
Total Demand	**4,236,645**	**4,367,650**	**4,453,698**

Local Supplies (AFY)			
Groundwater Production	1,308,101	1,321,220	1,322,197
Surface Production	113,705	113,705	113,705
Los Angeles Aqueduct	261,100	264,296	267,637
Seawater Desalination	50,637	50,637	50,637
Groundwater Recovery	142,286	158,816	162,688
Recycled Water	425,131	468,862	495,698
Other Non-Metropolitan Imports	13,100	13,100	13,100
Total Local Supplies	**2,314,061**	**2,390,637**	**2,425,663**

Demand On MET (AFY)			
Consumptive Use	1,743,866	1,826,245	1,880,131
Seawater Barrier	11,635	8,708	5,877
Replenishment	167,083	142,060	142,027
Total Net Demand on Metropolitan	**1,922,584**	**1,977,013**	**2,028,035**

4.2.2 Supplies from Colorado River and Delta

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

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

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

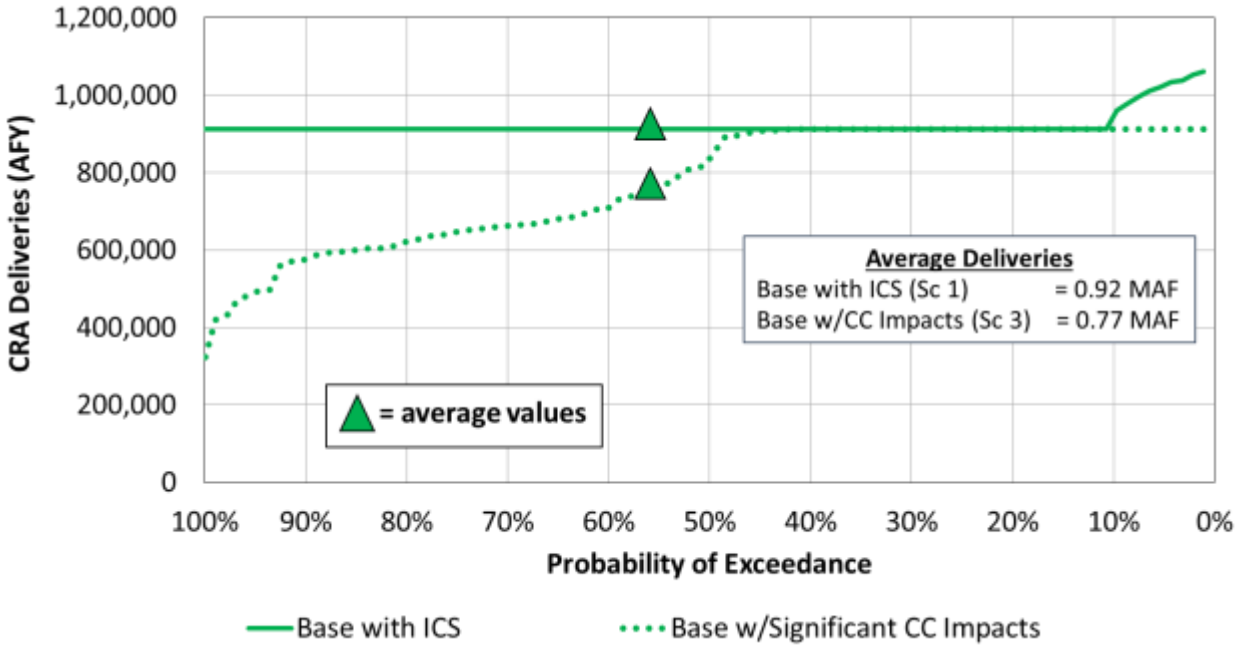


Figure 11. Colorado River Aqueduct Deliveries to MET

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

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

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

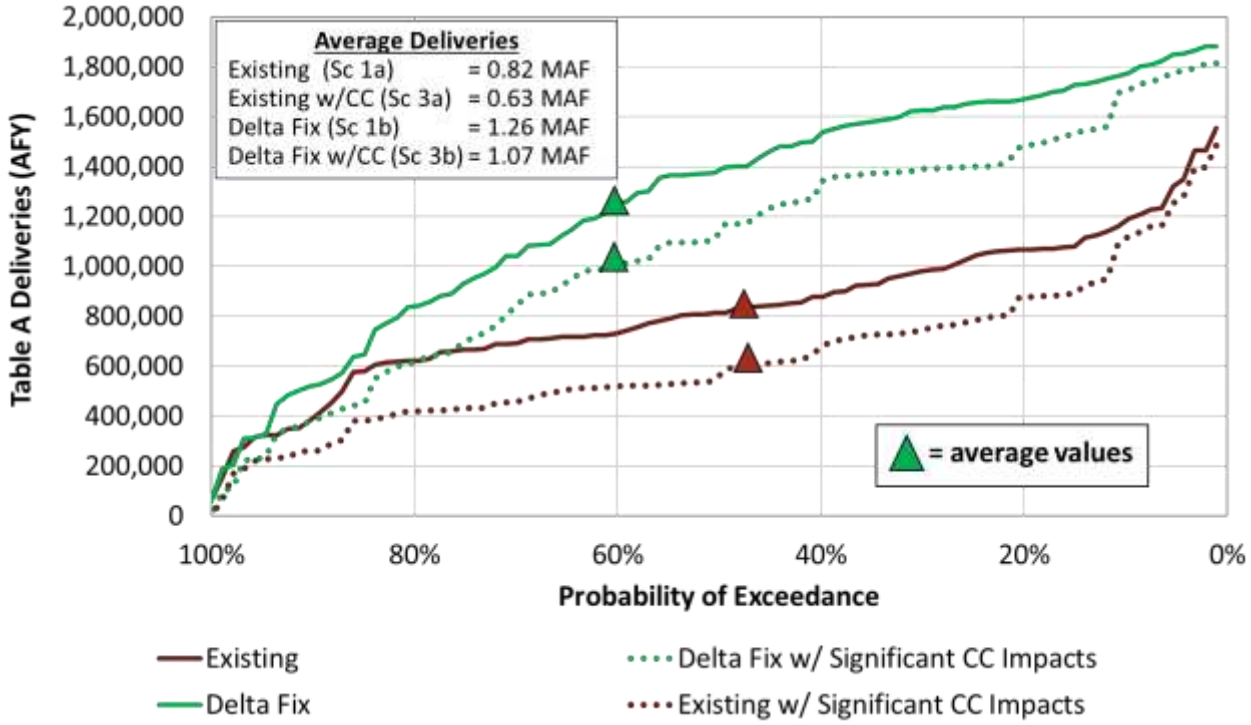


Figure 12. State Water Project Deliveries to MET

4.2.3 Overall MET Reliability

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

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

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

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

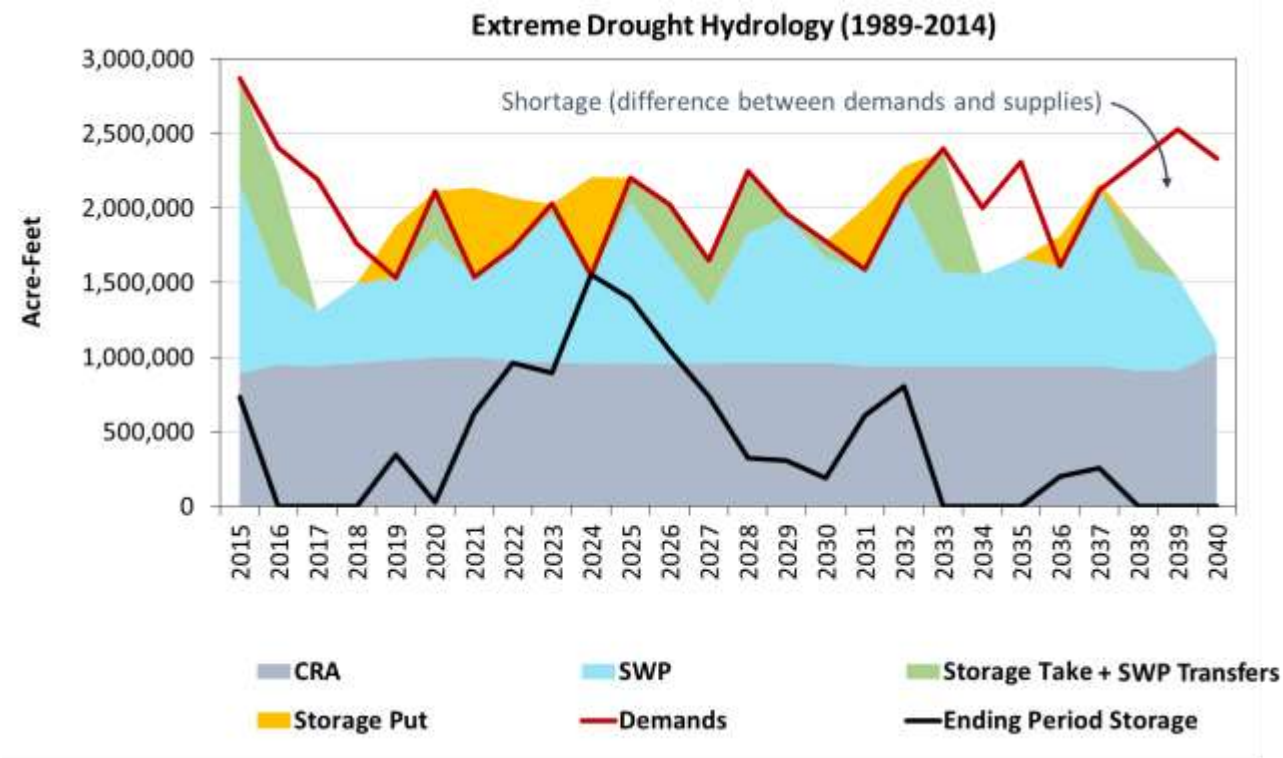


Figure 13. MET Reliability under Drought, for Scenario 1a (no Climate variability, no Cal Fix)

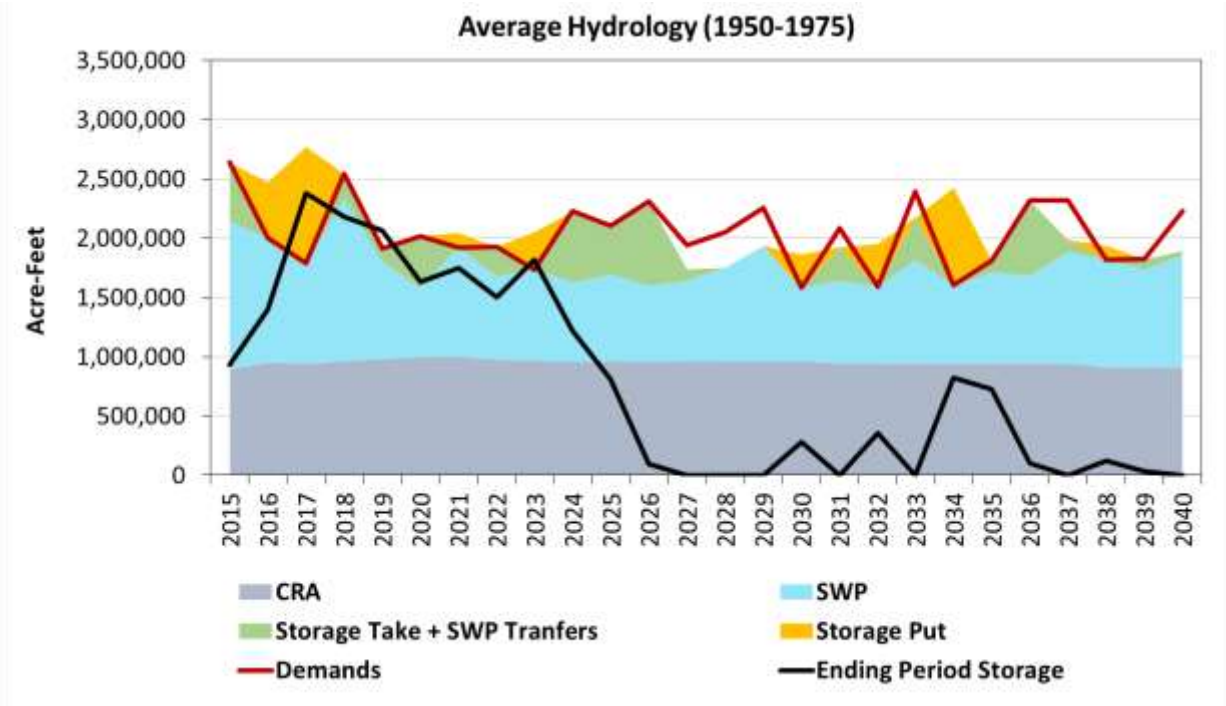


Figure 14. MET Reliability under Average Hydrology, for Scenario 1a (no Climate variability, no Cal Fix)

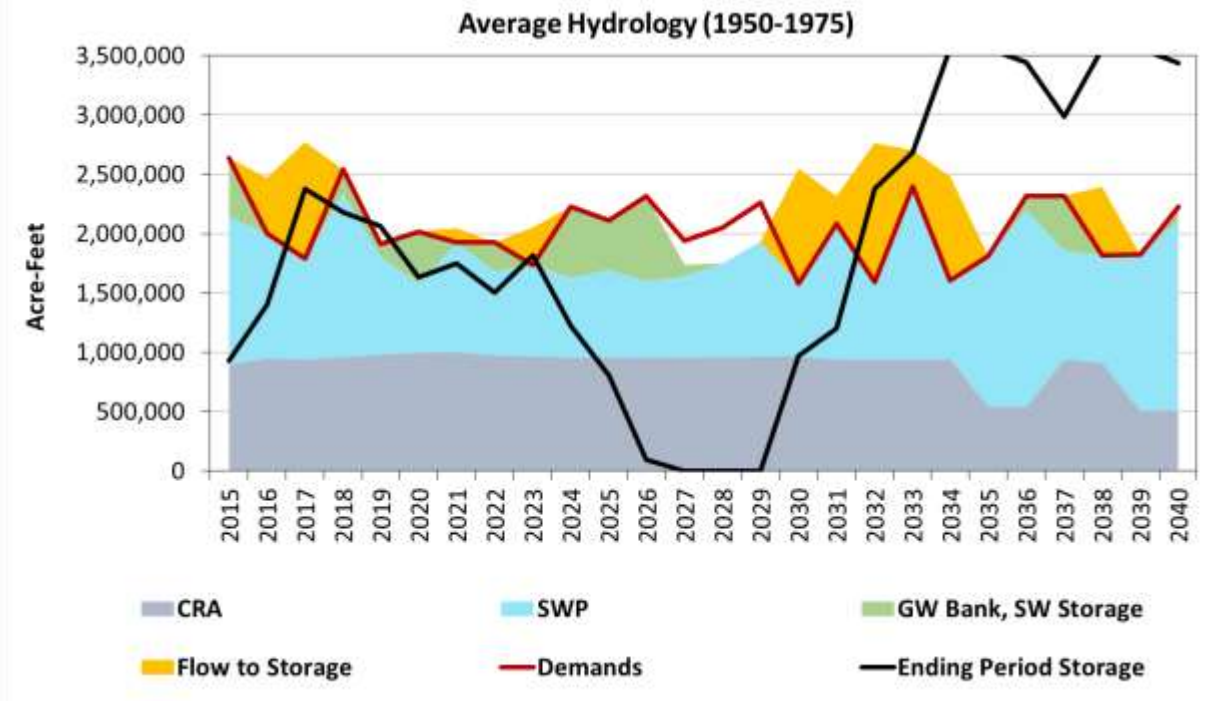


Figure 15. MET Reliability under Average Hydrology, for Scenario 1b (no Climate variability, with Cal Fix)

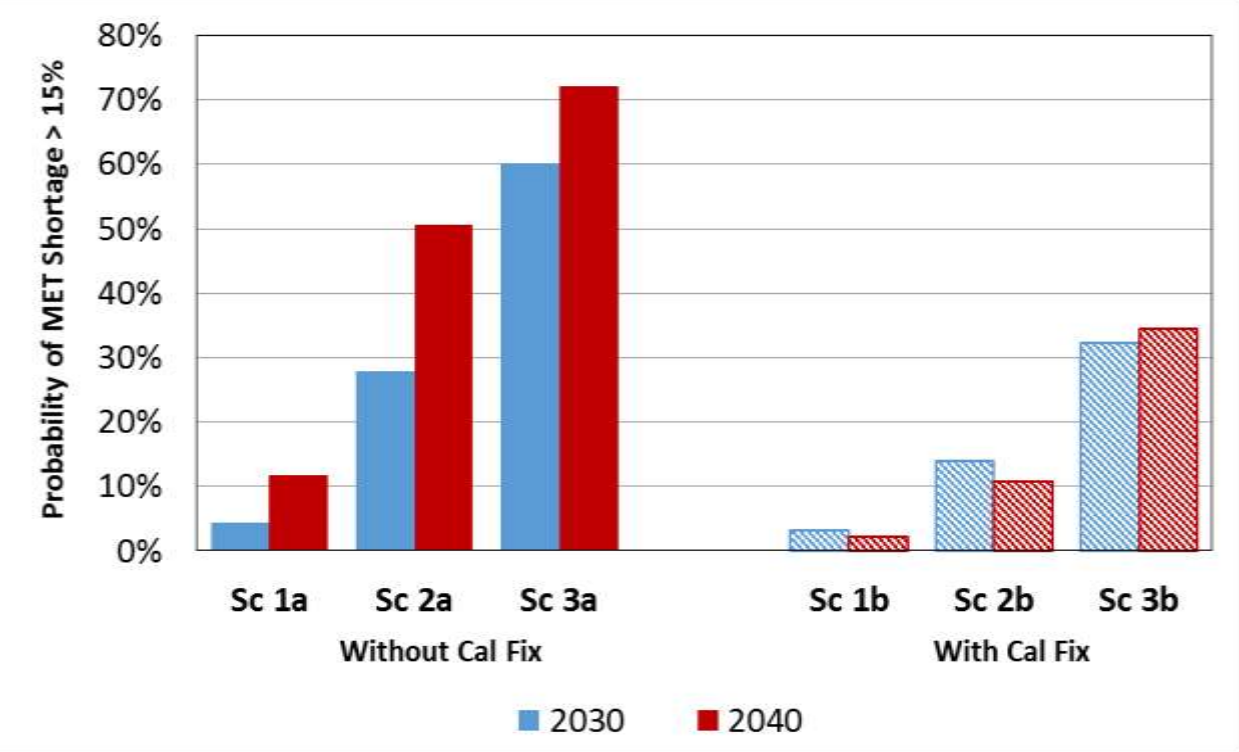


Figure 16. MET Supply Reliability (Percent of Time MET Supply Shortage Greater than 15%)

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

4.3 Orange County Water Supply Gap

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

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

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

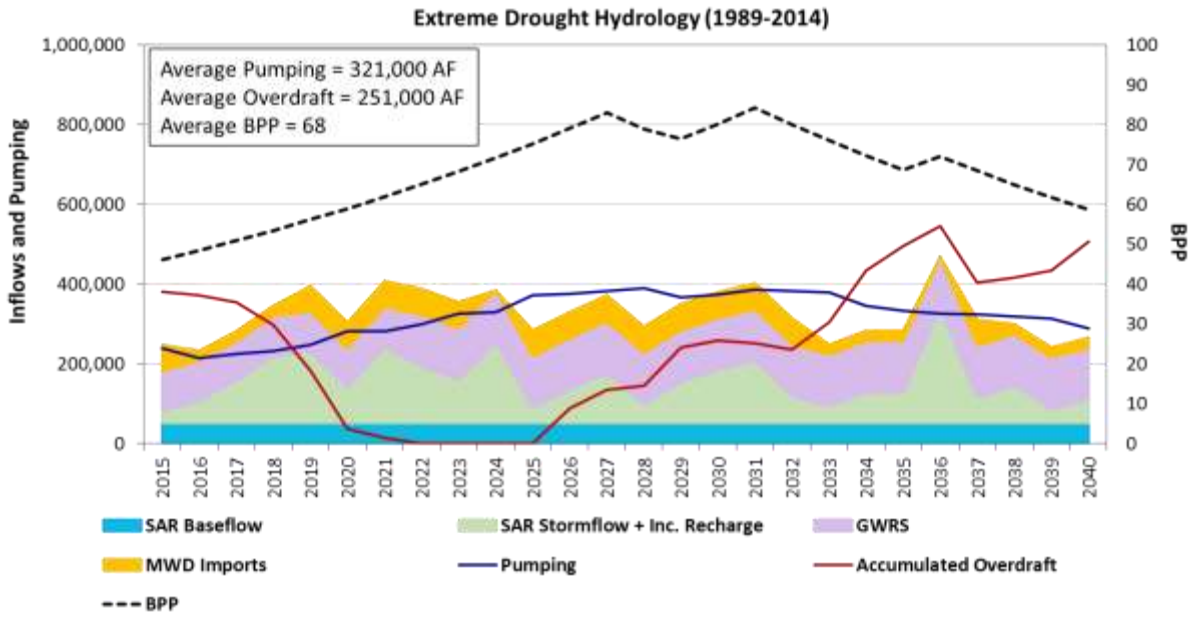


Figure 17. Simulation of OC Basin under Drought, for Scenario 1a (no Climate scenario, no Cal Fix)

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

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

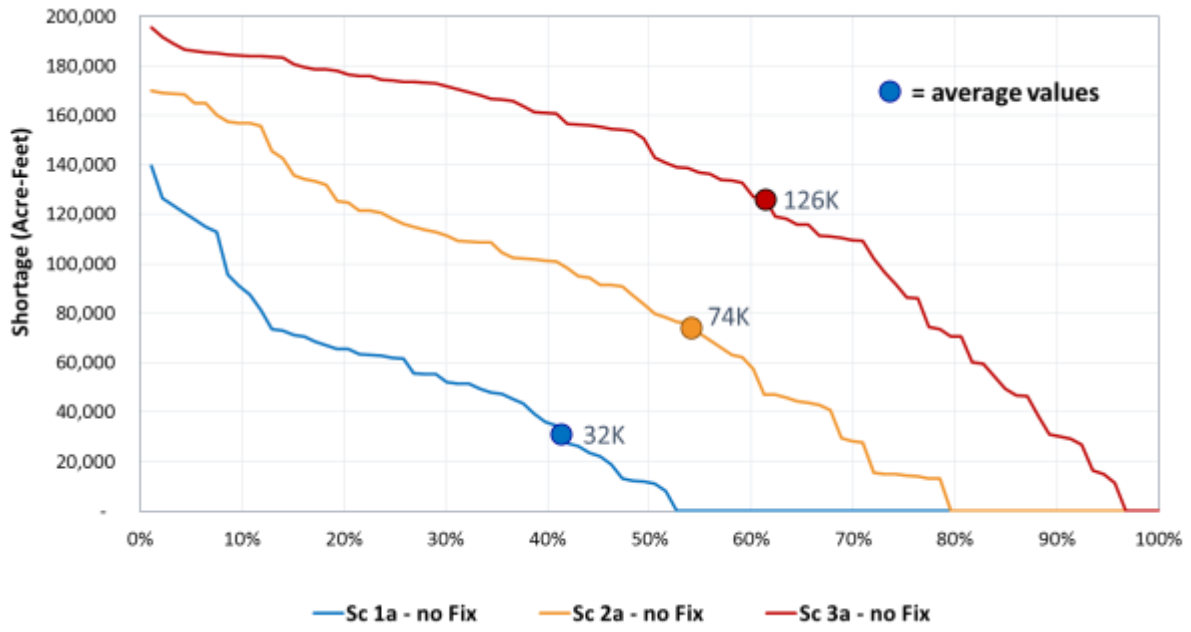


Figure 18. Probability of Water Shortages (Gap) for Orange County Total, No Cal Fix

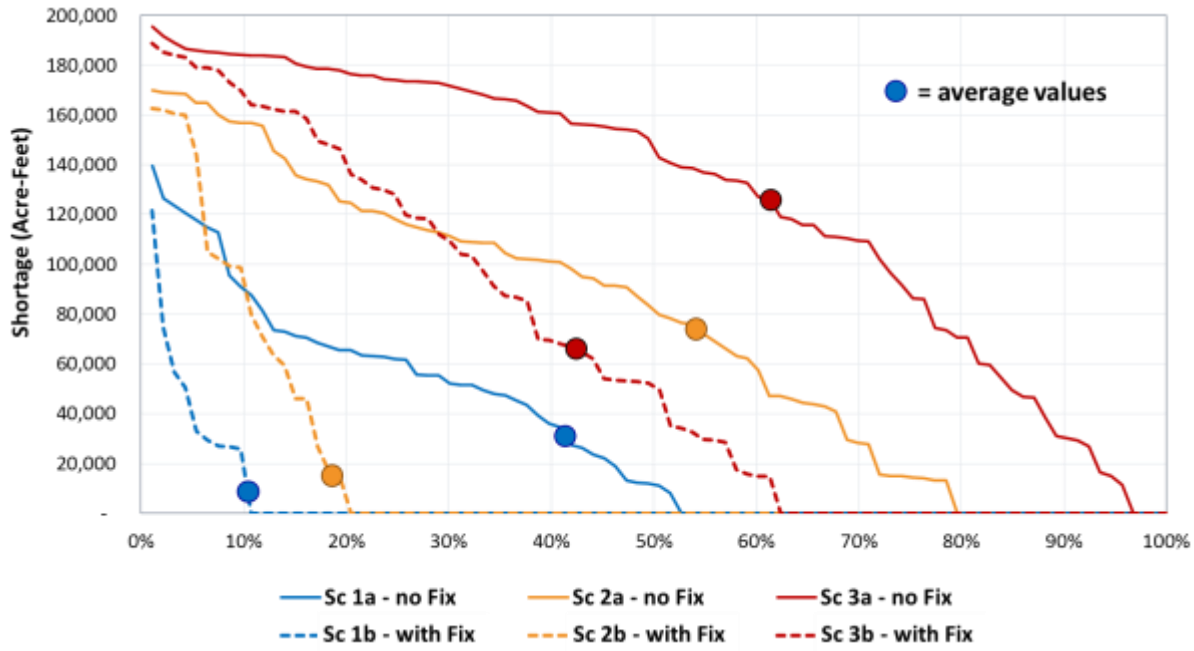


Figure 19. Probability of Water Shortages (Gap) for Orange County Total, with Cal Fix

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

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

Area	Scenario 1		Scenario 2		Scenario 3	
Brea / La Habra	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
2020	110 (1%)	110 (1%)	160 (1%)	160 (1%)	250 (1%)	250 (1%)
2040	820 (4%)	130 (1%)	1,800 (9%)	430 (2%)	3,100 (15%)	1,600 (8%)
OC Basin	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
2020	3,800 (1%)	3,800 (1%)	5,300 (1%)	5,300 (1%)	9,300 (2%)	9,300 (2%)
2040	19,000 (5%)	2,800 (1%)	49,000 (12%)	11,000 (3%)	85,000 (20%)	42,000 (10%)
South County	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
2020	2,100 (2%)	2,100 (2%)	3,000 (3%)	3,000 (3%)	4,800 (4%)	4,800 (4%)
2040	12,000 (9%)	1,900 (2%)	23,000 (18%)	5,600 (4%)	38,000 (28%)	20,000 (15%)
OC Total	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**	**a – no Fix**	**b – with Fix**
2020	6,000 (1%)	6,000 (1%)	8,500 (2%)	8,500 (2%)	14,000 (3%)	14,000 (3%)
2040	32,000 (6%)	4,800 (1%)	74,000 (13%)	17,000 (3%)	126,000 (21%)	64,000 (11%)

* Numbers in parentheses ( ) represent % of water demand.

5.0 Conclusions

While no attempt was made during Phase 1 of the OC Study to assign the likelihood of any one of the six scenarios occurring over the others, some might postulate that Scenario 2 would be the most likely to occur given that most climate experts believe we are already seeing evidence of climate variability impacts today. This all said, a number of observations can be made from this study, which are:

1. The most sensitive model parameters are:
    - Whether or not the Cal Fix is implemented, and by when
    - The extent that climate variability impacts our supply reliability, which can take many forms:
        - Loss of the snowpack in the Sierras and Rocky's affecting imported water
        - Higher reservoir evapotranspiration
        - Reduced groundwater recharge statewide and locally
        - Increased water demands for irrigation and cooling from higher temperatures
        - Requires increase storage to capture and utilize available supplies

2. The range in water supply gaps carry different implications, namely:
    - Under Scenario 1a (no climate variability, no Cal Fix), supply shortages are fairly manageable, with average shortages in 2040 being about 6% of demand with an occurrence of about 4 in 10 years.
    - Under Scenario 2a (moderate climate variability, no Cal Fix), supply shortages require moderate levels of new investments, with average shortages in 2040 being about 13% of demands with an occurrence of about 5 in 10 years.
    - Under Scenario 3a (significant climate variability, no Cal Fix), supply shortages require significant levels of new investments, with average shortages in 2040 being about 21% of demands with an occurrence of about 6 in 10 years.
    - Scenarios with Cal Fix significantly reduce average shortages by 85% for Scenario 1, by 77% for Scenario 2, and by 50% for Scenario 3 in 2040.
    - Modest shortages begin in 2020, 8,500 AF per year on average (about 2% of demands) with an occurrence of about 1 in 10 years
3. Decisions made by Orange County water agencies to improve water supply reliability with local water supply investments should consider the following:
    - The large influence of the Cal Fix. MET and Orange County are much more reliable with the Cal Fix; however, the following questions are posed:
        - What is the implication for triggering Orange County supply investments as long as the Cal Fix is an uncertainty?
        - How long should Orange County wait to see where the Cal Fix is headed? 3, 5 or 10 years?
        - What types of Orange County supply investment decisions would be beneficial whether or not the Cal Fix proceeds ahead?
    - MET is potentially undertaking a NEW Indirect Potable Reuse project.
        - What are the implications of this project for decision-making in Orange County?
    - Other MET investments in its recommended 2015 IRP.
        - What success rate does Orange County attribute to these planned MET water supply investments?
        - Will the success rate be influenced by the Cal Fix? (e.g., additional storage without Cal Fix may not provide much benefit if there is no replenishment water during normal hydrologic years)

Phase 2 of the OC Study seeks to address these observations in a collaborative way by providing insights as to the various cost implications of different portfolios made up from MET, the MET member agencies and Orange County water supply options and to discuss policy implications for MET and Orange County. The combined information from Phases 1 and 2 would give local decision

makers both an idea of the risk of water supply shortages under a wide range of plausible scenarios, and the range of cost implications for mitigating the shortages. The intent of the OC Study, however, is to not to make any specific recommendations as to which supply options should be implemented, but rather present common information in an objective manner for local decision making.

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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:	Kris Williams	
Email Address:	kris.williams@wsoglobal.com	
Telephone | Ext.:	585	2983655
Name of City / Utility:	La Habra	
City/Town/Municipality:	La Habra	
State / Province:	California (CA)	
Country:	USA	
Year:	2015	Financial Year
Start Date:	07/2014	Enter MM/YYYY numeric format
End Date:	06/2015	Enter MM/YYYY numeric format
Audit Preparation Date:	3/29/2016	
Volume Reporting Units:	Acre-feet	
PWSID / Other ID:		

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

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

Use of Option (Radio) Buttons: Pcnt: 0.25% Value:

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

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

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

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

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

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

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

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

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

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

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

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

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

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

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

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

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0
American Water Works Association.

? Click to access definition
+ Click to add a comment

Water Audit Report for: La Habra
Reporting Year: 2015 (7/2014 - 6/2015)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the

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

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

Master Meter and Supply Error Adjustments

WATER SUPPLIED

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

					Pcnt:	Value:	
Volume from own sources:	3	3,611.660	acre-ft/yr	3			acre-ft/yr
Water imported:	7	5,953.980	acre-ft/yr	3			acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

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

WATER SUPPLIED: 9,565.640 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	6	8,481.000	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	3	23.914	acre-ft/yr		23.914	acre-ft/yr

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

AUTHORIZED CONSUMPTION: ? 8,504.914 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 1,060.726 acre-ft/yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		23.914	acre-ft/yr	0.25%		acre-ft/yr

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

Customer metering inaccuracies:	3	173.082	acre-ft/yr	2.00%		acre-ft/yr
Systematic data handling errors:		21.203	acre-ft/yr	0.25%		acre-ft/yr

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

Apparent Losses: ? 218.198 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 842.528 acre-ft/yr

WATER LOSSES: 1,060.726 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 1,084.640 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	165.0	miles
Number of active AND inactive service connections:	8	13,121	
Service connection density:		80	conn./mile main

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

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

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

Average operating pressure: 3 81.7 psi

COST DATA

Total annual cost of operating water system:	8	$14,216,999	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$2.78	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	7	$979.25	$/acre-ft	☐Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 60 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Water imported
3: Customer metering inaccuracies

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0
American Water Works Association.

Water Audit Report for: La Habra
Reporting Year: 2015 | 7/2014 - 6/2015

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 60 out of 100 ***

System Attributes:

	Apparent Losses:	218.198	acre-ft/yr
+	Real Losses:	842.528	acre-ft/yr
=	**Water Losses:**	**1,060.726**	acre-ft/yr
?	Unavoidable Annual Real Losses (UARL):	261.81	acre-ft/yr
	Annual cost of Apparent Losses:	$264,231	
	Annual cost of Real Losses:	$825,044	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	11.3%	
	Non-revenue water as percent by cost of operating system:	7.8%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	14.85	gallons/connection/day
	Real Losses per service connection per day:	57.32	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.70	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	842.53	acre-feet/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	3.22	

* 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:	

Audit Item	Comment
Volume from own sources:	Volume calculated based on monthly summary data for each of three wells; Idaho, La Bonita, and Portola. Daily handwritten records were provided and have been reconciled with the monthly summary. In the cases where handwritten records deviated from the reported totals, WSO used the handwritten records. Level changes in the three reservoirs: Westridge, Puente Hills, and Byerrum have been used to correct the volume from own sources.
Vol. from own sources: Master meter error adjustment:	In the absense of test data, there is no justification for an adjustment.
Water imported:	Volume calculated based on monthly summary data for MWDOC and Cal Domestic water imports. Most of the water is imported from 22 connections with Cal Domestic, however, La Habra maintains two interties with MWDOC at OC-4 and OC-45.
Water imported: master meter error adjustment:	In the absense of test data, there is no justification for an adjustment.
Water exported:	LH did not export any water during the audit period.
Water exported: master meter error adjustment:	In the absense of test data, there is no justification for an adjustment.
Billed metered:	The volume is based on the apportioned sum of water consumption in the raw data supplied to WSO. Eleven abberant readings were adjusted based on additional investigation -- these were primarily misreads.
Billed unmetered:	There are no examples of Billed Unmetered Authorized Consumption during the audit period.
Unbilled metered:	There are no examples of Unbilled metered Authorized Consumption during the audit period.

Audit Item	Comment
Unbilled unmetered:	WSO has estimated unbilled unmetered authorized consumption as 0.25% of water supplied -- a typical estimate for CA utilities operating in drought conditions.
Unauthorized consumption:	The AWWA default value was used.
Customer metering inaccuracies:	In the absence of test data, WSO estimated customer meter underregistration as -2.00%
Systematic data handling errors:	The AWWA default value was used.
Length of mains:	La Habra provided GIS data that included mains and hydrant laterals.
Number of active AND inactive service connections:	LH provided the count of service connections from an electronic inventory system.
Average length of customer service line:	Meters are at the curbstop
Average operating pressure:	The average system pressure was calculated using the pressure readings at the inlet and outlet of all system PRVs. Miles of mains or count of service connections per pressure zone was not available to weight the pressures by pressure zone.
Total annual cost of operating water system:	The total cost of operating the system was provided to WSO and includes both operating expenses and capital improvement costs.
Customer retail unit cost (applied to Apparent Losses):	The rate used reflects the most recent flat retail unit cost.
Variable production cost (applied to Real Losses):	The variable production cost is the cost of MWDOC imports plus the total cost of electricity used for pumping.

AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.

Water Audit Report for:	La Habra	
Reporting Year:	2015	7/2014 - 6/2015
Data Validity Score:	60	

Own Sources (Adjusted for known errors)
3,611.660

Water Imported
5,953.980

System Input
9,565.640

Water Exported
0.000

Water Supplied
9,565.640

Authorized Consumption
8,504.914

Water Losses
1,060.726

Billed Authorized Consumption
8,481.000

Unbilled Authorized Consumption
23.914

Apparent Losses
218.198

Real Losses
842.528

Billed Water Exported

Billed Metered Consumption (water exported is removed)
8,481.000

Billed Unmetered Consumption
0.000

Unbilled Metered Consumption
0.000

Unbilled Unmetered Consumption
23.914

Unauthorized Consumption
23.914

Customer Metering Inaccuracies
173.082

Systematic Data Handling Errors
21.203

Leakage on Transmission and/or Distribution Mains
Not broken down

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

Leakage on Service Connections
Not broken down

Revenue Water
0.000

Revenue Water
8,481.000

Non-Revenue Water (NRW)
1,084.640

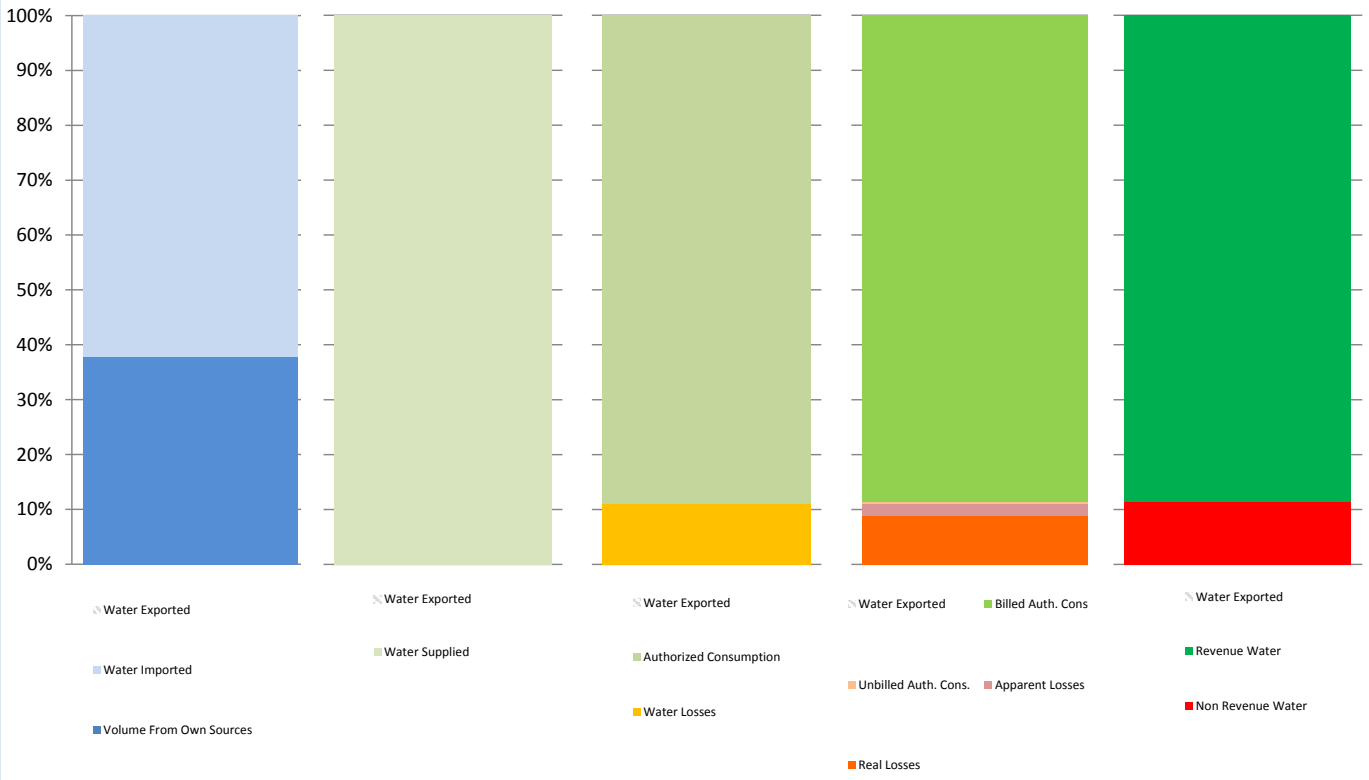
AWWA Free Water Audit Software:
Dashboard

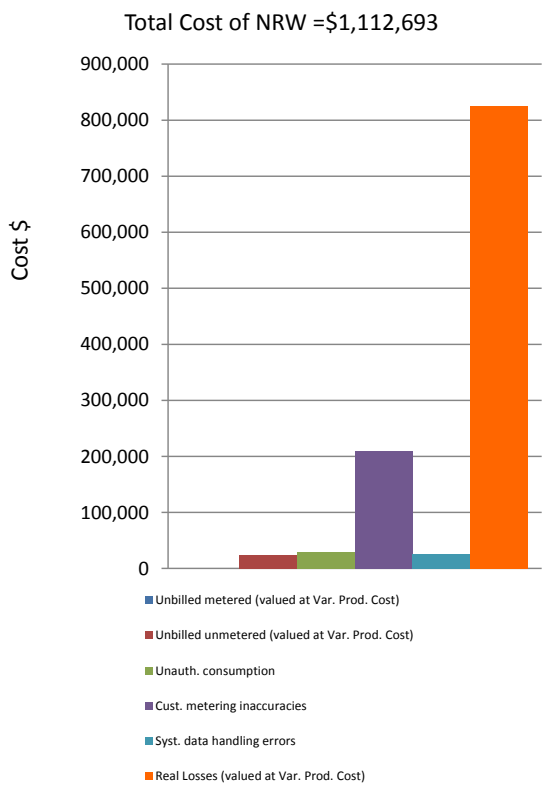
WAS v5.0
American Water Works Association.

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

Water Audit Report for:	**La Habra**	
Reporting Year:	**2015**	**7/2014 - 6/2015**
Data Validity Score:	**60**	

○ Show me the VOLUME of Non-Revenue Water
◉ Show me the COST of Non-Revenue Water





APPENDIX I

Water Use Efficiency Implementation Report

Orange County

Water Use Efficiency Programs Savings
and
Implementation Report

Retrofits and Acre-Feet Water Savings for Program Activity

Program	Program Start Date	Retrofits Installed in	Month Indicated		Current Fiscal Year		Overall Program		
			Interventions	Water Savings	Interventions	Water Savings	Interventions	Annual Water Savings[4]	Cumulative Water Savings[4]
High Efficiency Clothes Washer Program	2001	October-15	532	1.53	2,244	16.15	105,611	3,644	20,708
Smart Timer Program - Irrigation Timers	2004	October-15	1	0.00	371	15.65	13,438	4,655	28,933
Rotating Nozzles Rebate Program	2007	October-15	3,709	14.83	18,064	135.73	478,934	2,422	9,721
SoCal Water$mart Commercial Plumbing Fixture Rebate Program	2002	September-15	2,767	7.65	3,622	18.06	51,788	3,518	34,157
Water Smart Landscape Program [1]	1997	September-15	12,690	905.55	12,690	2,710.58	12,690	10,632	71,574
Industrial Process Water Use Reduction Program	2006	September-15	0	11.26	1	11.26	14	357	1,357
Turf Removal Program[3]	2010	November-15	947,615	11.05	2,868,923	68	10,386,596	1,454	2,982
High Efficiency Toilet (HET) Program	2005	October-15	2,337	8.28	8,102	114.87	54,376	2,010	11,439
Home Water Certification Program	2013	October-15	11	0.022	42	0.147	301	7.080	15.007
Synthetic Turf Rebate Program	2007						685,438	96	469
Ultra-Low-Flush-Toilet Programs [2]	1992						363,926	13,452	162,561
Home Water Surveys [2]	1995						11,867	160	1,708
Showerhead Replacements [2]	1991						270,604	1,667	19,083
Total Water Savings All Programs				**960**	**2,914,059**	**3,090**	**12,435,583**	**44,073**	**364,706**

(1) Water Smart Landscape Program participation is based on the number of water meters receiving monthly Irrigation Performance Reports.

(2) Cumulative Water Savings Program To Date totals are from a previous Water Use Efficiency Program Effort.

(3) Turf Removal Interventions are listed as square feet.

[4] Cumulative & annual water savings represents both active program savings and passive savings that continues to be realized due to plumbing code changes over time.

HIGH EFFICIENCY CLOTHES WASHERS INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY13/14	FY14/15	FY15/16	Total	Current FY Water Savings Ac/Ft (Cumulative)	Cumulative Water Savings across all Fiscal Years	15 yr. Lifecycle Savings Ac/Ft
Brea	132	175	156	42	186	144	93	115	114	43	1,777	0.30	346.91	919
Buena Park	85	114	146	59	230	145	105	106	91	24	1,412	0.19	263.13	731
East Orange CWD RZ	18	22	17	3	23	10	10	8	8	4	185	0.03	38.21	96
El Toro WD	91	113	130	32	162	112	134	121	111	29	1,438	0.23	267.47	744
Fountain Valley	205	219	243	72	289	158	115	102	110	37	2,296	0.24	467.55	1,188
Garden Grove	238	304	332	101	481	236	190	162	165	42	3,227	0.36	641.93	1,670
Golden State WC	339	401	447	168	583	485	265	283	359	106	4,723	0.80	909.33	2,444
Huntington Beach	761	750	751	211	963	582	334	295	319	89	7,930	0.64	1,649.30	4,103
Irvine Ranch WD	1,972	2,052	1,844	1,394	2,621	2,170	1,763	1,664	1,882	676	22,448	4.63	4,161.08	11,615
La Habra	96	136	83	22	179	128	82	114	87	25	1,233	0.16	230.28	638
La Palma	33	35	51	25	76	46	34	25	34	10	429	0.07	78.92	222
Laguna Beach CWD	57	77	77	27	96	57	38	37	39	23	904	0.16	181.03	468
Mesa Water	239	249	246	73	232	176	114	86	89	27	2,352	0.21	498.68	1,217
Moulton Niguel WD	652	716	742	250	1,127	679	442	421	790	337	8,995	2.42	1,691.75	4,654
Newport Beach	245	270	259	57	197	142	116	92	95	36	2,533	0.28	540.91	1,311
Orange	366	365	403	111	349	262	218	163	160	54	3,748	0.44	781.73	1,939
Orange Park Acres	4	8	-	-	-	-	-	-	-	-	12	0.00	3.09	6
San Juan Capistrano	109	103	127	43	190	110	76	73	92	34	1,397	0.30	271.08	723
San Clemente	204	261	278	63	333	206	140	94	141	41	2,516	0.29	494.64	1,302
Santa Margarita WD	654	683	740	257	1,105	679	553	662	792	224	8,907	1.68	1,660.81	4,609
Seal Beach	47	46	57	7	81	51	31	29	38	12	582	0.10	113.15	301
Serrano WD	30	31	23	7	21	20	13	10	26	5	343	0.03	71.90	177
South Coast WD	107	130	148	43	183	112	89	79	68	25	1,522	0.18	297.39	788
Trabuco Canyon WD	69	60	62	28	82	62	30	45	47	19	755	0.14	146.53	391
Tustin	152	146	144	45	174	97	78	59	80	32	1,534	0.23	314.38	794
Westminster	213	171	233	74	329	208	121	82	109	30	2,383	0.20	480.73	1,233
Yorba Linda	288	350	367	117	394	273	181	167	156	64	3,637	0.47	750.09	1,882
MWDOC Totals	7,406	7,987	8,106	3,331	10,686	7,350	5,365	5,094	6,002	2,048	89,218	14.78	17,352.00	17,237
Anaheim	854	847	781	860	910	477	331	285	295	98	10,301	0.68	2,141.25	5,330
Fullerton	269	334	330	69	397	270	200	186	211	63	3,486	0.45	644.49	1,804
Santa Ana	236	235	257	87	355	190	163	131	132	35	2,606	0.25	570.33	1,348
Non-MWDOC Totals	1,359	1,416	1,368	1,016	1,662	937	694	602	638	196	16,393	1.37	3,356.08	3,167
Orange County Totals	8,765	9,403	9,474	4,347	12,348	8,287	6,059	5,696	6,640	2,244	105,611	16.15	20,708.07	20,404

SMART TIMERS INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation ProgramS

	FY 04/05		FY 05/06		FY 06/07		FY 07/08		FY 08/09		FY 09/10		FY 10/11		FY 11/12		FY 12/13		FY 13/14		FY 14/15		FY 15/16		Total Program		Cumulative Water Savings across all Fiscal Years
Agency	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm.	
Brea	2	0	1	3	8	6	0	40	3	9	0	0	2	0	8	0	9	8	4	0	43	6	5	0	85	72	398.22
Buena Park	0	0	0	0	0	0	0	0	3	1	0	0	0	0	4	19	3	0	0	0	4	10	0	0	14	30	85.75
East Orange CWD RZ	1	0	2	0	0	0	0	0	0	0	0	0	1	0	5	0	2	0	0	0	2	0	0	0	13	0	3.55
El Toro WD	1	0	8	0	4	95	1	174	0	25	2	18	5	5	26	2	7	2	11	0	8	9	4	0	77	330	1,976.03
Fountain Valley	3	3	2	2	11	0	4	0	1	0	0	6	2	2	8	2	3	2	4	0	7	10	2	0	47	27	114.99
Garden Grove	2	2	11	1	2	0	1	3	2	1	6	0	5	4	7	0	5	2	9	0	10	14	3	3	63	30	106.46
Golden State WC	0	0	15	2	24	12	8	8	1	2	9	22	7	4	13	3	9	49	9	25	39	12	1	0	135	139	520.07
Huntington Beach	5	2	21	9	12	12	7	1	13	1	6	27	6	36	15	4	18	33	20	35	19	2	11	0	153	162	665.38
Irvine Ranch WD	2	2	68	111	160	434	66	183	29	56	14	145	28	153	267	71	414	135	71	59	67	310	9	0	1,195	1,659	7,923.73
La Habra	0	0	0	0	7	1	1	0	0	0	0	21	0	0	3	0	4	7	2	0	4	7	57	43	78	79	171.24
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	0	1	1	7	1	1.60
Laguna Beach CWD	3	0	5	0	21	0	5	0	2	0	2	14	4	1	109	2	76	2	71	0	86	0	0	0	384	19	157.52
Mesa Water	5	0	13	27	14	6	12	0	6	7	13	7	7	22	21	0	10	2	15	2	17	28	5	0	138	101	486.67
Moulton Niguel WD	2	0	25	10	39	52	59	20	21	23	17	162	36	60	179	31	51	74	40	45	46	95	2	0	517	572	2,337.11
Newport Beach	3	17	35	4	125	86	98	40	10	27	7	58	6	0	275	12	242	26	168	75	11	9	53	25	1,033	379	1,957.82
Orange	8	4	37	13	28	38	4	0	5	2	2	13	5	8	25	0	20	24	13	9	18	31	4	0	169	142	667.97
San Juan Capistrano	0	0	5	4	5	4	11	1	10	0	7	49	13	1	103	2	14	18	6	11	6	19	4	2	184	111	448.73
San Clemente	4	0	483	1	46	7	21	60	81	20	13	209	46	11	212	17	26	7	28	2	28	24	16	6	1,004	364	2,056.38
Santa Margarita WD	3	0	15	8	40	96	53	70	25	44	10	152	61	53	262	7	53	171	64	93	53	321	8	0	647	1,015	3,563.97
Santiago CWD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	1	31	1	2.10
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	1	0	1	36	1	12	0	0	3	52	104.07
Serrano WD	0	0	0	0	0	0	0	0	0	0	11	0	4	0	3	0	1	0	0	0	4	0	1	0	24	0	5.95
South Coast WD	2	0	6	1	17	29	7	49	11	6	3	10	13	3	78	10	13	16	8	4	104	73	4	0	266	201	828.89
Trabuco Canyon WD	0	0	29	0	10	93	4	0	1	0	2	0	2	10	12	0	6	0	2	0	6	1	6	0	80	104	695.27
Tustin	1	0	1	4	0	0	2	3	7	9	10	14	10	0	11	0	8	4	9	1	18	14	8	0	85	49	211.62
Westminster	1	0	8	12	6	0	1	0	3	0	3	0	1	1	2	0	1	1	2	0	13	17	4	0	45	31	130.93
Yorba Linda	0	0	30	6	31	5	20	41	8	5	5	21	25	0	22	0	20	0	12	5	32	2	15	1	220	86	529.19
MWDOC Totals	48	30	820	218	610	976	385	693	242	238	142	949	289	374	1,671	185	1,017	583	571	402	648	1,026	254	82	6,697	5,756	26,151.20
Anaheim	6	1	8	13	17	78	12	57	9	59	5	46	12	11	23	60	19	10	9	26	7	52	6	7	133	420	1,949.05
Fullerton	0	0	2	0	10	0	10	0	2	2	2	39	9	33	22	51	9	29	8	0	40	26	5	6	119	186	641.99
Santa Ana	0	0	0	0	1	0	3	0	2	4	1	8	8	0	6	5	8	19	7	8	9	27	10	1	55	72	190.50
Non-MWDOC Totals	6	1	10	13	28	78	25	57	13	65	8	93	29	44	51	116	36	58	24	34	56	105	21	14	307	678	2,781.54
Orange County Totals	54	31	830	231	638	1,054	410	750	255	303	150	1,042	318	418	1,722	301	1,053	641	595	436	704	1,131	275	96	7,004	6,434	28,933

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

	FY 06/07			FY 07/08			FY 08/09			FY 10/11			FY 11/12			FY 12/13			FY 13/14			FY 14/15			FY 15/16			Total Program			Cumulative Water Savings across all Fiscal Years
	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	
Agency	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	
Brea	0	0	0	0	0	0	22	0	0	32	0	0	130	0	0	65	120	0	84	0	0	157	45	0	0	842	0	498	1,107	0	13.71
Buena Park	0	0	0	0	0	0	37	75	0	29	0	0	32	0	0	65	0	0	53	0	0	248	0	0	0	0	0	464	75	2,535	450.81
East Orange	0	0	0	0	0	0	105	0	0	0	0	0	340	0	0	55	0	0	30	0	0	221	0	0	0	0	0	751	0	0	9.60
El Toro	0	0	0	0	0	0	88	290	0	174	0	0	357	76	0	23	6,281	0	56	3,288	0	1,741	28,714	0	90	4,457	0	2,674	45,980	890	635.80
Fountain Valley	0	0	0	51	0	0	83	0	0	83	0	0	108	0	0	35	0	0	0	0	0	107	0	0	18	0	0	506	0	0	7.95
Garden Grove	0	0	0	44	0	0	153	106	0	38	0	0	119	0	0	95	0	0	80	0	0	88	50	0	44	0	0	812	201	0	17.16
Golden State	0	0	0	161	0	0	83	0	0	303	943	0	294	0	0	257	2,595	0	192	0	0	583	1,741	0	65	0	0	2,218	5,308	0	102.89
Huntington Beach	0	0	0	93	845	1,202	322	19	1,174	203	625	0	458	0	0	270	0	0	120	0	0	798	1,419	0	198	1,432	0	2,501	7,760	2,681	746.72
Irvine Ranch	0	0	0	610	7,435	440	1,594	5,108	85	2,411	2,861	0	1,715	4,255	0	25,018	1,014	0	11,010	4,257	0	1,421	632	0	171	1,110	0	44,984	81,113	2,004	2,656.37
La Habra	0	535	0	9	0	0	15	0	900	0	0	0	33	90	0	0	0	0	15	0	0	109	338	0	21	0	0	202	1,236	900	217.49
La Palma	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0.24
Laguna Beach	0	0	0	115	0	0	101	47	0	156	0	0	763	0	0	3,596	0	0	2,948	878	0	2,879	1,971	0	46	0	0	10,795	2,896	0	164.61
Mesa Water	83	0	0	0	25	343	198	0	0	118	0	0	297	277	0	270	0	0	361	0	0	229	0	0	77	0	0	1,828	385	343	117.26
Moulton Niguel	0	0	0	297	120	0	426	6,883	1,986	1,578	0	0	1,225	0	0	512	1,385	0	361	227	0	1,596	4,587	0	473	233	0	6,702	13,435	2,945	906.15
Newport Beach	0	0	0	22	569	0	65	170	0	337	1,208	0	640	3,273	0	25,365	50	0	19,349	6,835	0	460	3,857	0	250	0	0	46,580	20,743	0	947.31
Orange	0	0	0	158	0	0	961	163	0	135	30	0	343	0	0	264	0	0	245	120	0	304	668	0	271	0	0	2,810	981	0	58.18
San Clemente	0	0	0	118	0	0	466	25	0	2,612	851	0	4,266	117	1,343	631	172	0	415	5,074	0	326	0	0	279	0	0	9,842	7,538	1,343	387.00
San Juan Capistrano	0	0	0	70	0	0	434	1,660	0	1,452	0	0	949	0	0	684	30	0	370	0	0	495	737	0	15	0	0	5,125	8,136	0	239.81
Santa Margarita	0	0	0	165	0	0	1,079	68	0	3,959	3,566	0	4,817	0	0	983	0	0	389	0	0	1,207	1,513	0	711	107	0	15,041	6,191	611	415.93
Seal Beach	0	0	0	0	0	0	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	5,261	0	0	0	0	155	5,552	0	50.97
Serrano	0	0	0	94	0	0	24	0	0	364	0	0	58	0	0	190	0	0	105	0	0	377	0	0	291	0	0	3,001	0	0	48.15
South Coast	0	0	0	74	133	0	115	0	0	318	1,772	0	688	359	0	435	0	0	70	0	0	4,993	13,717	0	116	179	0	6,809	16,160	0	213.13
Trabuco Canyon	0	0	0	130	0	0	0	0	0	0	0	0	379	0	0	34	0	0	0	0	0	56	0	0	77	0	0	2,033	791	0	52.43
Tustin	0	0	0	23	0	0	549	0	0	512	0	0	476	1,013	0	378	0	0	329	0	0	408	0	0	120	45	0	3,109	1,058	0	60.05
Westminster	0	0	0	0	0	0	111	0	0	0	0	0	26	0	0	15	0	0	0	0	0	54	0	0	57	0	0	343	0	0	5.47
Yorba Linda	0	0	0	563	0	0	440	113	500	529	0	0	559	0	0	730	0	0	40	990	0	921	0	0	636	0	0	4,789	4,359	500	255.63
MWDOC Totals	83	535	0	2,797	9,127	1,985	7,596	14,727	4,645	15,343	11,856	0	19,072	9,460	1,343	59,970	11,647	0	36,622	21,669	0	19,818	65,250	0	4,026	8,405	0	174,582	231,005	14,752	8,780.80
Anaheim	0	0	0	68	0	0	329	0	0	372	382	0	742	38,554	0	459	813	0	338	0	0	498	712	0	152	5,221	0	3,231	45,846	105	575.88
Fullerton	0	0	0	95	0	0	446	64	0	416	0	0	409	0	0	119	0	0	107	0	0	684	1,196	0	260	0	0	2,584	1,260	1,484	306.37
Santa Ana	0	0	0	145	0	0	96	56	0	53	0	0	22	65	0	99	0	0	86	2,533	0	310	0	0	0	0	0	859	3,226	0	57.47
Non-MWDOC Totals	0	0	0	308	0	0	871	120	0	841	382	0	1,173	38,619	0	677	813	0	531	2,533	0	1,492	1,908	0	412	5,221	0	6,674	50,332	1,589	939.71
Orange County Totals	83	535	0	3,105	9,127	1,985	8,467	14,847	4,645	16,184	12,238	0	20,245	48,079	1,343	60,647	12,460	0	37,153	24,202	0	21,310	67,158	0	4,438	13,626	0	181,256	281,337	16,341	9,720.51

SOCAL WATER$MART COMMERCIAL PLUMBING FIXTURES REBATE PROGRAM[1]
INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	Totals	Cumulative Water Savings across all Fiscal Years
Brea	27	113	24	4	1	234	0	10	53	**593**	**346**
Buena Park	153	432	122	379	290	5	23	56	94	**1,859**	**908**
East Orange CWD RZ	0	0	0	0	0	0	0	0	0	**0**	**0**
El Toro WD	0	92	143	1	137	0	212	6	1	**760**	**512**
Fountain Valley	17	35	0	2	314	0	0	1	0	**623**	**517**
Garden Grove	5	298	130	22	0	4	1	167	160	**1,525**	**1,304**
Golden State WC	46	414	55	68	135	0	1	0	182	**1,986**	**1,685**
Huntington Beach	48	104	126	96	156	104	144	7	451	**1,981**	**1,368**
Irvine Ranch WD	121	789	2,708	1,002	646	1,090	451	725	894	**11,702**	**5,898**
La Habra	191	75	53	4	0	0	0	0	109	**652**	**478**
La Palma	0	140	21	0	0	0	0	0	0	**166**	**74**
Laguna Beach CWD	20	137	189	0	0	0	27	0	0	**446**	**281**
Mesa Water	141	543	219	669	41	6	0	79	269	**3,080**	**1,817**
Moulton Niguel WD	9	69	151	6	0	0	0	3	0	**583**	**722**
Newport Beach	98	27	245	425	35	0	0	566	0	**1,834**	**1,144**
Orange	18	374	67	1	73	1	271	81	62	**1,966**	**1,560**
San Juan Capistrano	2	1	1	0	0	0	14	0	0	**260**	**367**
San Clemente	2	18	43	0	19	0	0	1	0	**432**	**350**
Santa Margarita WD	6	23	11	0	0	0	0	2	0	**117**	**182**
Santiago CWD	0	0	0	0	0	0	0	0	0	**0**	**0**
Seal Beach	1	2	124	0	0	0	0	0	0	**354**	**383**
Serrano WD	0	0	0	0	0	0	0	0	0	**0**	**0**
South Coast WD	9	114	56	422	84	148	0	382	0	**1,320**	**441**
Trabuco Canyon WD	0	4	0	0	0	0	0	0	0	**11**	**14**
Tustin	115	145	25	230	0	0	0	75	0	**832**	**720**
Westminster	40	161	16	63	35	1	28	0	20	**835**	**899**
Yorba Linda	10	24	8	30	0	1	0	0	135	**420**	**498**
MWDOC Totals	**1,079**	**4,134**	**4,537**	**3,424**	**1,966**	**1,594**	**1,172**	**2,161**	**2,430**	**34,337**	**22,466**
Anaheim	766	3,298	582	64	48	165	342	463	959	**11,331**	**6,099**
Fullerton	133	579	29	4	0	94	0	178	55	**1,736**	**1,427**
Santa Ana	493	815	728	39	12	16	17	5	178	**4,384**	**4,166**
Non-MWDOC Totals	**1,392**	**4,692**	**1,339**	**107**	**60**	**275**	**359**	**646**	**1,192**	**17,451**	**11,691**
Orange County Totals	**2,471**	**8,826**	**5,876**	**3,531**	**2,026**	**1,869**	**1,531**	**2,807**	**3,622**	**51,788**	**34,157**

[1] Retrofit devices include ULF Toilets and Urinals, High Efficiency Toilets and Urinals, Multi-Family and Multi-Family 4-Liter HETs, Zero Water Urinals, High Efficiency Clothes Washers, Cooling Tower Conductivity Controllers, Ph Cooling Tower Conductivity Controllers, Flush Valve Retrofit Kits, Pre-rinse Spray heads, Hospital X-Ray Processor Recirculating Systems, Steam Sterilizers, Food Steamers, Water Pressurized Brooms, Laminar Flow Restrictors, and Ice Making Machines.

Water Smart Landscape Program

Total Number of Meters in Program by Agency

Agency	FY 04-05	FY 05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	Overall Water Savings To Date (AF)
Brea	0	0	0	0	0	0	0	22	22	22	22	22	62.80
Buena Park	0	0	0	0	0	17	103	101	101	101	101	101	455.49
East Orange CWD RZ	0	0	0	0	0	0	0	0	0	0	0	0	0.00
El Toro WD	88	109	227	352	384	371	820	810	812	812	812	812	4,798.99
Fountain Valley	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Garden Grove	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Golden State WC	0	0	0	14	34	32	34	32	32	32	32	32	198.31
Huntington Beach	0	0	0	0	0	31	33	31	31	31	31	31	146.22
Irvine Ranch WD	277	638	646	708	1,008	6,297	6,347	6,368	6,795	6,797	6,769	6,780	37,821.08
Laguna Beach CWD	0	0	0	0	57	141	143	141	124	124	124	124	724.23
La Habra	0	0	0	0	23	22	24	22	22	22	22	22	135.15
La Palma	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Mesa Water	191	170	138	165	286	285	288	450	504	511	514	515	2,906.82
Moulton Niguel WD	80	57	113	180	473	571	595	643	640	675	673	695	4,073.55
Newport Beach	32	27	23	58	142	171	191	226	262	300	300	300	1,479.78
Orange	0	0	0	0	0	0	0	0	0	0	0	0	0.00
San Clemente	191	165	204	227	233	247	271	269	269	299	407	438	2,336.02
San Juan Capistrano	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Santa Margarita WD	547	619	618	945	1,571	1,666	1,746	1,962	1,956	2,274	2,386	2,386	14,007.83
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Serrano WD	0	0	0	0	0	0	0	0	0	0	0	0	0.00
South Coast WD	0	0	0	62	117	108	110	118	118	118	164	164	818.21
Trabuco Canyon WD	0	0	0	12	49	48	62	60	60	60	60	60	346.24
Tustin	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Westminster	0	0	0	10	18	18	20	18	18	18	18	18	115.17
Yorba Linda WD	0	0	0	0	0	0	0	0	0	0	0	0	0.00
MWDOC Totals	**1,406**	**1,785**	**1,969**	**2,733**	**4,395**	**10,025**	**10,787**	**11,273**	**11,766**	**12,196**	**12,435**	**12,500**	**70,425.9**
Anaheim	0	0	0	0	0	142	146	144	190	190	190	190	1,147.97
Fullerton	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Santa Ana	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Non-MWDOC Totals	**0**	**0**	**0**	**0**	**0**	**142**	**146**	**144**	**190**	**190**	**190**	**190**	**1,147.97**
Orange Co. Totals	**1,406**	**1,785**	**1,969**	**2,733**	**4,395**	**10,167**	**10,933**	**11,417**	**11,956**	**12,386**	**12,625**	**12,690**	**71,573.83**

INDUSTRIAL PROCESS WATER USE REDUCTION PROGRAM

Number of Process Changes by Agency

Agency	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	Overall Program Interventions	Annual Water Savings[1]	Cumulative Water Savings across all Fiscal Years[1]
Brea	0	0	0	0	0	0	0	0	0	0	0	0
Buena Park	0	1	0	0	0	0	0	0	0	1	54	365
East Orange	0	0	0	0	0	0	0	0	0	0	0	0
El Toro	0	0	0	0	0	0	0	0	0	0	0	0
Fountain Valley	0	0	0	0	0	0	0	0	0	0	0	0
Garden Grove	0	0	0	0	0	0	0	0	0	0	0	0
Golden State	1	0	0	0	0	0	0	0	0	1	3	22
Huntington Beach	0	0	0	0	0	2	0	1	0	3	127	234
Irvine Ranch	0	0	2	1	1	1	1	0	0	6	98	366
La Habra	0	0	0	0	0	0	0	0	0	0	0	0
La Palma	0	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	0	0	0	0	0	0	0	0	0	0	0	0
Mesa Water	0	0	0	0	0	0	0	0	0	0	0	0
Moulton Niguel	0	0	0	0	0	0	0	0	0	0	0	0
Newport Beach	0	0	0	0	0	0	0	1	0	1	21	18
Orange	1	0	0	0	0	0	0	0	0	1	43	330
San Juan Capistrano	0	0	0	0	0	0	0	0	0	0	0	0
San Clemente	0	0	0	0	0	0	0	0	0	0	0	0
Santa Margarita	0	0	0	0	0	0	0	0	0	0	0	0
Seal Beach	0	0	0	0	0	0	0	0	0	0	0	0
Serrano	0	0	0	0	0	0	0	0	0	0	0	0
South Coast	0	0	0	0	0	0	0	0	0	0	0	0
Trabuco Canyon	0	0	0	0	0	0	0	0	0	0	0	0
Tustin	0	0	0	0	0	0	0	0	0	0	0	0
Westminster	0	0	0	0	0	0	0	0	0	0	0	0
Yorba Linda	0	0	0	0	0	0	0	0	0	0	0	0
MWDOC Totals	2	1	2	1	1	3	1	2	0	13	346	1335
Anaheim	0	0	0	0	0	0	0	0	0	0	0	0
Fullerton	0	0	0	0	0	0	0	0	0	0	0	0
Santa Ana	0	0	0	0	0	0	0	0	1	1	11	23
OC Totals	2	1	2	1	1	3	1	2	1	14	357	1357

[1] Acre feet of savings determined during a one year monitoring period.

If monitoring data is not available, the savings estimated in agreement is used.

HIGH EFFICIENCY TOILETS (HETs) INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY05-06	FY 06-07	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	Total	Cumulative Water Savings across all Fiscal Years
Brea	0	2	7	43	48	8	0	0	38	146	115	407	**56.69**
Buena Park	0	1	2	124	176	7	0	0	96	153	75	634	**126.10**
East Orange CWD RZ	0	0	10	12	1	0	0	0	13	26	16	78	**12.77**
El Toro WD	0	392	18	75	38	18	0	133	218	869	159	1,920	**346.39**
Fountain Valley	0	69	21	262	54	17	0	0	41	132	144	740	**169.64**
Garden Grove	0	14	39	443	181	24	0	0	63	350	276	1,390	**281.36**
Golden State WC	2	16	36	444	716	37	80	2	142	794	385	2,654	**514.92**
Huntington Beach	2	13	59	607	159	76	0	0	163	1,190	455	2,724	**443.98**
Irvine Ranch WD	29	1,055	826	5,088	2,114	325	0	1,449	810	1,777	1,398	14,871	**3,784.91**
Laguna Beach CWD	0	2	17	91	28	11	0	0	45	112	42	348	**66.56**
La Habra	0	3	18	296	34	20	0	0	37	94	52	554	**139.13**
La Palma	0	1	10	36	26	13	0	0	21	59	34	200	**36.73**
Mesa Water	0	247	19	736	131	7	0	0	147	162	116	1,565	**441.29**
Moulton Niguel WD	0	20	104	447	188	46	0	0	400	2,497	1,455	5,157	**593.83**
Newport Beach	0	5	19	163	54	13	0	0	49	168	141	612	**110.87**
Orange	1	20	62	423	79	40	0	1	142	978	329	2,075	**326.05**
San Juan Capistrano	0	10	7	76	39	11	0	0	35	140	143	461	**69.71**
San Clemente	0	7	22	202	66	21	0	0	72	225	178	793	**141.13**
Santa Margarita WD	0	5	14	304	151	44	0	0	528	997	721	2,764	**350.18**
Seal Beach	0	678	8	21	12	1	0	2	17	50	45	834	**311.28**
Serrano WD	2	0	1	13	5	0	0	0	2	40	37	100	**12.47**
South Coast WD	2	2	29	102	41	12	23	64	102	398	175	950	**133.04**
Trabuco Canyon WD	0	0	4	23	23	0	0	0	10	108	107	275	**31.24**
Tustin	0	186	28	387	479	17	0	0	64	132	137	1,430	**393.93**
Westminster	0	17	25	541	167	23	0	0	35	161	287	1,256	**287.02**
Yorba Linda WD	0	14	89	323	96	18	0	0	40	280	278	1,138	**223.99**
MWDOC Totals	38	2,779	1,494	11,282	5,106	809	103	1,651	3,330	12,038	7,300	45,930	**9,405.17**
Anaheim	0	255	78	2,771	619	114	0	0	156	1,188	400	5,581	**1,433.43**
Fullerton	0	4	28	286	60	23	0	0	61	293	193	948	**174.49**
Santa Ana	0	11	25	925	89	23	0	0	33	602	209	1,917	**425.93**
Non-MWDOC Totals	0	270	131	3,982	768	160	0	0	250	2,083	802	8,446	**2,033.86**
Orange County Totals	**38**	**3,049**	**1,625**	**15,264**	**5,874**	**969**	**103**	**1,651**	**3,580**	**14,121**	**8,102**	**54,376**	**11,439.03**

TURF REMOVAL BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY 10/11		FY 11/12		FY 12/13		FY 13/14		FY 14/15		FY 15/16		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	
Brea	**0**	**0**	3,397	9,466	7,605	0	5,697	0	71,981	30,617	12,421	0	101,101	40,083	**46.12**
Buena Park	**0**	**0**	0	0	0	0	0	0	11,670	1,626	5,827	0	17,497	1,626	**4.54**
East Orange	**0**	**0**	0	0	0	0	1,964	0	18,312	0	6,921	0	27,197	0	**6.92**
El Toro	**0**	**0**	4,723	0	4,680	72,718	4,582	0	27,046	221,612	15,277	86,846	56,308	381,176	**132.49**
Fountain Valley	**0**	**0**	1,300	0	682	7,524	4,252	0	45,583	5,279	5,869	0	57,686	12,803	**22.35**
Garden Grove	**0**	**46,177**	14,013	0	4,534	0	8,274	0	67,701	22,000	13,443	0	107,965	68,177	**81.61**
Golden State	**0**	**0**	42,593	30,973	31,813	3,200	32,725	8,424	164,507	190,738	29,919	0	301,557	233,335	**192.04**
Huntington Beach	**801**	**3,651**	27,630	48,838	9,219	12,437	20,642	0	165,600	58,942	54,016	7,426	277,908	131,294	**149.53**
Irvine Ranch	**5,423**	**12,794**	6,450	1,666	32,884	32,384	36,584	76,400	234,905	317,999	70,450	1,174,609	386,696	1,615,852	**434.10**
La Habra	**0**	**7,775**	0	8,262	0	0	0	0	14,014	1,818	6,127	2,936	20,141	20,791	**18.02**
La Palma	**0**	**0**	0	0	0	0	0	0	4,884	0	500	57,400	5,384	57,400	**9.47**
Laguna Beach	**978**	**0**	2,533	0	2,664	1,712	4,586	226	13,647	46,850	2,693	0	27,101	48,788	**24.38**
Mesa Water	**0**	**0**	6,777	0	10,667	0	22,246	0	131,675	33,620	18,947	0	190,312	33,620	**68.99**
Moulton Niguel	**956**	**16,139**	4,483	26,927	11,538	84,123	14,739	40,741	314,250	1,612,845	80,041	127,043	426,007	1,907,818	**681.78**
Newport Beach	**0**	**0**	3,454	0	3,548	2,346	894	0	33,995	65,277	1,064	55,287	42,955	122,910	**41.78**
Orange	**0**	**0**	12,971	0	15,951	8,723	11,244	0	120,093	281,402	19,781	0	180,040	290,125	**142.80**
San Clemente	**0**	**0**	21,502	0	16,062	13,165	18,471	13,908	90,349	1,137	18,718	392,742	165,102	420,952	**128.24**
San Juan Capistrano	**0**	**0**	22,656	103,692	29,544	27,156	12,106	0	101,195	32,366	13,778	19,598	179,279	182,812	**167.35**
Santa Margarita	**4,483**	**5,561**	1,964	11,400	10,151	11,600	17,778	48,180	211,198	514,198	104,454	178,666	350,028	769,605	**300.42**
Seal Beach	**0**	**0**	0	0	3,611	0	0	0	15,178	504	2,159	0	20,948	504	**6.72**
Serrano	**0**	**0**	0	0	0	0	2,971	0	41,247	0	32,545	0	76,763	0	**17.35**
South Coast	**0**	**16,324**	6,806	0	9,429	4,395	15,162	116,719	84,282	191,853	46,342	0	162,021	329,291	**165.41**
Trabuco Canyon	**0**	**0**	272	0	1,542	22,440	2,651	0	14,771	0	5,436	66,964	24,672	89,404	**29.00**
Tustin	**0**	**0**	0	0	9,980	0	1,410	0	71,285	14,137	13,567	1,700	96,242	15,837	**32.24**
Westminster	**0**	**0**	0	0	0	0	0	0	14,040	34,631	11,354	0	25,394	34,631	**15.22**
Yorba Linda	**11,349**	**0**	0	0	0	0	0	0	112,136	12,702	51,470	54,587	174,955	67,289	**59.33**
MWDOC Totals	**23,990**	**108,421**	**183,524**	**241,224**	**216,104**	**303,923**	**238,978**	**304,598**	**2,195,544**	**3,692,153**	**643,119**	**2,225,804**	**3,501,259**	**6,876,123**	**2,978.20**
Anaheim	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	0	**-**
Fullerton	**0**	**0**	0	0	0	0	0	9,214	0	0	0	0	0	9,214	**3.87**
Santa Ana	**0**	**0**	0	0	0	0	0	0	0	0	0	0	0	0	**-**
Non-MWDOC Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9,214**	**0**	**0**	**0**	**0**	**0**	**9,214**	**3.87**
Orange County Totals	**23,990**	**108,421**	**183,524**	**241,224**	**216,104**	**303,923**	**238,978**	**313,812**	**2,195,544**	**3,692,153**	**643,119**	**2,225,804**	**3,501,259**	**6,885,337**	**2,982**

[1]Installed device numbers are listed as square feet

HOME WATER SURVEYS PERFORMED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 13/14		FY 14/15		FY 15/16		Total		Cumulative
	Surveys	Cert Homes	Surveys	Cert Homes	Surveys	Cert Homes	Surveys	Cert Homes	Water Savings
Brea	1	0	2	0	0	0	3	0	0.16
Buena Park	0	0	1	0	0	0	1	0	0.05
East Orange	19	0	1	0	0	0	20	0	1.39
El Toro	0	0	3	0	0	0	3	0	0.14
Fountain Valley	3	0	4	0	0	0	7	0	0.40
Garden Grove	0	0	6	0	1	0	7	0	0.31
Golden State	0	0	0	0	0	0	0	0	0.00
Huntington Beach	2	0	5	0	2	0	9	0	0.42
Irvine Ranch	1	0	3	0	5	0	9	0	0.33
La Habra	0	0	1	0	0	0	1	0	0.05
La Palma	0	0	0	0	0	0	0	0	0.00
Laguna Beach	4	0	8	0	1	0	13	0	0.68
Mesa Water	0	0	0	0	0	0	0	0	0.00
Moulton Niguel	4	0	4	0	0	0	8	0	0.47
Newport Beach	2	0	8	0	3	0	13	0	0.59
Orange	2	0	18	0	1	0	21	0	1.01
San Clemente	15	0	13	0	0	0	28	0	1.67
San Juan Capistrano	4	0	13	0	2	0	19	0	0.94
Santa Margarita	15	0	40	1	12	0	67	1	3.22
Seal Beach	0	0	1	0	1	0	2	0	0.07
Serrano	0	0	2	0	0	0	2	0	0.09
South Coast	6	0	4	0	1	0	11	0	0.64
Trabuco Canyon	0	0	4	0	0	0	4	0	0.19
Tustin	0	0	10	0	4	0	14	0	0.56
Westminster	0	0	0	0	0	0	0	0	0.00
Yorba Linda	0	0	13	0	8	0	21	0	0.80
MWDOC Totals	**78**	**0**	**164**	**1**	**41**	**0**	**283**	**1**	**14.18**
Anaheim	0	0	0	0	0	0	0	0	0.00
Fullerton	0	0	17	0	1	0	18	0	0.82
Santa Ana	0	0	0	0	0	0	0	0	0.00
Non-MWDOC Totals	**0**	**0**	**17**	**0**	**1**	**0**	**18**	**0**	**0.82**
Orange County Totals	**78**	**0**	**181**	**1**	**42**	**0**	**301**	**1**	**15.007**

SYNTHETIC TURF INSTALLED BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY 07/08		FY 08/09		FY 09/10		FY 10/11		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	
Brea	0	0	2,153	2,160	500	0	0	0	2,653	2,160	3.30
Buena Park	0	0	1,566	5,850	0	0	0	0	1,566	5,850	5.19
East Orange	0	0	0	0	983	0	0	0	983	0	0.55
El Toro	3,183	0	2,974	0	3,308	0	895	0	10,360	0	6.98
Fountain Valley	11,674	0	1,163	0	2,767	0	684	0	16,288	0	12.46
Garden Grove	1,860	0	0	0	3,197	0	274	0	5,331	0	3.47
Golden State	6,786	0	13,990	0	15,215	0	2,056	0	38,047	0	24.88
Huntington Beach	15,192	591	12,512	0	4,343	1,504	0	0	32,047	2,095	25.29
Irvine Ranch	11,009	876	13,669	0	2,585	0	0	0	27,263	876	21.00
La Habra	0	0	0	0	0	0	0	0	0	0	-
La Palma	429	0	0	0	0	0	0	0	429	0	0.36
Laguna Beach	3,950	0	3,026	0	725	0	0	0	7,701	0	5.84
Mesa Water	4,114	0	3,005	78,118	4,106	0	2,198	0	13,423	78,118	63.46
Moulton Niguel	14,151	0	25,635	2,420	7,432	0	0	0	47,218	2,420	35.69
Newport Beach	2,530	0	6,628	0	270	0	0	0	9,428	0	6.92
Orange	4,169	0	7,191	0	635	0	0	0	11,995	0	8.89
San Clemente	9,328	0	11,250	455	2,514	1,285	500	0	23,592	1,740	18.37
San Juan Capistrano	0	0	7,297	639	2,730	0	4,607	0	14,634	639	9.02
Santa Margarita	12,922	0	26,069	0	21,875	0	7,926	0	68,792	0	44.68
Seal Beach	0	0	817	0	0	0	0	0	817	0	0.57
Serrano	7,347	0	1,145	0	0	0	0	0	8,492	0	6.97
South Coast	2,311	0	6,316	0	17,200	0	1,044	0	26,871	0	16.43
Trabuco Canyon	1,202	0	9,827	0	0	0	0	0	11,029	0	7.89
Tustin	6,123	0	4,717	0	2,190	0	0	0	13,030	0	9.67
Westminster	2,748	16,566	8,215	0	890	0	0	0	11,853	16,566	22.47
Yorba Linda	11,792	0	12,683	0	4,341	5,835	0	0	28,816	5,835	24.48
MWDOC Totals	132,820	18,033	181,848	89,642	97,806	8,624	20,184	0	432,658	116,299	384.83
Anaheim	4,535	0	7,735	20,093	13,555	65,300	4,122	0	29,947	85,393	69.18
Fullerton	4,865	876	5,727	0	6,223	0	105	0	16,920	876	12.36
Santa Ana	0	0	2,820	0	525	0	0	0	3,345	0	2.27
Non-MWDOC Totals	9,400	876	16,282	20,093	20,303	65,300	4,227	0	50,212	86,269	83.81
Orange County Totals	142,220	18,909	198,130	109,735	118,109	73,924	24,411	0	482,870	202,568	468.63

[1]Installed device numbers are calculated in square feet

ULF TOILETS INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	Previous Years	FY 95-96	FY 96-97	FY 97-98	FY 98-99	FY 99-00	FY 00-01	FY 01-02	FY 02-03	FY 03-04	FY 04-05	FY 05-06	FY 06-07	FY 07-08	FY 08-09	Total	Cumulative Water Savings across all Fiscal Years
Brea	378	189	299	299	122	144	867	585	341	401	26	48	17	4	0	**3,720**	**1,692.64**
Buena Park	361	147	331	802	520	469	524	1,229	2,325	1,522	50	40	18	9	0	**8,347**	**3,498.37**
East Orange CWD RZ	2	0	33	63	15	17	15	50	41	44	19	18	13	2	0	**332**	**138.23**
El Toro WD	1,169	511	678	889	711	171	310	564	472	324	176	205	61	40	0	**6,281**	**3,091.16**
Fountain Valley	638	454	635	858	1,289	2,355	1,697	1,406	1,400	802	176	111	58	32	0	**11,911**	**5,383.10**
Garden Grove	1,563	1,871	1,956	2,620	2,801	3,556	2,423	3,855	3,148	2,117	176	106	67	39	0	**26,298**	**12,155.41**
Golden State WC	3,535	1,396	3,141	1,113	3,024	2,957	1,379	2,143	3,222	1,870	167	116	501	43	0	**24,607**	**11,731.47**
Huntington Beach	3,963	1,779	2,600	2,522	2,319	3,492	3,281	2,698	3,752	1,901	367	308	143	121	0	**29,246**	**13,854.70**
Irvine Ranch WD	4,016	841	1,674	1,726	1,089	3,256	1,534	1,902	2,263	6,741	593	626	310	129	0	**26,700**	**11,849.23**
Laguna Beach CWD	283	93	118	74	149	306	220	85	271	118	32	26	29	6	0	**1,810**	**845.69**
La Habra	594	146	254	775	703	105	582	645	1,697	1,225	12	31	6	7	0	**6,782**	**2,957.73**
La Palma	65	180	222	125	44	132	518	173	343	193	31	27	20	17	0	**2,090**	**927.52**
Mesa Water	1,610	851	1,052	2,046	2,114	1,956	1,393	1,505	2,387	988	192	124	56	14	0	**16,288**	**7,654.27**
Moulton Niguel WD	744	309	761	698	523	475	716	891	728	684	410	381	187	100	0	**7,607**	**3,371.14**
Newport Beach	369	293	390	571	912	1,223	438	463	396	1,883	153	76	36	16	0	**7,219**	**3,166.77**
Orange	683	1,252	1,155	1,355	533	2,263	1,778	2,444	2,682	1,899	193	218	88	53	4	**16,600**	**7,347.93**
San Juan Capistrano	1,234	284	193	168	323	1,319	347	152	201	151	85	125	42	39	0	**4,663**	**2,324.42**
San Clemente	225	113	191	65	158	198	667	483	201	547	91	66	37	34	0	**3,076**	**1,314.64**
Santa Margarita WD	577	324	553	843	345	456	1,258	790	664	260	179	143	101	29	0	**6,522**	**3,001.01**
Seal Beach	74	66	312	609	47	155	132	81	134	729	29	10	6	12	0	**2,396**	**1,073.80**
Serrano WD	81	56	68	41	19	52	95	73	123	98	20	15	14	2	0	**757**	**338.66**
South Coast WD	110	176	177	114	182	181	133	358	191	469	88	72	32	22	0	**2,305**	**990.05**
Trabuco Canyon WD	10	78	42	42	25	21	40	181	102	30	17	20	12	14	0	**634**	**273.02**
Tustin	968	668	557	824	429	1,292	1,508	1,206	1,096	827	69	89	26	12	0	**9,571**	**4,423.88**
Westminster	747	493	969	1,066	2,336	2,291	2,304	1,523	2,492	1,118	145	105	70	24	0	**15,683**	**7,064.28**
Yorba Linda WD	257	309	417	457	404	1,400	759	1,690	1,155	627	158	136	81	41	0	**7,891**	**3,409.49**
MWDOC Totals	24,256	12,879	18,778	20,765	21,136	30,242	24,918	27,175	31,827	27,568	3,654	3,242	2,031	861	4	**249,336**	**113,878.61**
Anaheim	447	1,054	1,788	3,661	1,755	7,551	4,593	6,346	9,707	5,075	473	371	462	341	1	**43,625**	**18,359.52**
Fullerton	1,453	1,143	694	1,193	1,364	2,138	1,926	2,130	2,213	1,749	172	77	44	23	2	**16,321**	**7,435.23**
Santa Ana	1,111	1,964	1,205	2,729	2,088	8,788	5,614	10,822	10,716	9,164	279	134	25	5	0	**54,644**	**22,887.95**
Non-MWDOC Totals	3,011	4,161	3,687	7,583	5,207	18,477	12,133	19,298	22,636	15,988	924	582	531	369	3	**114,590**	**48,682.70**
Orange County Totals	27,267	17,040	22,465	28,348	26,343	48,719	37,051	46,473	54,463	43,556	4,578	3,824	2,562	1,230	7	**363,926**	**162,561.30**

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