
Appendix I Water Supply Assessment

Water Supply Assessment for the City of Santa Ana Metro East Mixed-Use Zone



Prepared for
City of Santa Ana

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*City of Santa Ana
Metro East Mixed-Use Zone
Water Supply Assessment*

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ATTACHMENTS

Attachment A	Project Technical Memorandum
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ACRONYMS and ABBREVIATIONS

AF	Acre Feet
AFY	Acre Feet per Year
AWPF	Advanced Water Purification Facilities
BEA	Basin Equity Assessment
BMP	Best Management Practices
BPP	Basin Pumping Percentage
CALSIM	California Water Allocation and Reservoir Operations Model
CDR	Center for Demographic Research
CEQA	California Environmental Quality Act
cfs	Cubic Feet Per Second
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DHS	Department of Health Services
DWR	Department of Water Resources
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
EOC	Emergency Operations Center
ERP	Emergency Response Plan
EWCP	Emergency Water Conservation Plan
GAP	Green Acres Project
gpd	Gallons Per Day
gpm	Gallons Per Minute
GWRS	Groundwater Replenishment System
IAWP	Interim Agricultural Water Program
IRP	Integrated Resources Plan
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
LTFP	Long Term Facilities Plan
LRP	Local Resources Program
MAF	Million Acre Feet
MARS	Metropolitan Area Radio System Network
MG	Million Gallons
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
MEOC	Metropolitan Emergency Operations Center
MPR	Master Plan Report
MWDOC	Municipal Water District of Orange County
OCWA	Orange County Water Association
OCWD	Orange County Water District
OCSD	Orange County Sanitation District1
PEIR	Program Environmental Impact Report
QSA	Quantification Settlement Agreement
RA	Replenishment Assessment
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SARI	Santa Ana Regional Interceptor
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SBVMWD	San Bernardino Valley Municipal Water District
SOCWRS	South Orange County Water Reliability Study
SWP	State Water Project
SWRCB	State Water Resources Control Board

TDS	Total Dissolved Solids
TIN	Total Inorganic Nitrogen
USBR	U.S. Bureau of Reclamation
UWMP	Urban Water Management Plan
VEPO	Volunteer Emergency Preparedness Organization
WARN	Water Agencies Response Network
WEROC	Water Emergency Response Organization of Orange County
WOC	Water Operations Center
WSA	Water Supply Assessment
WSDM	Water Surplus and Drought Management

EXECUTIVE SUMMARY

The City of Santa Ana has proposed the creation of a mixed-use overlay zone (Overlay Area) over a portion of the City. The Overlay Area is also known as the Metro East Mixed-Use Zone (Project). The Project is located immediately east of the Santa Ana Freeway (Interstate 5, I-5) and immediately west of State Route 55 (SR-55) in the City of Santa Ana in Orange County. The Project is bounded by I-5 on the west and south; Tustin Avenue on the east, and East 6th Street on the north.

The Project is comprised of over 200 acres of land that is designated in the City's General Plan for Professional and Administrative Office, and is currently developed with commercial and office uses, or vacant properties. The areas surrounding the Project area are a mix of residential and commercial properties, including a single-family residential neighborhood to the north, and a private school and multi-family residential properties to the south. The overlay zone will allow for the development of mixed-use and/or residential land uses within the Project area. Total Project proposed land use includes 152.9 acres of Residential (59%), 78.3 acres of Office (30%), and 29.3 acres of Commercial (11%).

The City will need to amend the current General Plan to permit these new land uses and the Zoning Code to establish development standards that implement the City's vision for the development of mixed-use and/or residential in the Project area. These amendments will allow the City to encourage a more active commercial and residential community, provide an expanded economic base, maximize property and sales tax revenues, and provide employment opportunities for City residents. Creation of this Project area will also allow the City to consider subsequent actions consistent with these updates in the General Plan and the Land Use designations.

Additionally, the City has determined that future individual development projects and infrastructure improvements within the Project area will require further environmental review and analysis of potential site specific environmental impacts in conjunction with the processing of discretionary applications; therefore, the City is preparing an Environmental Impact Report (EIR). The EIR is intended to serve as the primary environmental document for subsequent actions within the Project area, including all local discretionary approvals.

The EIR includes an assessment of utilities, including water supply. Recent legislation, SB 610, requires that a water supply assessment be prepared to document the sufficiency of an available water supply for the City and the proposed Project. This Water Supply Assessment identifies water supply and water reliability to the City, now and into the future, including a sufficient water supply for the Project.

Development Specific Level

At this time, one project-specific development, consistent with the objectives of the proposed overlay zone designation, has been proposed within the Project area. This development is specifically evaluated along with the entire Overlay Area land use designations.

The development is the First and Cabrillo Tower by NDC Development on approximately five acres, which is currently developed and will include some demolition. The development includes 374 residential units in one 22-story tower with 191 residential units, and one 21-story tower with 183 residential units. The development also includes 8,900 square feet of commercial/retail space fronting both First Street and Cabrillo Park Drive.

Source of Water

The City currently obtains water from the following primary water sources: 1) groundwater; and 2) imported water. The City currently receives approximately 69 percent of its water supply from groundwater and 31 percent from imported water. The City also supplies a small amount of recycled water (150 acre-feet per year) in the south part of the City, which is expected to remain constant since City infrastructure for recycled water is not expected to be expanded and the source of recycled water is not expected to produce additional water to meet local agency future projections.

Water Demand

The City's 2005 water demand was 44,944 acre feet (AF), with an average over the past five years of about 48,700 acre-feet per year (AFY). The 20-year planning period from the time of this Water Supply Assessment, as required by SB 610, projects City water demand by 2025 to be 59,280 afy. This projection is consistent with the City's 2005 Urban Water Management Plan (UWMP) water demand projections, which were developed from City documents, including the General Plan to include overall city growth. However, since the new vision for Metro East Mixed-Use Zone is part of the City's General Plan Update Program, the new land use assumptions for this area were not included in the City's 2005 UWMP. Therefore, water demand projections are required for the Metro East Mixed-Use Zone and the City as whole in this Water Supply Assessment.

The build out of the Project is projected to increase water demand by approximately 1,037.5 afy of water. Build out of the Project is estimated to be consistent with the 20-year time horizon typically associated with the General Plan¹; however, build out may occur sooner or even beyond the 20-year planning period. Build out sooner than or beyond the 20-year planning period would not impact the sufficiency of water for the City and the Project.

¹ Dependent on Metro East Mixed-Use Zone development applications and approval.

While groundwater supply is expected to remain relatively stable throughout the forecast period, the 20-year development phasing plan also allows for the potential to have water demands within the southern California region met from sources that are currently being planned, developed and implemented within the region, including but not limited to, additional conservation programs, recycled water, and desalted water, thereby providing reliability to the sources available to the City.

Supply Projections

Analysis of water supply projections for the City demonstrates that projected supplies will exceed demand through the year 2030. These projections consider land use based on the Metro East Mixed-Use Zone development intensities; projections from the City's 2005 UWMP; water development programs and projects; and water conservation. Analysis shows that groundwater and imported water are anticipated to remain stable to the City, based on studies and reports of the Orange County Water District (OCWD) and the Metropolitan Water District of Southern California (Metropolitan), respectively.

The 20-year projection, and beyond, of water demand will be met by approximately 70 percent groundwater, based on an expected long-term Basin Production Percentage (BPP), and 30 percent imported water confirmed reliable by Metropolitan. Additionally, analysis of normal, single-dry, and multiple-dry year scenarios also demonstrate the City's ability to meet or exceed demand during the 20-year planning period, even under reduced imported water supply conditions.

Additionally, the City has the opportunity to increase supply to meet demand, if extraordinary circumstances require, through the following measures: 1) production of groundwater above the BPP up to the basin safe yield; 2) increasing imported water purchases; and 3) increased water conservation measures.

Reliability of future water supplies to the region will be ensured through continued implementation of the local agency programs, OCWD's Long-Term Facilities Plan, and the combined efforts and programs among member agencies of Metropolitan, such as the Integrated Resources Plan (IRP) and proposed Capital Improvement Program. Agencies include all water wholesalers and retailers, the Orange County Sanitation District (OCSA), the Santa Ana Regional Water Quality Control Board (RWQCB), and the Santa Ana Watershed Project Authority (SAWPA).

Collectively, the information included in this Water Supply Assessment identifies a sufficient water supply and reliability to the City, now and into the future, including a sufficient water supply for Metro East Mixed-Use Zone.

1.0 INTRODUCTION

The City of Santa Ana has proposed the creation of the Metro East Mixed-Use Zone (Overlay Area or Project), which is comprised of over 200 acres of land. This land is currently designated in the City's General Plan for Professional and Administrative Office, and is currently developed with commercial and office uses.

The purpose of the overlay zone is to allow for the development of mixed-use and/or residential land uses within the Project area. To accommodate this objective, the City will need to amend the current General Plan to permit these new land uses, and the Zoning Code to establish development standards that implement the City's vision for the development of mixed-use and/or residential in the Project area.

Further, the City has determined that future individual development projects and infrastructure improvements within the Project area will require further environmental review and analysis of potential site specific environmental impacts in conjunction with the processing of discretionary applications; therefore, the City is preparing an Environmental Impact Report (EIR). The EIR is intended to serve as the primary environmental document for subsequent actions within the Project area, including all local discretionary approvals.

The EIR includes an assessment of utilities, including water supply. Recent legislation, SB 610, requires that a water supply assessment be prepared to document the sufficiency of an available water supply for the City and the proposed Project.

This Water Supply Assessment (WSA) includes a discussion of the relevant legislation requiring the WSA, an overview of the proposed Project, analysis of water demands for the City's existing supply sources and the Project over a 20-year or more planning period, analysis of reliability of the City's water supplies, including each agency that impacts water supply and water quality to the region, and concludes with a sufficiency analysis of water supply during normal, single-dry, and multiple dry years over a 20-year planning period.

2.0 LEGISLATION

Due to the Project's potential affect on current and future water supplies, the State of California, through SB 610, requires that a WSA be completed for the proposed development. The Project proposes 5,551 residential units and 4.7 million square feet of office and commercial space exceeding the threshold of 500 units and 250,000 square feet respectively to comply with development of a WSA.

The City has determined that the Project is subject to California Environmental Quality Act (CEQA) and, therefore, has prepared this WSA. The following outlines the requirements of SB 610.

2.1 SB 610 – Costa – Water Supply Planning

SB 610 was chaptered into law on October 9, 2001. SB 610 requires a city or county that determines a project subject to CEQA to identify any public water system that may supply water for the project and to request those public water systems to prepare a specified WSA. The assessment is to include the following:

1. Discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing.
2. Identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project and water received in prior years pursuant to those entitlements, rights, and contracts.
3. Description of the quantities of water received in prior years by the public water system under the existing water supply entitlements, water rights or water service contracts.
4. Water supply entitlements, water rights or water service contracts shall be demonstrated by the following:
 - a. Written contracts or other proof of entitlement to an identified water supply.
 - b. Copies of capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.
 - c. Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.
 - d. Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.
5. Identification of other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system.

6. If groundwater is included for the supply for a proposed project, the following additional information is required:
 - a. Review of any information contained in the Urban Water Management Plan (UWMP) relevant to the identified water supply for the proposed project.
 - b. Description of any groundwater basin(s) from which the proposed project will be supplied. Adjudicated basins must have a copy of the court order or decree adopted and a description of the amount of groundwater the public water system has the legal right to pump. For non-adjudicated basins, information on whether the DWR has identified the basin as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of DWR that characterizes the condition of the basin, and a detailed description of the efforts being undertaken in the basin to eliminate the long-term overdraft condition.
 - c. Description and analysis of the amount and location of groundwater pumped by the public water system for the past 5 years from any groundwater basin which the proposed project will be supplied. Analysis should be based on information that is reasonably available, including, but not limited to, historic use records.
 - d. Description and analysis of the amount and location of groundwater projected to be pumped by the public water system from any groundwater basin which the proposed project will be supplied. Analysis should be based on information that is reasonably available, including, but not limited to, historic use records.
 - e. Analysis of sufficiency of the groundwater from the basin(s) from which the proposed project will be supplied.
 - f. The water supply assessment shall be included in any environmental document prepared for the project.
 - g. The assessment may include an evaluation of any information included in that environmental document. A determination shall be made whether the projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.

Additionally, SB 610 requires new information to be included as part of an UWMP if groundwater is identified as a source of water available to the supplier. Information must also include a description of all water supply projects and programs that may be undertaken to meet total projected water use. The City of Santa Ana 2005 UWMP includes a comprehensive discussion of groundwater. SB 610 prohibits eligibility for funds from specified bond acts until the plan is submitted to the State. Until January 1, 2006, SB 610 requires the California Department of Water Resources (DWR) to consider if an updated UWMP has been submitted in determining eligibility for funds made available from programs administered by DWR. Recent proposed legislation by Senator Kuehl (SB 1640) extending this sunset date was vetoed by the Governor.

3.0 SANTA ANA METRO EAST MIXED-USE ZONE

3.1 Project Description

Program Level

The City of Santa Ana has proposed the creation of a mixed-use overlay zone (Overlay Area) over a portion of the City. The Overlay Area is also known as the Metro East Mixed-Use Zone (Project). The Project is located immediately east of the Santa Ana Freeway (Interstate 5, I-5) and immediately west of State Route 55 (SR-55) in the City of Santa Ana in Orange County, as shown in Figure 1. The junction of I-5 and SR-55 is located approximately 0.2 miles to the southeast of the Project. The Project is bounded by I-5 on the west and south; Tustin Avenue on the east, and East 6th Street on the north.

The Project is comprised of 200 acres of land that is designated in the City's General Plan for Professional and Administrative Office, and is currently developed with commercial and office uses. There are several large vacant properties located along the western boundary of the Project area. The areas surrounding the Project area are a mix of residential and commercial properties, including a single-family residential neighborhood to the north, and a private school and multi-family residential properties to the south. Figure 2 shows the Project area.

The purpose of the overlay zone is to allow for the development of mixed-use and/or residential land uses within the Project area. To accommodate this objective, the City will need to amend the current General Plan to permit these new land uses, and the Zoning Code to establish development standards that implement the City's vision for the development of mixed-use and/or residential in the Project area. These amendments will allow the City to encourage a more active commercial and residential community, provide an expanded economic base, maximize property and sales tax revenues, and provide employment opportunities for City residents. Creation of this Project area will also allow the City to consider subsequent actions consistent with these updates in the General Plan and the Land Use designations.

Project Specific Level

One project-specific development, consistent with the objectives of the proposed overlay zone designation, has been proposed within the Project area; First and Cabrillo Towers by NDC Development.

The proposed Draft Environmental Impact Report (EIR) will have two volumes. Volume One (Program EIR) will evaluate the potential environmental effects of implementing a mixed-use overlay zone (Overlay Area) over a portion of the City of Santa Ana. Volume Two of the EIR will evaluate the potential environmental effects of the proposed project-specific development of the First and Cabrillo Towers.

3.2 Metro East Mixed-Use Zone (Project) Water Demands

The Project will generate a build-out need over a 20-year planning horizon of approximately 1,386 AFY of potable water. The Project is not proposed to use recycled water since the City's recycled water infrastructure is limited to the south part of the city and is not expected to be expanded. The recycled water source is not expected to produce additional water to meet local agency future projections.

In order to determine water demand requirements for the Project development, a water demand analysis was performed and presented to the City in a technical memorandum. The Project Technical Memorandum is included as Attachment A to this Assessment, which includes important assumptions regarding the water demand the Project will put on the City's water system. These assumptions provide the rationale for the volume of estimated Project water demand.

The water demand analysis includes all 260.5 gross acres of the Project by land use designation. For the water demand analysis,² the Project is shown complete by fiscal year 2030, which includes the 20-year planning period. Comparing the latest water projection of the study area as presented in the City's 2005 UWMP, there is an overall decrease in the anticipated office and commercial water demands over time as residential water demand increases significantly. Table 3.2.1-1 shows a summary of the Project water demands, including total demand and net demand change based on land use type changes through 2030.

**Table 3.2.1-1
 Metro East Mixed-Use Zone
 Summary of Water Demand Analysis**

Water Use Sector	Net Demand (gpd)	Net Demand Change (gpd)	Net Demand Change (AFY)
Residential	994,024	994,024	1,113.5
Office	156,169	<43,449>	<48.7>
Commercial	87,840	<24,445>	<27.3>
Total Project Net Demand	1,238,033	926,131	1,037.5

² Dudek Technical Memorandum, *Water Demands for the Metro East Mixed-Use Zone*, October 2006.

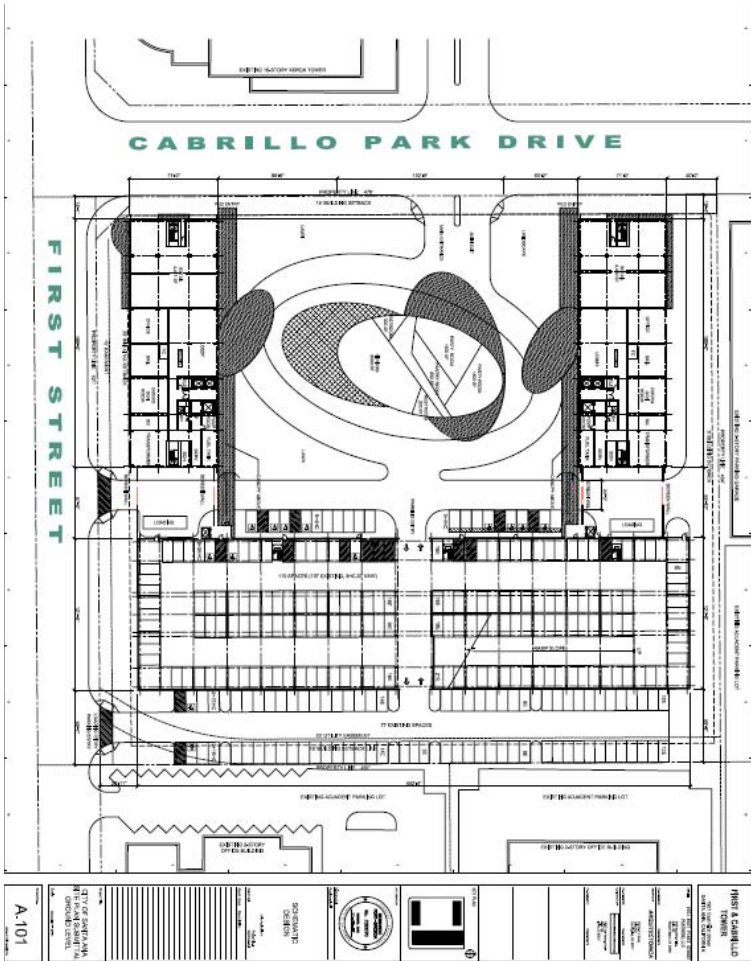


Figure 3 First & Cabrillo Tower Site Plan

Water demands for the Project are theoretically calculated in 5-year increments; however, build out of the Project is dependent on market demand, which may fluctuate over the 20-year planning period. The existing demands established the starting point. The percent increase per 5-year increment was established by EIP Associates: 2010=17%, 2015=38%, 2020=59%, 2025=79%, and 2030=100%. The difference between existing and built-out water demand was multiplied by the 5-year percentage increase for each increment and added to the existing demand to derive the water demand total for each 5-year water demand.

Projected water demands for each of the land use categories in the Overlay Area were determined by multiplying the assumed water demand factors with the area. The equation used to calculate the ultimate water demands is as follows:

$$\text{Ultimate Water Demands} = \text{Unit Water Demand Factor (gallons per day (gpd)/acre)} * \text{Area (acres)}$$

Section 4.0, Water Demand and Supplies, discusses the incremental increase in water demand for the City growing at approximately 12.5 percent for the 5-year period to 2010 and 6.5 percent every 5-year period after that to 2030.³ The resulting water demand for the Overlay Area is projected to increase 94.6 percent through 2010, 59.4 percent to 2015, 37.3 percent to 2020, 27.2 percent to 2025, and 21.4 percent to 2030.

³ Project phasing will be dependent on the Project development applications and approval.

4.0 CITY OF SANTA ANA WATER DEMAND AND SUPPLIES

4.1 Overview of Supply and Demand

The City of Santa Ana Water Utility Division (City) currently serves water to an area of approximately 27 square miles and to approximately 350,600 people. A map of the City's service area is shown in Figure 4. The City currently obtains water from the following primary water sources: 1) naturally and artificially recharged local groundwater through 19 operating wells; and 2) imported water through seven import connections. The City has limited recycled water infrastructure in the south part of the City providing only about 150 AFY of recycled water, and it is not anticipated to be expanded in the 25-year planning horizon. In addition, the City maintains eight reservoirs with a storage capacity of 49.3 million gallons, seven pumping stations, and 444 miles of transmission and distribution mains.

The City currently receives approximately 69 percent of its water supply from its groundwater wells that access the Orange County Groundwater Basin and 31 percent imported water from the Metropolitan Water District of Southern California (Metropolitan). The Orange County Groundwater Basin is managed by the Orange County Water District (OCWD). Current and planned improvements will increase the efficient and reliable use of both water sources. Each of the sources of water for the City are briefly discussed in this section and more fully discussed in the following subsections.

Growth Rate

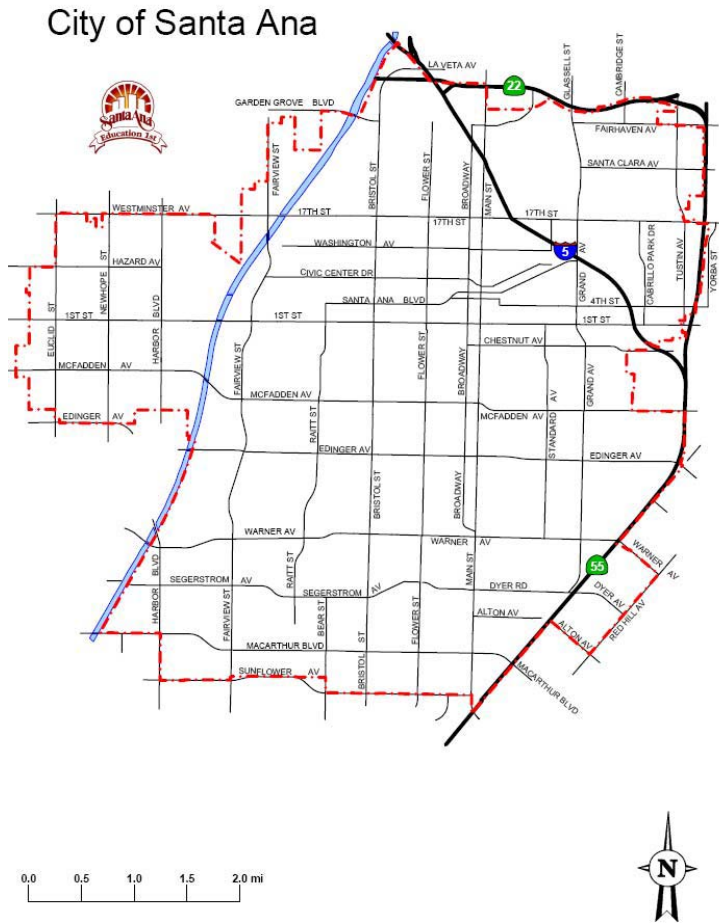
The City's adopted 2005 UWMP included an analysis on the City's expected growth rate. According to the UWMP, the Center for Demographic Research at California State University, Fullerton (CDR) has estimated the City's growth rate to increase by about 5.6 percent over the next 25 years. Table 4.1-1 shows the projected population for the City rounded to the nearest hundred.

**Table 4.1-1
 City of Santa Ana Population – Current and Projected**

2000	2005	2010	2015	2020	2025	2030
337,997	350,625	359,823	364,049	368,026	370,196	370,130

Source: City of Santa Ana 2005 Urban Water Management Plan (City of Santa Ana Planning Department and the Center for Demographic Research, California State University Fullerton).

Figure 4. City of Santa Ana Water Service Area



Water Demand

The City's water demand is satisfied from groundwater, imported water, and a very small amount of recycled water. Table 4.1-2 shows historic water production by source for the past five years.

Table 4.1-2
City of Santa Ana
Historical Water Production by Source to Meet Demand
(AF)

Source	2001	2002	2003	2004	2005
Groundwater	43,269	27,717	29,715	28,043	25,743
Imported Water	6,984	21,578	17,144	19,811	19,033
Recycled Water	150	155	159	164	168
Total Water Supply	50,403	49,450	47,018	48,018	44,944

Source: City of Santa Ana 2005 Urban Water Management Plan

The average water use over the four year period between 2001 and 2004 was 48,722 AFY, followed by an 8.5 percent decline in 2005. This decline is directly attributable to the historic rainfall levels recorded in southern California in 2005. That being the case, the 2001-2004 average has been used as the basis for future projections.

The City also tracks demand by customer classes, which is shown in Table 4.1-3 for the years 2000 and 2005.

Table 4.1-3
City of Santa Ana
Historical Water Use by Customer Class
(AF)

Customer Class	2000	2005
Single Family Residential	20,569	16,684
Multi-Family Residential	12,117	12,319
Commercial, Industrial, Institutional	13,436	12,139
Landscape	2,541	2,069
Recycled Water	146	168
Other	49	38
Water Use by Class	48,858	43,417
Unaccounted for System Losses	2,119	1,527
Total Water Use	50,977	44,944

Source: City of Santa Ana 2005 Urban Water Management Plan

Unaccounted for water is the difference between water production and water consumption and represents “lost” water. Unaccounted-for water occurs for a number of reasons:

- Water lost from system leaking, i.e., from pipes, valves, pumps, and other water system appurtenances.
- Hydrant testing by the City Fire Department to monitor the level of fire protection available throughout the City.
- Hydrant flushing by the City Water Utilities Division to eliminate settled sediment and ensure better water quality.
- Fire fighting usage by the Fire Department.
- Customer meter inaccuracies. Meters have an inherent accuracy for a specified flow range. However, flow above or below this range is usually registered at the lower rate. Meters become less accurate with time due to wear.

The City’s average unaccounted-for water loss of about 5 percent is based on an average over the past five years. This percentage is significantly lower than the 9 percent acceptable threshold of unaccounted-for water, as established by the American Water Works Association.

Demand and Supply Comparison

Table 4.1-4 shows the current and projected water demand and supply for the City of Santa Ana, including additional demand the Project will require through 2030. While SB 610 requires a 20-year planning period, 2030 represents a 25-year planning period, consistent with the City’s 2005 UWMP.

Demand and supply projections consider land use, in addition to water development programs and projects. A supply surplus is indicated demonstrating a sufficient water supply for the City and the Project through the 20-year planning period and beyond.

**Table 4.1-4
 Current and Projected Water Demand and Supply
 City of Santa Ana and the Metro East Mixed-Use Zone
 (AFY)**

Demand and Supply Source	Actual	Projected				
	2005	2010	2015	2020	2025	2030
DEMAND						
City	44,944	50,190	53,180	55,970	59,280	59,540
Metro East Mixed-Use Zone New Demand	--	176	392	607	822	1,037
Total Demand	44,944	50,366	53,572	56,577	60,102	60,577
SUPPLY CAPACITY						
Groundwater	25,743	35,030	37,120	39,070	41,390	41,570
Imported – Treated	19,033	19,630	20,140	22,340	22,260	21,030
Recycled Water	168	150	150	150	150	150
Total Supply	44,944	54,810	57,410	61,560	63,800	62,750
SUPPLY SURPLUS		4,444	3,838	4,983	3,698	2,173
Potable Supply Surplus		4,294	3,688	4,833	3,548	2,023

Source: All except Metro East Mixed-Use Zone demand, City of Santa Ana 2005 Urban Water Management Plan. Metro East Mixed-Use Zone demand from Dudek Technical Memorandum, October 2006.

Demand Assumptions:

1. **City Demand:** Demand projections are consistent with Table 4.2-4 of the City’s 2005 UWMP, which has been adopted by the City Council. Year 2005 includes existing demands for the Metro East Mixed Use Zone, and future demand projections include land use assumptions in the year 2005.
2. **Metro East Mixed-Use Zone Potable Demand:** Project demand assumptions are discussed in Section 3.2, which is summarized from the Project Water Demand Technical Memorandum prepared by Dudek. Project development is calculated in 5-year increments over a 20-year build out period. Total existing and projected demand for the Metro East Mixed-Use Zone is as follows: 2005 – 211 AF; 2010 – 411 AFY, 2015 – 655 AFY, 2020 – 899 AFY, 2025 – 1143 AFY, and 2030 – 1387 AFY. The Project is not proposed to use recycled water since the City’s water infrastructure does not support recycled water distribution beyond the south part of the city. New demand is the difference between existing land use, which is included in the City Demand projections, and the incremental increase resulting from land use changes.

Supply Assumptions:

1. **Groundwater – City:** Groundwater is currently limited to satisfying up to 69 percent (Greg Woodside, OCWD, 9/15/06) of the City's total water demand. However, OCWD is currently developing its Long Term Facilities Plan, which supports a long-term ability of the Basin Production Percentage (BPP) estimated at 70 percent. Since the Orange County Groundwater Basin is not adjudicated, the City may pump above the BPP set by OCWD, with the overage being subject to an additional Basin Equity Assessment. However, for this assessment, 70 percent has been used, consistent with the City's 2005 UWMP for projections through 2030.
2. **Imported - Treated:** The City maintains a capacity of 125 cubic feet per second (CFS) through its seven connections to Metropolitan feeders. Although supply is can be shown as ultimate available regardless of cost, the City's approach is to have supply meet demand. Imported supply is consistent with Table 4.2-4 of the City's 2005 UWMP.

4.2 Groundwater

Orange County Water District (OCWD)

In 1933, OCWD was formed by legislative act to protect and manage the County's vast, natural, underground water supply with the best available technology and to defend its water rights to the Santa Ana River Basin. As part of its original formation, OCWD was established by a special act (Act), of the State of California Legislature. This legislation is found in the State of California Statutes, Water – Uncodified Acts, Act 5683, as amended.⁴ The basin is managed by OCWD under the Act, which functions as a statutorily-imposed physical solution. Section 77 of the Act states that, *'nothing in this act contained shall be so construed as to affect or impair the vested right of any person, association or corporation to the use of water.'*⁵ According to the Act, the City has the right to construct and operate groundwater-producing facilities in the basin. The Act also empowers OCWD to impose replenishment assessments and basin equity assessments on production and to require registration of water-producing facilities and the filing of certain reports; however, OCWD is expressly prohibited from limiting extraction unless a producer agrees.⁶

The basin is managed by OCWD for the benefit of municipal, agricultural and private groundwater producers. OCWD has 23 major producers extracting water from the Orange County groundwater basin (basin) serving a population of approximately 2.9 million.⁷ Carefully managed by OCWD in collaboration with the other water and wastewater agencies, the growing population can be assured of a secure water supply from the groundwater source. Processes such as groundwater recharge of the Santa Ana River, recycling of wastewater, conservation and water use efficiency, and creative water

⁴ Orange County Water District Act.

⁵ Orange County Water District Act, Section 77.

⁶ Orange County Water District Act, Sections 23 and 31.5.

⁷ U.S. Census Bureau. State and County QuickFacts. Available: <http://quickfacts.census.gov/qfd/states/06/06059.html>

purchases have aided in replenishing the groundwater basin to desired levels to meet required demands.

Orange County Groundwater Basin

The Orange County groundwater basin underlies the north half of Orange County beneath broad lowlands. The basin covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, the Pacific Ocean to the southwest, and terminates at the Orange County line to the northwest, where its aquifer systems continue into the Central Basin of Los Angeles County. The aquifers comprising the Orange County groundwater basin extend over 2,000 feet deep and form a complex series of interconnected sand and gravel deposits.

Groundwater supply currently meets approximately 69 percent (FY 2005/06)⁸ of the water supply demand for the 23 groundwater producers. This amount can be adjusted as needed based on groundwater basin hydrologic conditions, but is typically set on an annual basis.

During the water year July 2003 to June 2004, total basin production for all agencies was approximately 284,621 acre-feet.⁹ The groundwater basin generally operates as a reservoir in which the net amount of water stored is increased in wet years to allow for managed overdrafts in dry years. The basin is recharged primarily from local rainfall (greater in wet years), base flow from the Santa Ana River (much of which is actually recycled wastewater from treatment plants in Riverside and San Bernardino Counties), imported water percolated into the basin, and recycled wastewater directly recharged into the basin. The production capability of the basin is being increased as a result of a variety of specific management initiatives including increased wastewater reclamation and the blending of lower quality water with potable water for public distribution.

The Orange County groundwater basin is not adjudicated and based on the Department of Water Resources' official departmental bulletins, California's Groundwater Bulletin 118 Updated 2003 and Bulletin 160, The California Water Plan Update 2005, the Orange County groundwater basin is not specifically identified as a basin in an overdraft condition. The California Water Plan Update, however, does state that groundwater overdraft is a challenge for the South Coast Hydrologic Region, which includes the Orange County groundwater basin. The Orange County groundwater basin is considered in an overdraft condition by OCWD; however, the groundwater levels and amount of overdraft fluctuate overtime. OCWD continually monitors groundwater level trends and has collected data since 1962. OCWD's Groundwater Management Plan summarizes the

⁸ Greg Woodside, OCWD, 9/15/06

⁹Orange County Water District, *Draft 2003-2004 Engineer's Report on Groundwater conditions, Water Supply and Basin Utilization in the Orange County Water District*, February 2005.

accumulated overdraft and water level elevations within the basin. OCWD estimates that the accumulated overdraft in June 2004 was approximately 400,000 acre-feet.¹⁰

Based on OCWD's 2004 Groundwater Management Plan, the target accumulated overdraft is 200,000 AF. An accumulated overdraft condition minimizes the localized high groundwater levels and increases the ability to recharge storm events from the Santa Ana River. OCWD estimates that the groundwater basin can safely be operated on a short-term emergency basis with a maximum accumulated overdraft of approximately 500,000 AF; however, 400,000 AF is preferred. With an accumulated overdraft of 200,000 AF, the basin is considered 99.5 percent full with 40 MAF of groundwater in storage.

In an effort to eliminate long-term overdraft conditions, OCWD developed a comprehensive computer-based groundwater flow model to study and better understand the basin's reaction to pumping and recharge. OCWD has also implemented a monitoring program to track dynamic conditions including groundwater production, storage, elevations, and quality. Components of this monitoring program include the request for the City to provide its groundwater production to OCWD on a monthly basis, yearly measurement of groundwater levels, water quality monitoring, and prevention of sea water intrusion.

Most recently in Spring 2006¹¹, OCWD reported that the 2005/06 winter rains added 170,000 acre-feet of natural recharge to the basin, as well as 269,330 acre-feet of Santa Ana River water, considered a record amount. OCWD hydrogeologists have determined the basin is in great shape, containing more groundwater than it has in more than a decade.

Basin Pumping Percentage (BPP)

One of the methods OCWD uses to manage the amount of production from the Orange County groundwater basin is the establishment of a BPP. OCWD recommends a BPP each water year which is calculated by dividing a producer's groundwater production by their total water demands. The BPP is based on groundwater conditions, availability of imported water supplies, and basin management objectives. The BPP is also a major factor in determining the cost of groundwater production from the basin for that year.

While the BPP has been as high as 75 percent in recent years, the BPP was set at 66 percent for 2004-2005 and 69 percent for the water year 2005-2006. While the BPP may fluctuate from year to year, it is anticipated to increase to 70 percent over the next five years. Producers may pump above the BPP to 100 percent of their needs by paying the Basin Equity Assessment (BEA). The BEA is the additional fee paid on any water pumped above the BPP, making the cost of that water equal or greater to the cost of

¹⁰Orange County Water District, *Draft 2003-2004 Engineer's Report on Groundwater conditions, Water Supply and Basin Utilization in the Orange County Water District*, February 2005.

¹¹Orange County Water District, *Hydrospectives- Orange County Groundwater News*, Spring 2006.

imported water. Such flexibility in producing over the BPP guarantees the City and other water utilities in Orange County the ability to provide water to their customers during periods of varying water availability.

When Metropolitan has an abundance of water, they may choose to activate their In-Lieu Program, where imported water is purchased in-lieu of pumping groundwater. This is a special program supported by Metropolitan, OCWD, and the Municipal Water District of Orange County (MWDOC), which allows some agencies to pump above the BPP without penalty of the BEA.

Recharge Facilities

Another method for controlling overdraft is through recharge management programs. The basin is recharged by multiple sources including natural and artificial sources. Natural recharge occurs when groundwater producers use surface water in-lieu of groundwater. The reduction in pumping naturally recharges the basin. Another source of natural recharge is the result of precipitation and OCWD estimates that approximately 60,000 AFY is recharged to the basin.

Artificial recharge occurs through developed percolation ponds (approximately 1,000 acres) and also via injection through the Talbert and Alamitos Barriers. The four groundwater spreading systems throughout OCWD's service area and their respectable percolations rates are summarized in Table 4.2-1.

These percolation systems can recharge Santa Ana River baseflow and storm flows. OCWD estimates that approximately 155,000 AF of baseflow and 60,000 AF of storm flows are recharged each year on average. OCWD also imports between 35,000 and 60,000 AF of replenishment water to be used for recharging the basin.

**Table 4.2-1
 Orange County Groundwater Basin
 Groundwater Spreading Systems**

System	Area (acres)	Storage Capacity (AF)	Percolation Rate (cfs)
Main River System	245	480	87-115
Off-River System	126	394	15-40
Deep Basin System	280	8,484	89-300
Burriss Pit/Santiago System	373	17,500	106-210

Source: OCWD, Groundwater Management Plan, 2004.

OCWD also recharges the basin by injecting water to prevent seawater intrusion. The seawater intrusion barriers include the Talbert and Alamitos Barriers. The Talbert Barrier has 26 injection wells and injects 12 mgd into the groundwater basin. Over 95 percent of the water injected flows inland and is therefore considered replenishment water. The Alamitos Barrier injects approximately 5,000 AFY of which 50 percent stays within the basin for replenishment. The estimated average annual recharge of the basin based on the information provided above is 328,400 AF to 353,400 AF. The range is due to the amount of imported water purchased from Metropolitan each year. The amount of water available for recharge will vary from year to year.

City Wells

Within the City, groundwater is produced from 19 operating wells that vary in depth from 650 to 1,500 feet, with production varying from 1,100 gallons per minute (gpm) to 3,600 gpm, with a total system capacity of approximately 45,860 gpm (not including proposed Wells 40 and 41; capacities may change after final design) as shown in Table 4.2-2.

**Table 4.2-2
 City of Santa Ana Groundwater Wells**

Well Number	Year Drilled	Depth (feet)	Average Capacity (gpm)
16	1932	978	1,500
18	1956	654	2,285
20	1962	981	3,023
21	1962	986	2,892
24	1965	688	1,286
26	1967	1,186	2,082
27	1977	1,152	2,757
29	1980	1,090	2,534
30	1962	989	3,024
33	1986	1,080	2,849
34	1990	830	1,514
36	1988	1,310	3,600
28	1977	990	2,516
31	1984	1,260	2,762
32	1985	1,030	2,239
35	1992	1,500	2,200
37	1992	1,506	2,300
38	1992	1,300	1,500
39	2002	1,310	3,000
40 - New	2005	1,320	2,500
41 - New	2005	1,000	3,000
Total System Capacity			51,363

Table 4.2-3 summarizes the amount of groundwater pumped by the City for the last five years from the Santa Ana River (Orange County) Basin. In 2001, the BPP was 75 percent; however, the City used groundwater to meet 86 percent of its water demands. The City participated in a summer demonstration program with OCWD to reduce the coastal pumping and transfer groundwater production inland. By participating in the program, the City received a reduction in their BEA from OCWD which provided financial assistance to pump over the BPP. Since 2001, the City has participated in in-lieu programs with Metropolitan and OCWD and therefore the percentage of water demands met with groundwater has consistently been less than the BPP.

**Table 4.2-3
 City of Santa Ana Groundwater Analysis
 Historic Amount of Groundwater Pumped
 (AF)**

Basin	Fiscal Year					
	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Santa Ana River Basin	38,419.6	43,268.5	27,717.3	29,714.6	28,043.0	25,742.9
Percent of Total Water Supply	75%	86%	56%	63%	58%	57%

Notes:

- 1) Totals are based on a fiscal year of June 30 to July 1. For example, production shown for 2001 is for groundwater pumped from 7/1/00 to 6/30/01.
- 2) The City's groundwater use fluctuates each year due to in-lieu deliveries from Metropolitan and participation in other programs such as the summer demonstration program in 2001 to reduce seawater intrusion.

Table 4.2-4 shows the amount of groundwater that is projected to be pumped from all wells in the future. As discussed earlier, demand is expected to remain stable over the 25-year planning horizon due to the declining trend in water consumption coupled with the increasing trend in population.

**Table 4.2-4
 City of Santa Ana Groundwater Analysis
 Amount of Groundwater Projected to be Pumped
 (AF)**

Basin	Fiscal Year				
	2010	2015	2020	2025	2030
Santa Ana River Basin	35,030	37,120	39,070	41,390	41,570
Percent of Total Water Supply	70%	70%	70%	70%	70%

4.3 Imported Water (Surface Water)

As one of Metropolitan’s 26 member agencies, the City receives supplemental imported water from Northern California through the State Water Project and the Colorado River. As a water wholesaler, Metropolitan has no retail customers, and distributes treated and untreated water directly to its member agencies. Metropolitan provides an average of 60 percent of the municipal, industrial and agricultural water used within its service area. The remaining 40 percent comes from local supplies including groundwater, surface water, and recycled water.

The City works together with two primary agencies to insure a safe and high quality water supply, which will continue to serve the community in periods of drought and shortage. The agencies who work in collectively to provide these services are Metropolitan and OCWD, as discussed in Section 4.2.

Metropolitan Water District of Southern California (Metropolitan)

Metropolitan was formed in the late 1920’s. At that time, Orange County was mostly an agriculturally based economy with the cities of Santa Ana, Anaheim, and Fullerton as the primary centers of urban development. Although other cities and residential communities existed at that time, it was these three cities that joined ten others located in Southern California, to form Metropolitan in 1928. Collectively, these charter members recognized the limited water supplies available within the region, and realized that continued prosperity and economic development of Southern California depended upon the acquisition and careful management of an adequate supplemental water supply. This foresight made the continued development of southern California and Orange County possible. Metropolitan acquires water from northern California via the State Water Project and from the Colorado River to supply water to most of southern California. As a wholesaler, Metropolitan has no retail customers, and distributes treated and untreated water directly to its 26 member agencies, including the City.

Imported Water

Currently, approximately 31 percent of the City’s water supply comes from imported water wholesaled by Metropolitan. Imported water is delivered from northern California via the State Water Project and from the Colorado River, and is treated at the Robert B. Diemer Filtration Plant and Weymouth Filtration Plant before the water is delivered to the City.

The City maintains seven imported water connections to the Metropolitan system. The characteristics of these connections are shown in Table 4.3-1. The City participates, in coordination with MWDOC and OCWD, in Metropolitan’s in-lieu program. OCWD, MWDOC, and Metropolitan have developed a successful and efficient in-lieu program to increase storage in the groundwater basin and anticipate working together on future programs. One such future program is the proposed Surplus Water Program.

**Table 4.3-1
 City of Santa Ana
 Imported Water Connections**

Designation	Location	Capacity (cfs)
SA-1	2401 N. Bristol Street	10
SA-2	2315 N. Bristol Street	10
SA-3	1300 W. McFadden	10
SA-4	1299 W. Warner Ave	15
SA-5	Bristol/Alton Ave	10
SA-6	2301 N. Tustin Ave	20
SA-7	1701 E. Warner Ave	50
Total		125

The Surplus Water Program will allow Metropolitan to make direct deliveries to the City’s distribution system in lieu of producing water from the Orange County groundwater basin. This in-lieu program indirectly replenishes the basin by avoiding pumping. In the in-lieu program, OCWD requests the City to halt pumping from specified wells. The City then takes replacement water through its import connections, which is purchased by OCWD from Metropolitan (through MWDOC). OCWD purchases the water at a reduced rate, and then bills the City the amount it would have had to pay for energy and the Replenishment Assessment (RA) if it had produced the water from its wells. The deferred local production results in water being left in local storage for future use.

4.4 Recycled Water

Recycled water is defined as domestic wastewater purified through primary, secondary and tertiary treatment. Recycled water is acceptable for most non-potable water purposes such as irrigation and commercial and industrial processes. Although the City has not completed a recycled water master plan due to limited recycled water use, the City completed a sewer master plan in September 2003.

Orange County Sanitation District (OCSD)

Wastewater from the City’s service area is collected and treated by OCSD. OCSD manages wastewater collection and treatment for approximately 471 square miles in central and northwest Orange County, which includes 21 cities, 3 special districts, and 2.4 million residents. OCSD utilizes the following two facilities: Reclamation Plant No. 1 in Fountain Valley and Treatment Plant No. 2 in Huntington Beach to treat a combined daily average of 264 million gallons of wastewater. OCSD also operates 650 miles of collection system, with pipelines ranging in size from 6 to 96 inches in diameter along with 20 pump stations.¹² Effluent from Reclamation Plant No. 1 is either routed to the

¹² MWDOC 2005 Regional Urban Water Management Plan.

ocean disposal system or is sent to the OCWD facility, Green Acres Project, for advanced treatment and recycling. The Green Acres Project supplies recycled water to various municipal users in Orange County, which offsets the demand for potable water supplies.

The City maintains an agreement with OCWD to supply Green Acres Project (GAP) water to customers where available. The City has limited recycled water infrastructure in the south part of the city, and it is not anticipated to be expanded in the 25-year planning horizon. Additionally, the GAP has experienced limitations of recycled water production and has been unable to meet the local agency projections.

Although the City serves a limited supply of recycled water, approximately 150 AFY, the City supports regional efforts to increase the use of recycled water. Because the City produces a majority of its water supply from the groundwater basin, the City benefits from the actions of OCWD using recycled water to protect the Basin through seawater intrusion barriers and groundwater recharge basins. The City, therefore, indirectly benefits from this regional use of recycled water.

Current and Projected Recycled Water Use

The City currently provides limited recycled water in the south part of the City, which is provided by OCWD’s GAP. Projected recycled water use is anticipated to remain constant since City infrastructure for recycled water in not expected to be expanded and the GAP is not expected to produce additional water to meet local agency future projections. The community is essentially built-out, therefore new recycled water mains are not proposed. New users of recycled water are limited to those that can connect directly to the existing distribution system.

Table 4.4-1 shows the comparison 2000 projection of recycled water use by 2005 to the actual recycled water use in 2005, as well as projections to 2030. In 2000, the City estimated that approximately 480 AF of recycled water would be used within the service area. A large use of recycled water, a carpet dye company, is no longer utilizing recycled water due to a lack of water quality controls. The loss of this customer significantly reduced the demand for recycled water in the City.

**Table 4.4-1
 City of Santa Ana Current and Projected Recycled Water Use
 (AF)**

Current Users	2005		2010	2015	2020	2025	2030
	Projected in 2000	Actual Use					
Landscape Irrigation	480	168	150	150	150	150	150
Total Recycled Water Use	480	168	150	150	150	150	150

Potential Uses of Recycled Water

The City supports efforts of the regional water management agencies to utilize recycled water as a primary resource for groundwater recharge in Orange County. Recycled water in the county is also used to irrigate crops, golf courses, parks, schools, business landscapes, residential lawns, and some industrial operations

While the City recognizes the potential uses of recycled water in its community, such as landscape irrigation, parks, industrial and other uses, OCWD does not have the recycled water infrastructure to support additional use of recycled water within the City. Therefore, the City will continue to serve its current recycled water customers, and will support, encourage and contribute to the continued development of recycled water and potential uses throughout the region through OCWD and OCSD’s Groundwater Replenishment System.

5.0 RELIABILITY OF WATER SUPPLIES

The City of Santa Ana and all of Orange County communities and water agencies in Orange County are facing increasing challenges in their role as stewards of water resources in the region. The region faces a growing gap between its water requirements and its firm water supplies. Increased environmental regulations and the collaborative competition for water from outside the region have resulted in reduced supplies of imported water. Continued population and economic growth in Orange County result in increased water demand within the region, putting an even larger burden on local supplies.

During the 2005 Fiscal Year, the City received approximately 57 percent of its water supply from local groundwater, managed by OCWD, even though the BPP was set at 66 percent for this year, and 43 percent from import water from Metropolitan. This was due to participation in the In-Lieu Program. However, during the three prior fiscal years, groundwater production averaged about 70 percent with imported water making up the 30 percent balance.

As required by the Safe Drinking Water Act, which was reauthorized in 1996, the City provides annual Water Quality Reports to its customers; also known as Consumer Confidence Reports. This mandate is governed by the Environmental Protection Agency (EPA) and the California Department of Health Services (DHS) to inform customers of their drinking water quality. In accordance with the Safe Drinking Water Act, the City monitors regulated and unregulated compounds in its water supply and in years past, the water delivered to the City meets the standards required by the state and federal regulatory agencies.¹³ As mentioned earlier, the City's source of water is from imported water supplies and groundwater.

Although Santa Ana is not a member agency of the Municipal Water District of Orange County (MWDOC), a regional water wholesaler in Orange County, the City does benefit from some of MWDOC's programs as well as those of OCWD. With that in mind, both of these agency's programs will be discussed in this section of the WSA.

Both MWDOC and OCWD are implementing water supply alternative strategies for the region aimed at ensuring a reliable future water supply for the Orange County region. Strategies are identified in the MWDOC 2005 Regional UWMP, the OCWD Long Term Facilities Plan (Draft October 2005), and the OCWD 2004 Groundwater Management Plan. The optimum water supply strategy should attempt to meet the following objectives:

- Ensure that the groundwater basin is protected
- Ensure available water for Orange County residents and businesses in the future
- Minimize the consumers water supply cost
- Use a variety of sources

¹³ City of Santa Ana 2005 Water Quality Report

- Reverse the adverse salt balance in the groundwater basin
- Provide flexibility to allow both MWDOC and OCWD to quickly take advantage of changing and new markets if and when they develop

The reliability of the City's water supply is currently dependent on the reliability of both groundwater and imported water supplies, which are managed and delivered by OCWD and Metropolitan, respectively. The following sections will discuss these agencies, and others throughout the region, their roles in water supply reliability, and the near and long-term efforts they are involved with to ensure future reliability of water supplies to the City and the region as a whole.

5.1 SANTA ANA WATER UTILITY DIVISION

Water System

The City works together with two primary agencies to insure a safe and high quality water supply, which will continue to serve the community in periods of drought and shortage. The agencies who work in concert to provide these services are Metropolitan and OCWD.

The City maintains 444 miles of transmission and distribution mains, 8 reservoirs with a storage capacity of 49.3 million gallons, seven pumping stations, 19 wells, and 7 import connections.

Thirteen of the City wells pump into small surface reservoirs with booster stations pumping the water into the distribution system. The remaining wells pump directly into the City's distribution system. Water pumped from these wells has been naturally filtered as it passes through underlying aquifers of sand, gravel, and soil. This well water only requires disinfectant treatment for system distribution.

The City maintains seven import water connections to receive water through Metropolitan's Orange County and East Orange County Feeder pipelines. Seven metered connections with a total capacity of 56,250 gpm transfer water into the City's distribution system.

5.2 Metropolitan Water District of Southern California

Metropolitan's primary goal is to provide reliable water supplies to meet the water needs of its service area at the lowest possible cost. The reliability of Metropolitan's water supply has been threatened as existing imported water supplies from the Colorado River and State Water Project (SWP) face increasing challenges. Despite these challenges, Metropolitan continues to develop and encourage projects and programs to ensure reliability now and into the future. One such project is Metropolitan's recently completed Diamond Valley Lake in Hemet, California, an 800,000 AF capacity reservoir for regional seasonal and emergency storage for SWP and Colorado River water. The

reservoir began storing water in November 1999 and reached the sustained water level by early 2002.¹⁴

Colorado River Aqueduct (CRA)

Pursuant to the 1964 U.S. Supreme Court decree, Metropolitan's dependable supply of Colorado River water was limited to 550,000 acre-feet per year assuming no surplus or unused Arizona and Nevada entitlement was available and California agricultural agencies use all of their contractual entitlement. Historically, Metropolitan has also possessed a priority for an additional 662,000 acre-feet per year depending upon availability of surplus water. In addition, MWD maintains agreements for storage, exchanges and transfers within the service area of Imperial Irrigation District that provide hundreds of thousands of acre-feet per year of water to MWD.¹⁵

Water supplies from the Colorado River have been and continues to be a topic of negotiation and intense debate. The 1964 Court Decree required California to limit its annual use to 4.4 million acre-feet (MAF) basic annual apportionment of Colorado River water plus any available surplus. To keep California at 4.4 MAF, Metropolitan reduces its level of diversions in years when no surplus is available.

In 1999, the Colorado River Board developed "California's Colorado River Water Use Plan," also known as the "California Plan" and the "4.4 Plan," which was endorsed by all seven Colorado River Basin states and the U.S. Department of the Interior. This plan developed the framework that specifies how California will transition and live within its basic apportionment of 4.4 MAF of Colorado River water.

The U.S. Bureau of Reclamation (USBR) implemented Interim Surplus Guidelines to assist California's transition to the 4.4 Plan. Seven priorities for use of the waters of the Colorado River within the State of California were established. Metropolitan would only be able to exercise its fourth priority right to 550,000 AF annually, instead of the maximum aqueduct capacity of 1.3 MAF. Priorities 1 through 3 can not exceed 3.85 MAF annually. Together, Priorities 1 through 4 total California's 4.4 MAF apportionment.

In October 2003, the Quantification Settlement Agreement (QSA), a critical component of the California's Colorado River Water Use Plan and for purposes of Section 5(B) of the Interim Surplus Guidelines, was authorized defining Colorado River water deliveries, delivery of Priority 3(a) and 6(a) Colorado River water, and transfer and other water delivery commitments, thus facilitating the transfer of water from agricultural agencies to urban uses. The QSA is a landmark agreement, signed by the four Colorado River water

¹⁴ The Metropolitan Water District of Southern California, Regional Urban Water Management Plan, 2005.

¹⁵ Metropolitan Water District of Southern California. Integrated Water Resources Plan. 2003 Update. May 2004.

use agencies and the U.S. Secretary of the Interior, which will guide reasonable and fair use of the Colorado River by California through the year 2037.

Metropolitan's Integrated Water Resources Plan 2003 Update, recognizes that the QSA supports Metropolitan's development plans for CRA deliveries, and demonstrates the reliability benefits as a result of the QSA and existing supply enhancement programs.

State Water Project (SWP)

The reliability of the SWP impacts Metropolitan's member agencies' ability to plan for future growth and supply. DWR's Bulletin 132-98, November 1999, provides certain SWP reliability information, and in 2002, the DWR Bay-Delta Office prepared a report specifically addressing the reliability of the SWP.¹⁶ This report, *The State Water Project Delivery Reliability Report*, provides information on the reliability of the SWP to deliver water to its contractors assuming historical precipitation patterns. The following SWP reliability information is included in these reports.

On an annual basis, each of the 29 SWP contractors including Metropolitan request an amount of SWP water based on their anticipated yearly demand. In most cases, Metropolitan's requested supply is equivalent to its full "Table A Amount"; currently at 1,911,500 AFY. After receiving the requests, DWR assesses the amount of water supply available based on precipitation, snow pack on northern California watersheds, volume of water in storage, projected carry over storage, and Sacramento-San Joaquin Bay Delta regulatory requirements. For example, the SWP annual delivery of water to contractors has ranged from 552,600 AFY in 1991 to 3.5 MAF in 2000. Due to the uncertainty in water supply, contractors are not typically guaranteed their full Table A Amount, but instead a percentage of that amount based on the available supply.

Typically, around December of each year, DWR provides the contractors with their first estimate of allocation for the following year. Due to the variability in water supply for any given year, it is important to understand the reliability of the SWP to supply a specific amount of water each year to the contractors. As hydrologic and water conditions develop throughout the year, DWR revises the allocations.

On January 14, 2005, SWP supplies were projected to meet 60 percent of most SWP contractor's Table A Amounts. This allocation was increased to 70 percent on April 1, 2005 and to 80 percent on April 21, 2005. The final allocation increase occurred on May 27, 2005 and the notice projected the SWP would meet 90 percent of most contractor's Table A Amounts.

DWR prepared an update to the SWP Reliability Report issued in 2003, which was completed April 2006. The Final SWP Reliability Report recommended the results of studies 4 and 5 since they contain the most current information for assumed demands. The results of studies 4 and 5 show average deliveries of 69 percent of full Table A under

¹⁶ Department of Water Resources, State Water Project Delivery Reliability Report. 2002.

current conditions and 77 percent under future conditions. The more recent studies also show a minimum delivery of 4 and 5 percent, current and future years respectively, compared to 20 percent for the 2003 report. These amounts are shown in Table 5.2-1 compared to the earlier CALSIM modeling as discussed below.

DWR analyzed the SWP’s reliability using the California Water Allocation and Reservoir Operations Model (CALSIM II model) in their Reliability Report. The CALSIM II model was developed by DWR and the USBR to simulate operations of the SWP and the Central Valley Project (CVP). The CALSIM II model is used to estimate water deliveries to both SWP and CVP users under various assumptions such as hydrologic conditions, land use, regulations, and facility configurations. Documentation for CALSIM II, including assumptions, can be found on the DWR Web site at <http://modeling.water.ca.gov>.

One of the key assumptions of the CALSIM II model is that past weather patterns will repeat themselves in the future. The model uses a monthly time step to calculate available water supply based on historical rainfall data from 73 years of records (1922 – 1994). The model scenarios used in the preparation of the Reliability Report also assumed that regulatory requirements and facilities would not change in the future. DWR considered this assumption conservative since additional facilities such as reservoirs may be implemented in the future to specifically increase the SWP’s reliability.

The CALSIM II model was used to complete three benchmark studies dated May 17, 2002 for the Reliability Report. The benchmark studies evaluated the water supply and demand at the 2001 condition, 2021 condition and at the 2025 condition. In 2001, SWP water demand was estimated to vary from 3.0 to 4.1 MAF per year depending on the weather conditions (wet or dry years). SWP water demands in 2021 were estimated to range from 3.3 to 4.1 MAF per year. DWR prepared two benchmark studies for the 2021 condition and one benchmark study for the 2025 condition. The first study and the 2025 study assumed that SWP water demands would depend on weather conditions, whereas the second study assumed the contractor’s water demand would be their maximum Table A Amount; 4.1 MAF per year regardless of weather. Table 5.2-1 shows the results, which demonstrate that SWP deliveries, on average, can meet 75 percent of the maximum Table A Amount.

The Monterey Agreement states that contractors will be allocated part of the total available project supply in proportion to their Table A Amount. The Monterey Agreement changed SWP water allocation rules by specifying that, during drought years, project supplies be allocated proportionately based on the maximum contractual Table A Amount. Water is allocated to urban and agricultural purposes on a proportional basis, deleting a previous initial supply reduction to agricultural contractors. The agreement further defines and permits permanent sales of SWP Table A Amounts and provides for transfer of up to 130,000 AF of annual Table A Amounts from agricultural use to municipal use. The Agreement also allows SWP contractors to store water in another agency’s reservoir or groundwater basin, facilitates the implementation of water transfers and provides a mechanism for using SWP facilities to transport non-project water for

SWP water contractors. The Agreement provides greater flexibility for SWP contractors to use their share of storage in SWP reservoirs.

Table 5.2-1
SWP Table A Deliveries from the Delta
Percent of Total Table A Amount of 4.133 maf
(maf)

Study	Average	Maximum	Minimum
2001 Study	2.962 (72%)	3.845 (93%)	0.804 (19%)
2021 Study A ^[1]	3.083 (75%)	4.128 (100%)	0.830 (20%)
2021 Study B ^[2]	3.130 (76%)	4.133 (100%)	0.830 (20%)
2005 Study ^[3]	2.818 (68%)	3.848 (93%)	0.159 (4%)
2025 Study ^[4]	3.178 (77%)	4.133 (100%)	0.187 (5%)

Source: Department of Water Resources, 2005 SWP Delivery Reliability Final Report – April 2006

^[1] Assumes demands depend on weather conditions.

^[2] Assumes demands at maximum Table A amount.

^[3] Revises demands to current conditions.

^[4] Revises demands at levels of use projected to occur by 2025.

Report on Metropolitan Water Supplies, A Blueprint for Water Reliability

Metropolitan released a *Report on Metropolitan’s Water Supplies, A Blueprint for Water Reliability* on March 25, 2003, to provide updated information on Metropolitan’s projected supply and demand for incorporation into Water Verification and Water Supply Assessments for compliance with SB 221 and SB 610, respectively. The report addresses water supply reliability issues and states Metropolitan’s roles and responsibilities, which include the following: (1) implementing water management programs that support the development of cost-effective local resources; (2) securing additional imported supplies as necessary through programs that increase the availability of water delivered through the Colorado River Aqueduct and the SWP; (3) providing the infrastructure needed to integrate imported and local sources; (4) establishing a comprehensive management plan dealing with periodic surplus and shortage conditions; and (5) developing a rate structure that strengthens Metropolitan’s financial capabilities to implement water supply programs and make infrastructure improvements.

The report details that Metropolitan’s regional water demand projections are 6 percent to 16 percent *higher*, depending on what 5-year projection period, and 11 percent for Year 2025, than the aggregated projections of Metropolitan’s member agencies. As stated in

the Report, “this difference indicated that Metropolitan’s supplies would provide a level of ‘margin of safety’ or flexibility to accommodate delays in local resources development or adjustments in development plans.”¹⁷ Additionally, the report concludes that “current practices allow Metropolitan to bring water supplies on-line at least ten years in advance of demand with a very high degree of reliability.” More particularly, MWD documented sufficient currently available supplies to meet 100 percent of member agencies’ supplemental water demands for 20 years under Average and Wet Year conditions, for 15 years under Multiple Dry Year conditions (with 8 to 26 percent reserve capacity), and for 15 years under Single Dry Year conditions (with 8-25 percent reserve capacity). With the addition of supplies under development, MWD will be able to meet 100 percent of its agencies’ supplemental water needs under all supply and demand conditions through 2030 with 20-25 percent reserve capacity.¹⁸

The Report also identifies the ways Metropolitan is managing changes in Southern California’s water supplies, including reduced Colorado River deliveries and water quality constraints. In addition, opportunities for additional supplies are currently being implemented in the following ways:

- 1) Full Diamond Valley Lake: The Lake is now fully operational with an increased conveyance capacity for refill system storage.
- 2) Re-Operation of Storage and Transfer Programs: In 2003, Metropolitan developed additional storage and transfer capabilities and completed filling local resources to achieve full storage accounts in operational reservoirs and banking/transfer programs.
- 3) Enhanced Conservation Programs: A new campaign is designed to encourage more efficient outdoor water use and promote innovative conservation measures.
- 4) Development of Additional Local Resources: There are promising opportunities identified to develop seawater desalination and expand the Local Resources Program.

In addition to the *Report on Metropolitan’s Water Supplies, A Blueprint for Water Reliability*, MWD’s 2005 Regional Urban Water Management Plan (RUWMP) demand and supply analysis also projects surpluses (of regional supplies compared with regional demands) ranging from 5 percent to 35 percent in all years and all drought scenarios through 2030.¹⁹

As demand forecasts are refined, supply goals are also refined. Metropolitan has consistently supplied over 50 percent of water supplies to the Southern California region. To continue to accomplish this, Metropolitan continues to approve new and innovative projects and programs to ensure reliability. For example, in August 2001, Metropolitan

¹⁷ Metropolitan Water District of Southern California. Report on Metropolitan Water Supplies, A Blueprint for Water Reliability, p. 9. March 25, 2003.

¹⁸ Metropolitan Water District of Southern California. Report on Metropolitan Water Supplies, A Blueprint for Water Reliability, p. 24-25. March 25, 2003.

¹⁹ Tables II-7, 8 and 9 of Metropolitan’s 2005 Regional Urban Water Management Plan.

took action to move forward initiatives to bolster future supplies by supporting seawater desalination projects, increased commercial conservation efforts, improve water quality by decreasing salinity in supplies from the SWP and the Colorado River, increased underground storage and retrieval facilities, adopted principles for establishing cooperative programs, and endorsed legislation that would further water reliability.

Integrated Water Resources Plan (IRP)

To address the SWP reliability challenges, Metropolitan and its member agencies developed an Integrated Water Resources Plan (IRP) in 1996. The overall objective of the IRP process is the selection and implementation of a Preferred Resource Mix (or strategy) consisting of complementary investments in local water resources, imported supplies and demand-side management that meet the region’s desired reliability goal in a cost-effective and environmentally sound manner. The 1996 IRP was reviewed as part of Metropolitan’s strategic plan and rate refinement to guide the development and implementation of revised Metropolitan water management programs through the year 2005.

The IRP 2003 Update was approved and released July 13, 2004, and includes various projects and programs that contribute to the reliability of Metropolitan’s imported water supplies. During the adoption of the IRP 2003 Update, the Board decided that IRP Updates would be done in 5-year cycles to provide input to the 5-year UWMP. In addition, staff will report to the Board annually on the progress of IRP implementation. The 2005 implementation report was provided to the Board in November 2005. The upcoming 2006 implementation report is scheduled for release in October 2006. The IRP Update concluded that the resource targets from the 1996 IRP, factored in with changed conditions, will continue to provide for 100 percent reliability through 2025.

While the IRP 2003 Update and the IRP Implementation Report 2005 Update includes goals for a variety of resource targets, they identify the most significant programs as conservation and local supply development among the Preferred Resource Mix. The IRP details the Local Resources Program (LRP) and the Seawater Desalination Program as a means to increase reliability of local supplies.

Metropolitan initiated the LRP to promote the development of water recycling projects that reduced demand for imported water and improved regional water supply reliability in 1982. In 1991, the Groundwater Recovery Program was implemented to similarly promote the recovery of local degraded groundwater supplies. In 1995, both programs were combined into the LRP. As of 2005, the LRP, including both recycling and groundwater recovery, has provided financial incentives amounting to more than \$186 million. Metropolitan’s partnership with its member agencies to develop resource programs has helped to produce more than 1 MAF of recycled and treated groundwater.

In 2005, Metropolitan contributed \$14 million to recycled water projects that produced 73,000 AF in fiscal year 2005, and executed agreements for 10 new LRP projects to develop an additional 57,000 AF of recycled water production. In all, Metropolitan has

funding agreements for 59 member agency projects; 44 of which are currently in operation.²⁰

The IRP 2003 Update and the IRP Implementation Report 2005 Update states that Metropolitan's regional production target is 500,000 AF by 2020 for its LRP. Metropolitan's current projection of regional implementation of recycling, groundwater recovery, and seawater desalination resource targets exceeds the 1996 IRP goals. Although in FY 2002, recycling and groundwater recovery programs narrowly missed their target, the region is expected to meet its 2010 and 2020 targets. Meeting the targets will require the region to produce 159,000 AF of additional local project and/or seawater desalination supply by 2010 and 249,000 AF by 2020. Overall, the region has developed about 50 percent of the 1996 IRP local resources target for 2020. The IRP Implementation Report 2005 Update has set total Local Resources targets of 410,000 AF in 2010 and 500,000 AF in both 2020 and 2025. Furthermore, the 2005 Update states that Metropolitan's Board approved the process of executing contracts with member agencies for seawater desalination projects which will yield 142,000 AF per year, while additional recycling and groundwater recovery projects have been proposed.

Metropolitan continues to encourage development of local water resource process through offering financial incentives through the LRP to its member agencies. These anticipated water supply benefits are incorporated into the forecasts of demand on Metropolitan.

In addition to the LRP, Metropolitan also provides financial and technical assistance for implementing water conservation Best Management Practices (BMPs), as well as a significant investment in regional and local water conservation programs. Metropolitan was also responsible for distributing \$45 million in funds from Proposition 13 funding for development of conjunctive management programs in Southern California. To date, Metropolitan has utilized Proposition 13 funds to develop eight contractual groundwater storage programs. These agreements will provide a total of 197,000 AF of storage with 64,000 AF of dry-year-yield.²¹

5.3 Orange County Water District (OCWD)

OCWD is responsible for the protection of water rights to the Santa Ana River in Orange County as well as the management and replenishment of the basin.²² OCWD replenishes and maintains the basin at safe levels while more than doubling the basin's annual yield with the best available technology. OCWD primarily recharges the basin with water from the Santa Ana River and to a lesser extent with imported water purchased from

²⁰ Metropolitan Water District of Southern California, Annual Progress Report to the State Legislature, Achievements in Conservation, Recycling and Groundwater Recovery, February 2006.

²¹ Metropolitan Water District of Southern California Integrated Water Resources Plan Update – Implementation Report, November 2005.

²² OCWD Groundwater Management Plan, 2004.

Metropolitan. Other processes such as recycling of wastewater, conservation and water use efficiency programs, and creative water purchases have aided in replenishing the basin to desired levels to meet required demands. In addition, OCWD and OCSD have joined together to fund the Groundwater Replenishment System (GWRS) which is further discussed in Section 5.5.

Furthermore, OCWD has invested in seawater intrusion control (injection barriers), recharge facilities, laboratories, and basin monitoring to effectively manage the Basin. Consequently, although the basin is defined to be in an "overdraft" condition, it is actually managed to allow utilization of up to 500,000 AF of storage capacity of the basin during dry periods, acting as an underground reservoir and buffer against drought.²³ OCWD also operates the basin to keep the target dewatered basin storage at 200,000 AF as an appropriate accumulated overdraft.²⁴ If the basin is too full, artesian conditions can occur along the coastal area, causing rising water and water logging, an adverse condition.

Since the formation of OCWD in 1933, OCWD has made substantial investment in facilities, basin management and water rights protection, resulting in the elimination and prevention of adverse long-term "mining" overdraft conditions. OCWD continues to develop new replenishment supplies, recharge capacity and basin protection measures to meet projected production from the basin during average/normal rainfall and drought periods.²⁵

OCWD Long Term Facilities Plan

OCWD is preparing its Long Term Facilities Plan (LTFP) and will evaluate potential projects that may be implemented in the 20-year planning period. The LTFP was scheduled to be complete in 2005; however, at the time of this WSA, due to annexation issues in regard to the LTFP, it is still being developed and has not been approved by the Board. Once approved, the LTFP would be updated periodically to reflect changes in pumping and basin response forecasts to future production increases.

The LTFP's goal is to enhance basin management and water quality management activities. The LTFP is proposed to do the following:

- Evaluate projects to cost effectively increase the amount of sustainable basin production and protect water quality;
- Develop an implementation program for the recommended projects;
- Establish the basin's future maximum (target) annual production amount and correspondingly how much new recharge capacity would be required; and

²³ OCWD Groundwater Management Plan, 2004.

²⁴ Orange County Water District, *Draft 2003-2004 Engineer's Report on Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District*, February 2005.

²⁵ Orange County Water District, *Draft 2003-2004 Engineer's Report on Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District*, February 2005.

- Estimate impacts to potential future Replenishment Assessment and Basin Production Percentage rates.

A program environmental impact report (PEIR), pursuant to California Environmental Quality Act (CEQA), is being prepared to evaluate environmental impacts of projects in the LTFP and increased levels of basin production to serve lands currently within OCWD plus proposed annexations of lands, including by the City of Anaheim and Irvine Ranch Water District. In the PEIR, OCWD's groundwater model would be used to evaluate groundwater conditions, such as groundwater elevations and protection of basin water supplies from seawater intrusion, for specified amounts of basin production with and without annexation.

The LTFP utilizes information recently developed in OCWD's Groundwater Management Plan and Recharge Development Study. The LTFP includes a master list of developed and proposed projects. The various projects are grouped into five categories: 1) recharge facilities, 2) water source facilities, 3) basin management facilities, 4) water quality management facilities, and 5) operational improvements facilities. Each project is evaluated using criteria such as technical feasibility, cost, institutional support, functional feasibility, and environmental compliance. The LTFP develops an implementation plan for the 28 recommended projects over the 20-year planning period.

OCWD 2020 Water Master Plan Report (MPR)

OCWD's 2020 Water Master Plan Report (MPR) describes local water supplies and estimates their availability extending to the year 2020. Specifically, OCWD states in their 2020 Water MPR that significant water supply sources will be available in the future for potable, non-potable, and recharge purposes. The 2020 Water MPR discusses source waters such as imported water from Metropolitan, base flows from the Santa Ana River, treated wastewater through the OCWD/OCSD GWRS program, and possibly desalinated ocean water. The local supplies' availability and projections from the 2020 Water MPR are not being pursued, but instead will be revised and replaced with the LTFP.

5.4 Municipal Water District of Orange County (MWDOC)

In 1951, MWDOC was formed to provide supplemental water to many purveyors within Orange County who were not Metropolitan member agencies. MWDOC was formed for the purpose of contracting with Metropolitan to acquire supplemental import water supplies from northern California and the Colorado River for use within the Orange County area. MWDOC is Metropolitan's second largest wholesale member agency. MWDOC represents 30 member agencies, including 14 special districts, 14 city water departments, one private water company and one mutual water company. The actions of MWDOC have a regional benefit to the City although the City is not a member agency.

MWDOC represents its members at a regional, state and federal level, and advocates for the development and protection of imported water supplies and planning along with

coordinating the water needs for its service area.²⁶ MWDOC's water management goals and objectives include working together with Orange County water agencies, including the City when applicable, to focus on solutions and priorities for improving Orange County's future water supply reliability.

Efforts of MWDOC to maintain a reliable water supply include a commitment to the intensive and cost-effective development of Orange County's water resources. Development of local water supplies will lessen Orange County's dependence on imported water. Therefore, in order to maintain a more reliable water supply, a number of projects including storage, recycling, conjunctive use with groundwater basins, ocean desalination and new groundwater development will contribute to enhanced water reliability.

Programs and projects directly managed by MWDOC include exchanges and transfers, participation with the BMPs as well as extensive conservation and educational programs available to its member agencies. These programs and projects support further water reliability for its member agencies and throughout Orange County.²⁷

Integrated Regional Water Management Plan (IRWMP)

MWDOC has been working with the County of Orange, as the lead agency, and 24 other cities and special districts to develop and integrate regional strategies for water management within the region. In an effort to manage local and imported water supplies, projects have been identified that protect communities from drought, enhance water supply reliability, ensure continued water security, optimize watershed and coastal resources, improve water quality, and protect habitat. To date, nearly 100 projects have been identified in the South Orange County IRWM Plan and the responsibility of implementing the projects has been granted to the South Orange County Integrated Regional Water Management (IRWM) Group. The responsibility of the South Orange County IRWM Group and individual local agencies submitted a grant application in June 2006 for Proposition 50 in the amount of \$25 million, covering seven significant regional projects.

South Orange County Water Reliability Study

To ensure continued water reliability for south Orange County, 11 Orange County agencies, Metropolitan, and the USBR joined together to fund the South Orange County Water Reliability Study (SOCWRS). MWDOC served as the lead agency in this effort.

The SOCWRS provides an objective plan that addresses the pressing need to ensure water supply in the event of future water supply outages and/or emergencies. Although the study is focused on south Orange County, implementing measures recommended in

²⁶ [On-Line]. Municipal Water District of Orange County. Available: <http://www.mwdoc.com>. 2002.

²⁷ MWDOC. Regional Urban Water Management Plan. 2005.

the study will provide regional benefits for all of Orange County's water supply, and thus benefit the City.

5.5 Orange County Sanitation Districts (OCSD)

Wastewater from the City is collected and treated by OCSD. OCSD manages wastewater collection and treatment for central and northwest Orange County. A project that will benefit OCSD by reducing disposal of treated wastewater to the ocean and increase the reliability of water supplies in the region is the Groundwater Replenishment System (GWRS).

OCWD/OCSD Groundwater Replenishment System (GWRS)

The GWRS is a jointly funded project of OCWD and OCSD. The GWRS is a water supply project designed to ultimately reuse approximately 140,000 AFY of advanced treated wastewater. The first phase is currently underway and is scheduled to go online in 2007. The first phase anticipates treating 61,000 AFY in 2007/08, 68,000 AFY in 2008/09, and eventually 72,000 AFY.²⁸ Timing of future phases will be determined by projected flow requirements for anticipated water demands.

The objective of the project is to develop a new source of reliable, high quality, low salinity water that will be used to replenish the Basin and expand the existing seawater intrusion barrier. The GWRS supplements existing water supplies, and provides a new, cost-effective and reliable source of water to recharge the Basin, protect the Basin from further degradation due to seawater intrusion, and augment the supply of recycled water for irrigation and industrial use.

The GWRS is comprised of three major components: (1) Advanced Water Purification Facilities (AWPF) and pumping stations in Fountain Valley – 70% complete; (2) a 13-mile major pipeline connecting the treatment facilities in Fountain Valley to existing recharge basins in Anaheim along the Santa Ana River – 97% complete; and (3) expansion of an existing seawater intrusion barrier – 100% complete.²⁹

The benefits of the proposed GWRS include:

- Supply a significant amount of highly treated recycled water required by OCWD to maintain a higher basin production percentage through and beyond the year 2020.
- Provide a reliable replenishment water supply in times of drought.
- Expand the seawater intrusion barrier to provide additional groundwater production in the coastal zone.

²⁸ Orange County Water District, Draft Long-Term Facilities Plan Review Draft, August 2005.

²⁹ Orange County Water District/Orange County Sanitation District, GWRS Monthly Progress Report, July 2006, www.gwrssystem.com

5.6 Santa Ana Watershed Project Authority

The Santa Ana Watershed Project Authority (SAWPA) is a Joint Powers Authority and carries out functions useful to its member agencies. SAWPA is located in the geographic center of the Santa Ana Watershed in Riverside, California. SAWPA was formed in 1968 as a planning agency and reformed in 1972 with a mission to plan and build facilities to protect the water quality of the Santa Ana River Watershed. OCWD is a member agency of SAWPA, whose activities and projects significantly contribute to the health of the watershed and the Orange County Groundwater Basin, and therefore provides significant benefits to the City and continued reliability of its groundwater source.

Watersheds and the state as a whole are facing many challenges in ensuring there is sufficient, high-quality water for the ever-growing population of the region. SAWPA works with planners, water experts, design and construction engineers, other government agencies to identify issues and solutions, and then use innovation to resolve many water-related problems. SAWPA also works with legislators on ensuring there are useful laws on water resources, with funding sources to ensure that necessary projects can be completed, with planners to ensure that there is enough water in the future, with regulators to ensure that the water is safe and clean, and with all other stakeholders (including the concerned public) to build collaborative, regional solutions to the area's water needs.

In a need to obtain funding for water-related projects, SAWPA developed an Integrated Watershed Management Plan (IWMP) and Step 1 grant application pursuant to Proposition 50, Chapter 8 and submitted it to DWR in July 2005. Within SAWPA's IWMP Step 1 application, the City of Santa Ana requested \$350,000 for a pilot project identified as the Urban Water Improvement Project. SAWPA was invited to submit a full proposal to the IRWM grant program. Thus, in June 2006, SAWPA developed and submitted an IRWM Step 2 grant application requesting a total of \$25 million for various water-related projects. Unfortunately, due to the size and priority of other projects, the Urban Water Improvement Project requested by the City of Santa Ana was eliminated from the IRWM Step 2 grant application, although remains in the IWMP and could be submitted for funding in the future. SAWPA is currently beginning an update of its IWMP as a complete rewrite and renaming it the SAWPA IRWM Plan. The update is anticipated to be complete in March 2008.

SAWPA owns and operates the Santa Ana Regional Interceptor (SARI) line, a buried pipeline that captures Desalter Brine and other industrial/private waste waters and sends them to wastewater treatment facilities in Orange County before they can degrade the water quality in the watershed. The SARI line is designed to convey 30 million gallons per day (MGD) of non-reclaimable wastewater from the upper Santa Ana River basin to the ocean for disposal, after treatment. The non-reclaimable wastewater consists of Desalter concentrate and industrial wastewater. Domestic wastewater is also received on a temporary basis.

The SARI System Enhancements Program Feasibility Study is the preliminary evaluation of the feasibility for segregating brine flows from domestic wastewater, for discharge to an ocean outfall. The concept considers installation of a new “brine-only” pipeline through Orange County. Treatment of waters prior to discharge into the brine line or rerouting certain non-brine discharges to traditional domestic wastewater treatment plants in the Upper Santa Ana River area would also be required. The Study is intended to evaluate the benefits of a brine-only pipeline in all three counties such as, reuse of a portion of the flow in the GWRS being constructed by OCWD and OCSD, making available additional Orange County pipeline and treatment plant capacities and reducing disposal costs for brine-only discharges which meet ocean discharge water quality requirements.

Finally, the Arlington Desalter removes salt from water extracted from the Arlington Groundwater Basin and delivers the treated water to OCWD for percolation into Orange County’s groundwater basin. In order to reduce reliance on imported State Project and Colorado River water, to remove salts from the groundwater basins, and to provide additional water for the Orange County Groundwater Basin recharge, a number of additional desalters are under construction, or planned for the near future.

5.7 Santa Ana Regional Water Quality Control Board – Region 8

Background

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (Regional Boards) are responsible for the protection and, where possible, the enhancement of the quality of California’s waters. The SWRCB sets statewide policy, and together with Regional Boards, implements state and federal laws and regulations. Each of the nine Regional Boards adopts a Water Quality Control Plan or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region’s ground and surface waters, and local water quality conditions and problems.³⁰

In 1975, the Santa Ana Regional Water Quality Control Board (RWQCB) adopted the original Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin. In 1995, the RWQCB updated the Basin Plan to address issues that had evolved over time due to increasing populations and changing water demands in the region. The scope of the document covers the Santa Ana River Basin, which includes the upper and lower Santa Ana River watersheds including northwestern Orange County. In 2002, a triennial review of the Basin Plan was performed. In July 2002, at a public hearing, the RWQCB adopted Resolution No. R8-2002-0070, approving the Triennial Review Priority List and Work Plan.

The Basin Plan is more than just a collection of water quality goals and policies, descriptions of conditions, and discussions of solutions. It is also the basis for the

³⁰ Santa Ana Regional Water Quality Control Board. Region 8 Water Quality Control Plan (Santa Ana River Basin). January 1995.

RWQCB’s regulatory programs. The Basin Plan establishes water quality standards for all the ground and surface waters of the region. The RWQCB also regulates water discharges to minimize and control their effects on the quality of the region’s ground and surface water. Permits are issued under a number of programs and authorities.

Water quality problems in the region are listed in the Basin Plan, along with the causes, where they are known. For water bodies with quality below the levels necessary to allow all the beneficial uses of the water to be met, plans for improving water quality are included. Legal basis and authority for the RWQCB reflects, incorporates, and implements applicable portions of a number of national and statewide water quality plans and policies, including the California Water Code (Porter-Cologne Water Quality Control Act) and the Clean Water Act.³¹

Key Regional Issues

Water quality degradation due to high concentrations of nitrogen and total dissolved solids (TDS) is the most significant regional water quality problem in the Santa Ana River Watershed (Watershed). Historically, the Santa Ana River likely flowed during most of the year, recharging deep alluvial groundwater basins in the inland valley and the coastal plain. However, irrigation projects eventually led to the diversion of all surface flow in the river, and the quantity of groundwater recharge diminished greatly. Water quality concerns in the Watershed focus on elevated concentrations of TDS and total inorganic nitrogen (TIN).

A Task Force was formed in 1995 to provide oversight, supervision, and approval of a study to evaluate the impact of TIN and TDS on water resources in the Watershed. The study is coordinated by SAWPA, and is investigating questions related to TIN and TDS management in the Watershed, including groundwater subbasin water quality objectives, subbasin boundaries, and regulatory approaches to wastewater reclamation and recharge.³²

Water Resources and Water Quality Management

Numerous water resource management studies and projects, focused on water quality and/or water supply, are in progress in the Region under the auspices of a variety of parties. As stated above, the RWQCB has been working with SAWPA concerning water supply and reliability issues. SAWPA has been studying TIN and TDS issues and is a valuable partner in water resource and water quality management. SAWPA, and its member agencies, conduct water related investigations and planning studies, and build physical facilities where needed for water supply, wastewater treatment or water quality remediation. Other studies and projects ongoing and planned that will affect reliability

³¹ Santa Ana Regional Water Quality Control Board. Region 8 Water Quality Control Plan (Santa Ana River Basin). January 1995.

³² Santa Ana Regional Water Quality Control Board. Watershed Management Initiative. Revised May 2004.

and quality of water supplies to the Region, including areas affecting water supplies in the Orange County Basin, are discussed further in following sections of this Assessment.

Some of these activities bear directly on the implementation of the Basin Plan, while others may lead to future Basin Plan amendments to incorporate appropriate changes, such as revised regulatory strategies for various dischargers. These investigations and the implementation of appropriate physical solutions are an essential and integral part of the effort to restore and maintain water quality in the Region.

5.8 Water Shortage Plans

5.8.1 City of Santa Ana's Emergency Water Conservation Plan

Santa Ana's Emergency Water Conservation Plan (EWCP) was passed by the City on March 6, 1991. The purpose of the EWCP is to provide a guide to deal with extended water shortages in a timely and systematic manner. It provides procedures, rules, and regulations for mandatory water conservation that gain results while minimizing the effect of a water shortage on the City's water customers. The EWCP is a multi-function plan that guides conservation actions in a variety of emergencies including drought, earthquakes, fires, or other emergencies that can create water shortage conditions.

The City is fully dependent on Metropolitan and OCWD for its water supply. Confirmation of an extended water shortage emergency would generally be received from one or both of these agencies. An actual shortage does not have to exist; merely the threat of a shortage is sufficient cause to impose sanctions. In past droughts, actions taken by the governing boards of Metropolitan and OCWD have dictated the City's course of action.

When a water shortage appears imminent, the City Manager notifies the City Council and recommends holding a public hearing for the purpose of determining whether a water shortage emergency exists. If the City Council determines a water shortage exists, it then makes the decision as to the appropriate phase of the EWCP to implement. The Phase selection will be based on rationing or sanctions adopted by Metropolitan and/or OCWD.

The EWCP sets forth three basic implementation phases keyed to the severity of the water shortage as included in the Santa Ana Code shown as follows:

Section 39-106. Phase I: During water conservation Phase I no person shall:

- 1) Wash sidewalks, walkways, driveways, parking areas or other paved surfaces, except as is required to dispose of dangerous liquids or substances dangerous to the public health and safety.
- 2) Water lawn, landscape or other turf areas except between the hours of 4:00 p.m. and 10:00 a.m.

- 3) Use water to clean, fill or maintain levels in decorative fountains, ponds, lakes or other similar aesthetic structures unless such water is part of a recycling system.
- 4) Serve drinking water to any customer unless expressly requested. Nor shall any restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale serve drinking water to any customer unless expressly requested.

Section 39-107. Phase II: During water conservation Phase II no person shall:

- 1) Violate the provisions of section 39-106, except that the restrictions on watering lawn, landscape or other turf areas shall be modified to prohibit watering more often than every other day and such areas shall only be watered between the hours of 6:00 p.m. and 6:00 a.m. This provision shall not apply to commercial nurseries and golf courses.
- 2) Water lawn, landscape or other turf areas shall be modified to prohibit watering more often than every other day and such areas shall only be watered between the hours of 6:00 p.m. and 6:00 a.m. There shall be no restriction on watering utilizing reclaimed water.
- 3) Make, cause, use or permit the use of water for any purpose in an amount in excess of ninety (90) percent of the amount used on that customer's premises during the corresponding billing period during the prior calendar year.

Section 39-108. Phase III: During water conservation Phase III no person shall:

- 1) Same as action 1 in Phase II.
- 2) Same as action 2 in Phase II.
- 3) Use water from fire hydrants except for fire fighting and related activities. Other uses of water for municipal purposes shall be limited to activities necessary to maintain the public health, safety and welfare.
- 4) Make, cause, use or permit the use of water for any purpose in excess of eighty (80) percent of the amount used on the customer's premises during the corresponding billing period of the prior calendar year.

Each month the Water Utility shall monitor and evaluate the demand for water by customers and the projected available supply. Upon determination of potential or actual water shortage, the Director of Public Works shall recommend to the City Council the extent of the conservation phase required by customers in order for the Water Utility to prudently supply water to customers.

The City's EWCP appropriately includes percentage reductions listed as 90% and 80% in Phases II and III, respectively. The curtailment provision means a customer must reduce his demands to 90% (or 80 %) or less than his base year demands. Violations result in increased surcharges, written notices, installation of flow restrictors, and as a last resort, termination of water service. Since the provision includes the "or less" this allows the City to enforce a reduction of 50% for residential and/or total water demand in times of

severe water shortages. A resolution will be adopted to implement the appropriate stage and consumption reduction percentage.

In order to meet short-term water demand deficiencies and short- or long-term drought requirements, the City will implement its EWCP, in response to and in coordination with Metropolitan's Water Surplus and Drought Management Plan.

5.8.2 Metropolitan's Water Surplus and Drought Management (WSDM) Plan

In 1999, Metropolitan in conjunction with its member agencies developed the WSDM Plan. This plan addresses both surplus and shortage contingencies.

The WSDM Plan will guide management of regional water supplies to achieve the reliability goals of Southern California's IRP. The IRP sought to meet long-term supply and reliability goals for future water supply planning. The WSDM Plan guiding principle is to minimize adverse impacts of water shortage and ensure regional reliability. From this guiding principle come the following supporting principles:

- Encourage efficient water use and economical local resource programs.
- Coordinate operations with member agencies to make as much surplus water as possible available for use in dry years.
- Pursue innovative transfers and banking programs to secure more imported water for use in dry years.
- Increase public awareness about water supply issues.

The WSDM Plan guides the operations of water resources (local resources, Colorado River, State Water Project, and regional storage) to ensure regional reliability. It identifies the expected sequence of resource management actions Metropolitan will take during surpluses and shortages of water to minimize the probability of severe shortages that require curtailment of full-service demands. Mandatory allocations are avoided to the extent practicable, however, in the event of an extreme shortage an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

The WSDM Plan distinguishes between *Surpluses*, *Shortages*, *Severe Shortages*, and *Extreme Shortages*. Within the WSDM Plan, these terms have specific meaning relating to Metropolitan's capability to deliver water to the City.

Surplus: Metropolitan can meet full-service and interruptible program demands, and it can deliver water to local and regional storage.

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. In a Severe

Shortage, Metropolitan may have to curtail Interim Agricultural Water Program (IAWP) deliveries in accordance with IAWP.

Extreme Shortage: Metropolitan must allocate available supply to full-service customers.

The WSDM Plan also defines five surplus management stages and seven shortage management stages to guide resource management activities. Each year, Metropolitan will consider the level of supplies available and the existing levels of water in storage to determine the appropriate management stage for that year. Each stage is associated with specific resource management actions designed to: 1) avoid an Extreme Shortage to the maximum extent possible; and 2) minimize adverse impacts to retail customers should an "Extreme Shortage" occur. The current sequencing outline in the WSDM Plan reflects anticipated responses based on detailed modeling of Metropolitan's existing and expected resource mix. This sequencing may change as the resource mix evolves.

WSDM Plan Shortage Actions by Shortage Stage

When Metropolitan must make net withdrawals from storage, it is considered to be in a shortage condition. However, under most of these stages, it is still able to meet all end-use demands for water. The following summaries describe water management actions to be taken under each of the seven shortage stages.

Shortage Stage 1. Metropolitan may make withdrawals from Diamond Valley Lake.

Shortage Stage 2. Metropolitan will continue Shortage Stage 1 actions and may draw from out-of-region groundwater storage.

Shortage Stage 3. Metropolitan will continue Shortage Stage 2 actions and may curtail or temporarily suspend deliveries to Long Term Seasonal and Replenishment Programs in accordance with their discounted rates.

Shortage Stage 4. Metropolitan will continue Shortage Stage 3 actions and may draw from conjunctive use groundwater storage (such as the North Las Posas program) and the SWP terminal reservoirs.

Shortage Stage 5. Metropolitan will continue Shortage Stage 4 actions. Metropolitan's Board of Directors may call for extraordinary conservation through a coordinated outreach effort and may curtail Interim Agricultural Water Program deliveries in accordance with their discounted rates. In the event of a call for extraordinary conservation, Metropolitan's Drought Program Officer will coordinate public information activities with member agencies and monitor the effectiveness of ongoing conservation programs. The Drought Program Officer will implement monthly reporting on conservation program activities and progress and will provide quarterly estimates of conservation water savings.

Shortage Stage 6. Metropolitan will continue Shortage Stage 5 actions and may exercise any and all water supply option contracts and/or buy water on the open

market either for consumptive use or for delivery to regional storage facilities for use during the shortage.

Shortage Stage 7. Metropolitan will discontinue deliveries to regional storage facilities, except on a regulatory or seasonal basis, continue extraordinary conservation efforts, and develop a plan to allocate available supply fairly and efficiently to full-service customers. The allocation plan will be based on the Board-adopted principles for allocation listed previously. Metropolitan intends to enforce these allocations using rate surcharges. Under the current WSDM Plan, the surcharges will be set at a minimum of \$175 per af for any deliveries exceeding a member agency's allotment. Any deliveries exceeding 102% of the allotment will be assessed a surcharge equal to three times Metropolitan's full-service rate.

The overriding goal of the WSDM Plan is to never reach Shortage Stage 7, an Extreme Shortage. Given present resources, Metropolitan fully expects to achieve this goal over the next ten years and beyond.

Reliability Modeling of the WSDM Plan

Using a technique known as "sequentially indexed Monte Carlo simulation," Metropolitan undertook an extensive analysis of system reservoirs, forecasted demands, and probable hydrologic conditions to estimate the likelihood of reaching each Shortage Stage through 2010. The results of this analysis demonstrated the benefits of coordinated management of regional supply and storage resources. Expected occurrence of a Severe Shortage is four percent or less in most years and never exceeds six percent; equating to an expected shortage occurring once every 17 to 25 years. An Extreme Shortage was avoided in every simulation run.

Metropolitan also tested the WSDM Plan by analyzing its ability to meet forecasted demands given a repeat of the two most severe California droughts in recent history. Hydrologic conditions for the years 1923–34 and 1980–91 were used in combination with demographic projections to generate two hypothetical supply and demand forecasts for the period 1999–2010. Metropolitan then simulated operation to determine the extent of regional shortage, if any. The results again indicate 100 percent reliability for full-service demands through the forecast period.

Allocation of Supply for M&I Demands

The equitable allocation of supplies is addressed by the Implementation Goals for the WSDM Plan, with the first goal being to "avoid mandatory import water allocations to the extent practicable." The reliability modeling for the WSDM Plan discussed above results in 100 percent reliability for full-service demands through the year 2010. However, the second fundamental goal of the WSDM Plan is to "equitably allocate imported water on the basis of agencies' needs." Factors for consideration in establishing the equitable allocation include retail and economic impacts, recycled water production, conservation levels, growth, local supply production, and participation and investment in

Metropolitan's system and programs. In the event of an extreme shortage, an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

In an effort to avoid allocation, import water reliability is planned through the Southern California IRP and the WSDM Plan. The IRP presents a comprehensive water resource strategy to provide the region with a reliable and affordable water supply for the next 25 years. The WSDM Plan will guide management of regional water supplies to achieve the reliability goals of the IRP.

Under a drought scenario, OCWD may have Metropolitan replenishment water temporarily unavailable to them for replenishment of the groundwater basin. OCWD would first attempt to purchase other water supplies at a similar cost to replace the Metropolitan source. If no alternative water supply sources are economically available, OCWD may temporarily mine the basin by increasing the BPP to meet local demand and refill it in the future. OCWD used this strategy during the later years of the 1986-92 drought period. If this option is not available, then OCWD may lower the current BPP to match the basin's Dependable Yield. Under this last scenario, the City may request increased imported water along with conservation and water use efficiency measures by customers to meet demand. The OCWD Master Plan Report, Chapter 14 – Basin Management Issues, further describes OCWD activities that may affect the City during a declared drought.

5.8.3 Municipal Water District of Orange County (MWDOC) Water Shortage Measures

Working as a regional agency, MWDOC's shortage mitigation measures are consistent with the City's and provide a regional benefit. In order to meet short-term water demand deficiencies, and short-or long-term drought requirements, MWDOC will implement its own policy or pass through the policy of Metropolitan, as detailed in the section above. MWDOC is considering development of its own drought management policy that would consider local issues, supply and reliability issues, and a regional supply mix. MWDOC's service area can be divided into two regions based on reliable supply, those that have access to significant local supplies and those that have little or no access to local supply sources.³³

During past shortages, MWDOC has taken stringent action to manage the limited supplies. For example, during the 1976-1977 drought MWDOC included both operational and demand management activities. Operational activities included increasing Colorado River diversion, exchanges and expanded local supplies. Demand management activities included alternative rate structures, distribution of low-flow shower heads, water waste prohibitions, school education and public information.³⁴ Additionally, MWDOC works with its member agencies in adopting ordinances and/or resolutions that establish mandatory water use restrictions in water shortage situations.

³³ MWDOC. Regional Urban Water Management Plan. 2000.

³⁴ MWDOC. Regional Urban Water Management Plan. 2000.

During the drought that occurred from 1987-1992, MWDOC implemented the same operational and demand management measures. However, MWDOC also implemented demand reduction goals, a drought rebate program, weather caster slides, restaurant table tents, plant tags, newspaper slicks, an implementation task force, and participation in the State Drought Emergency Water Bank. In addition to MWDOC's efforts during the 1987-1992 drought, OCWD temporarily increased the BPP from 75% to 80% to reduce the need for imported supplies.

Since 1991, MWDOC has adopted water use efficiency BMPs and has actively pursued implementation of local and regional water use efficiency programs with its member agencies. As a member agency of Metropolitan, MWDOC supports and follows Metropolitan's water shortage mitigation measures, including the WSDM Plan, as outlined above.

5.8.4 Orange County Water District (OCWD) Water Shortage Measures

OCWD is dedicated to maintaining a reliable supply of water for its groundwater users. OCWD purchases replenishment water from Metropolitan through MWDOC. OCWD's plan for water shortage supports MWDOC and Metropolitan water shortage plans, as described above. OCWD has also identified reliability measures independent of MWDOC and Metropolitan to help mitigate emergency water shortages or in times of drought, including the following:

- OCWD has an agreement with San Bernardino Valley Municipal Water District (SBVMWD) to purchase groundwater supplies. SBVMWD's groundwater table is very high, making excess supply available for pumping to the Santa Ana River for OCWD's use.
- OCWD continues to discuss the purchase of non-SWP water supplies via SBVMWD's capacity in the SWP system.
- OCWD previously entered into a one-year contract with Western Water Company to purchase water from Northern California and plans to continue with similar contracts in the future.
- Wheeled water supplies are available for purchase through Metropolitan.
- The OCWD/OCSD GWRS will allow treatment and use of wastewater that is currently discharged into the Pacific Ocean by OCSD.
- Facilities to capture greater amounts of Santa Ana River Storm flows are being constructed.

During the 1987-1992 drought, OCWD exercised its ability to utilize the Basin to reduce the need for imported water supplies by temporarily increasing the BPP from 75% to 80%. Thereby, demonstrating the conjunctive use ability of the Basin during times of drought, as well as for reliability.

5.8.5 Catastrophic Supply Interruption Plans

As presented earlier, the City's EWCP, implemented through the approval of Ordinance No. NS-2073, considers earthquakes and other emergencies that can create water shortage conditions. The City is fully dependent on Metropolitan and OCWD for its water supply. Confirmation of an extended water shortage emergency would generally be received from one or both of these agencies.

The Water Utility's Emergency Response Plan (ERP) identifies the immediate actions that the City will take to respond, in coordination with the City's Emergency Response Plan, to a declared water shortage. The City will work in close cooperation with Metropolitan and the Metropolitan Area Radio System (MARS) Network, an organization of water utilities within the service area of Metropolitan to immediately contact its customer agencies during an emergency about potential interruption of services. MARS is an emergency communications system to facilitate the flow of information, control, and exchange of materials and mutual aid within Metropolitan's service area. Metropolitan and its member agencies formed MARS to improve emergency response, provide alternate means of communication in emergencies, and expedite mutual aid. In the case that the Metropolitan Emergency Operations Center (MEOC) is activated, the MEOC will direct all coordination with member agencies.

The Water Utility's ERP describes the organizational and operational policies and procedures required to meet the needs of sufficient water for firefighting operations and safe drinking water and provide a system for organizing and prioritizing water repairs. It also cites authorities and specifies the public and private organizations responsible for providing water service.

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

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

In the event the City Emergency Operation Center (EOC) is activated, the City management Policy Group will set priorities. When the City EOC is activated, the WOC will take its direction from the City EOC. A City EOC *Action Plan* will be developed in the City EOC that will carry out the policies dictated by the *Policy Group*. The WOC will use the City EOC *Action Plan* in determining its course of action. Coordination between the WOC and the City EOC will be done by the Water Operations Manager (located in the WOC) and the representative located in the City EOC under the direction of the *Public Works Chief* (located in the City EOC).

If the situation is beyond the Water Utility and the City’s control, additional assistance will be sought through coordination with MARS and the Water Emergency Response Organization of Orange County (WEROC) to facilitate an organized and effective response to the emergency including mutual aid.

Water Emergency Response Organization of Orange County (WEROC)

The City of Santa Ana Water Utility Division actively participates in WEROC. WEROC performs coordination of information and mutual-aid requests among water agencies, and conducts disaster training exercises for the Orange County water community and with Metropolitan.

In 1983, the Orange County water community developed a *Water Supply Emergency Preparedness Plan* to respond effectively to disasters impacting the regional water distribution system. This plan was jointly funded by three regional water agencies: Coastal Municipal Water District, MWDOC, and OCWD, with the support and guidance from the Orange County Water Association (OCWA). The collective efforts of these agencies resulted in the formation of the countywide WEROC (originally known as VEPO – Volunteer Emergency Preparedness Organization), which is unique in its ability to provide a single point of contact for representation of water agencies in Orange County during a disaster.

Additional emergency services available to the City of Santa Ana in the State of California include the Master Mutual Aid Agreement, California Water Agencies Response Network (WARN) and Plan Bulldozer. The Master Mutual Aid Agreement includes all public agencies that have signed the agreement and is planned out of the California Office of Emergency Services. The WARN includes all public agencies that have signed the agreement to WARN and provides mutual aid assistance. It is managed by a State Steering Committee. Plan Bulldozer provides mutual aid for construction equipment to any public agency for the initial time of disaster when danger to life and property exists.

5.9 Water Conservation as a Reliable Water Source

The City of Santa Ana recognizes water use efficiency as an integral component of current and future water strategy for its service area. Through the California Urban Water Conservation Council’s (CUWCC) Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), 14 Best Management Practices (BMPs) have been established. The City of Santa Ana is signatory to the MOU and actively implements the BMPs through policies, programs, rules, regulations and ordinances, and the use of devices, equipment and facilities that provide a significant reduction in water demand.

As signatory to the MOU, the City has made the State-mandated BMPs for water conservation the cornerstone of its conservation programs and a key element in the overall regional water resource management strategy.

The 14 BMP programs the City implements and/or participates in include the following:

1. Water survey programs for single-family residential and multifamily residential customers
2. Residential plumbing retrofit
3. System water audits, leak detection, and repair
4. Metering with commodity rates for all new connections and retrofit of existing connections
5. Large landscape conservation programs and incentives
6. High-efficiency washing machine rebate programs
7. Public information programs
8. School education programs
9. Conservation programs for commercial, industrial, and institutional accounts
10. Wholesale agency programs
11. Conservation pricing
12. Water conservation coordinator
13. Water waste prohibition
14. Residential ultra-low-flush toilet replacement programs

5.10 Dry Year Reliability Comparison

The City’s water demand, including unaccounted-for system losses, in fiscal year 2005 was 44,944 AF. By the year 2030, the City’s projected water demand is 60,577 AF, including an estimated 1,037 AFY of water associated with the Metro East Mixed-Use Zone.

Table 5.10-1 shows the historical water demands for the City, which provides a basis for developing a “normal” year demand into the 20-year planning period. The City’s UWMP analyzed this data to derive a normal year, and considered past hydrologic data and their effect on historic water demand to determine factors for single-dry and multiple-dry years.

**Table 5.10-1
 City of Santa Ana
 Historical Water Demands
 Historical Water Production by Source to Meet Demand
 (AF)**

Source	2001	2002	2003	2004	2005
Groundwater	43,269	27,717	29,715	28,043	25,743
Imported Water	6,984	21,578	17,144	19,811	19,033
Recycled Water	150	155	159	164	168
Total Water Supply	50,403	49,450	47,018	48,018	44,944

Source: City of Santa Ana 2005 Urban Water Management Plan

The single-dry year demand for the City is estimated to increase 5.5 percent from the normal water year, and multiple-dry year demands are estimated to increase 6.7, 3.7, and 5.5 percent from the normal water year demand, respectively. Further, the projected normal, single-dry, and multiple-dry water year quantities assume a total supply breakdown of 70 percent groundwater, 29.75 percent Metropolitan imported water, and 0.25 percent recycled water. Analysis shows that long-term groundwater and imported water in the above quantities are anticipated to remain stable to the City, based on studies and reports of OCWD and Metropolitan, respectively. Recycled water will remain at a steady 150 AFY.

Table 5.10-2 shows dry year demand factors under normal groundwater supply conditions, consistent recycled water supply, and Metropolitan supplies based on their 2005 Regional UWMP projected available supplies. If Metropolitan implements specific resource management actions and measures that allows for consistency in available water supply in dry year conditions and does not make any reductions, the City's demands should continue to be met with 70 percent groundwater, 29.75 percent imported water, and 0.25 percent recycled water.

**Table 5.10-2
 City of Santa Ana
 Dry Year Demand and Supply Factors**

Dry Year Factors	Normal Year	Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand ¹	1.0	0.055	0.067	0.037	0.055
Normal Supply					
Groundwater	0.7000	0.7000	0.7000	0.7000	0.7000
Imported	0.2975	0.2975	0.2975	0.2975	0.2975
Recycled	0.0025	0.0025	0.0025	0.0025	0.0025
Supply with Metropolitan Reliability Projections²					
2010	1	1.065	0.982	0.982	0.982
2015	1	1.167	1.068	1.068	1.068
2020	1	1.131	1.033	1.033	1.033
2025	1	1.119	1.024	1.024	1.024
2030	1	1.119	1.024	1.024	1.024

¹ Source: Santa Ana 2005 Urban Water Management Plan, Section 4, Page 4-19.

² Source: Santa Ana 2005 UWMP, Section 4, Tables 4.2-1 and 4.2-2, Metropolitan Water Supply Reliability Projections.

In the event of a water supply shortage or drought and if Metropolitan reduces its available imported water supply, the City could increase groundwater pumping and pay the Basin Equity Assessment for pumping over the 70 percent BPP, and supplement the remaining with imported water.

The City anticipates maximizing groundwater at 70 percent; however, if the need arises based on reduced imported water, the City could increase groundwater pumping and pay the Basin Equity Assessment for pumping over the 70 percent BPP, and supplement the remaining with imported water.

Tables 5.10-3 through 5.10-7 show for the 20-year planning period available supply exceeds demand during normal, single and multiple dry years. Single and multiple dry year demand totals include projected annual demand increases then discounted by the dry year factor. Data for all tables has been extrapolated from Tables 4.2-5 through 4.2-10 of the City's 2005 UWMP, and Table 4.1-4 of this WSA.

**Table 5.10-3
 20-Year Water Supply and Demand Comparison
 During Single and Multiple Dry Years Including the Project
 Years 2006-2010
 (AFY)**

2006 Supply & Demand Through Fiscal Year 2010	2006	2007	2008	2009	2010
	Normal	Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand Total	48,990	52,828	54,586	52,362	53,564
Groundwater (70%) ^[1]	34,188	36,875	38,105	36,549	37,390
Imported	14,652	15,803	16,331	15,664	16,024
Recycled	150	150	150	150	150
Supply Total	51,918	55,747	55,518	53,962	54,804
Groundwater (70%) ^[1]	34,188	36,875	38,105	36,549	37,390
Imported	17,580	18,723	17,264	17,264	17,264
Recycled	150	150	150	150	150
Supply Surplus	2,928	2,919	933	1,600	1,239

^[1] Groundwater demand is estimated at 70% of the total potable demand except for the year 2006 when the BPP has been set at 69% by OCWD.

³⁵ MWD Press Release, *Court affirms superior court ruling supporting "preferential rights" procedures never used in agency's 75-year history*, March 25, 2004.

Table 5.10-4
20-Year Water Supply and Demand Comparison
During Single and Multiple Dry Years Including the Project
Years 2011-2015
(AFY)

2011 Supply & Demand Through Fiscal Year 2015	2011	2012	2013	2014	2015
	Normal	Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand Total	51,007	54,489	55,793	53,001	53,712
Groundwater (70%)	35,600	38,037	38,950	36,996	37,494
Imported	15,257	16,302	16,693	15,855	16,069
Recycled	150	150	150	150	150
Supply Total	55,480	61,329	60,385	58,538	59,142
Groundwater (70%)	35,600	38,037	38,950	36,996	37,494
Imported	19,730	23,142	21,285	21,392	21,499
Recycled	150	150	150	150	150
Supply Surplus	4,473	6,840	4,592	5,537	5,430

Table 5.10-5
20-Year Water Supply and Demand Comparison
During Single and Multiple Dry Years Including the Project
Years 2016-2020
(AFY)

2016 Supply & Demand Through Fiscal Year 2020	2016	2017	2018	2019	2020
	Normal	Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand Total	54,173	57,787	59,085	56,043	56,709
Groundwater (70%)	37,816	40,346	41,255	39,125	39,591
Imported (29.75%)	16,207	17,291	17,681	16,768	16,968
Recycled (0.25%)	150	150	150	150	150
Supply Total	58,546	61,573	63,573	61,898	62,819
Groundwater (70%)	37,816	40,346	41,255	39,125	39,591
Imported (29.75%)	20,580	21,078	22,168	22,623	23,077
Recycled (0.25%)	150	150	150	150	150
Supply Surplus	4,373	3,787	4,488	5,855	6,109

Table 5.10-6
20-Year Water Supply and Demand Comparison
During Single and Multiple Dry Years Including the Project
Years 2021-2025
(AFY)

2021 Supply & Demand Through Fiscal Year 2025	2021	2022	2023	2024	2025
	Normal	Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand Total	57,282	61,176	62,624	59,475	60,257
Groundwater (70%)	39,992	42,718	43,732	41,528	42,075
Imported	17,140	18,308	18,742	17,798	18,032
Recycled	150	150	150	150	150
Supply Total	62,462	66,629	65,781	63,566	64,104
Groundwater (70%)	39,992	42,718	43,732	41,528	42,075
Imported	22,320	23,760	21,899	21,889	21,879
Recycled	150	150	150	150	150
Supply Surplus	5,180	5,452	3,156	4,091	3,847

Table 5.10-7
20-Year Water Supply and Demand Comparison
During Single and Multiple Dry Years Including the Project
Years 2026-2030
(AFY)

2026 Supply & Demand Through Fiscal Year 2030	2026	2027	2028	2029	2030
	Normal	Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand Total	60,197	63,608	64,433	60,493	60,598
Groundwater (70%)	42,033	44,421	44,998	42,240	42,314
Imported (29.75%)	18,014	19,037	19,285	18,103	18,134
Recycled (0.25%)	150	150	150	150	150
Supply Total	64,193	67,756	66,291	63,297	63,135
Groundwater	42,033	44,421	44,998	42,240	42,314
Imported	22,010	23,185	21,142	20,907	20,671
Recycled	150	150	150	150	150
Supply Surplus	3,996	4,148	1,858	2,804	2,537

Further, Metropolitan tested the WSDM Plan by analyzing its ability to meet forecasted demand. The results indicated 100 percent reliability for full-service non-discounted demands through the forecast period under foreseeable hydrologic conditions. Metropolitan's extensive analysis of system resources demonstrated that the expected occurrence of a severe shortage when water supply is impacted is four percent or less in most years and it never exceeds six percent. This equates to an expected Severe Shortage occurring once every 17 to 25 years.

This reliability analysis shows for the 20-year planning period, available supply continues to exceed demand in single and multiple dry years. This analysis was completed for a 25-year planning period, exceeding the required 20-year planning period.

6.0 CONCLUSION

The City of Santa Ana has proposed the creation of the Metro East Mixed-Use Zone (Project or Overlay Area) over a portion of the City. The Project is bounded by the Santa Ana Freeway (Interstate 5) to the west and south, State Route 55 to the east, Tustin Avenue on the east, and East 6th Street on the north.

The Project is comprised of over 200 acres of land that is designated in the City's General Plan for Professional and Administrative Office, and is currently developed with commercial and office uses, or vacant properties. The overlay zone will allow for the development of mixed-use and/or residential land uses within the Project area. Total Project proposed land use includes 152.9 acres of Residential (59%), 78.3 acres of Office (30%), and 29.3 acres of Commercial (11%).

The City will need to amend the current General Plan to permit these new land uses and the Zoning Code to establish development standards that implement the City's vision for the development of mixed-use and/or residential in the Project area. Creation of this Project area will also allow the City to consider subsequent actions consistent with these updates in the General Plan and the Land Use designations.

Additionally, the City has determined that future individual development projects and infrastructure improvements within the Project area will require further environmental review and analysis of potential site specific environmental impacts in conjunction with the processing of discretionary applications; therefore, the City is preparing an Environmental Impact Report (EIR). The EIR is intended to serve as the primary environmental document for subsequent actions within the Project area, including all local discretionary approvals.

The EIR includes an assessment of utilities, including water supply. Recent legislation, SB 610, requires that a water supply assessment be prepared to document the sufficiency of an available water supply for the City and the proposed Project. This Water Supply Assessment identifies water supply and water reliability to the City, now and into the future, including a sufficient water supply for the Project.

Source of Water

The City currently obtains water from the following primary water sources: 1) groundwater; and 2) imported water. The City currently receives approximately 69 percent of its water supply from groundwater and 31 percent from imported water. The City also supplies a small amount of recycled water (150 AFY) in the south part of the City, which is expected to remain constant since City infrastructure for recycled water is not expected to be expanded and the source of recycled water is not expected to produce additional water to meet local agency future projections.

Water Demand

The City's 2005 water demand was 44,944 AF, with an average over the past five years of about 48,700 AFY. The 20-year planning period from the time of this Water Supply Assessment, as required by SB 610, projects City water demand by 2025 to be 59,280 afy. This projection is consistent with the City's 2005 UWMP water demand projections, which were developed from City documents, including the General Plan to include overall city growth. However, since the new vision for Metro East Mixed-Use Zone is part of the City's General Plan Update Program, the new land use assumptions for this area were not included in the City's 2005 UWMP. Therefore, water demand projections are required for the Metro East Mixed-Use Zone and the City as whole in this Water Supply Assessment.

The build out of the Project is projected to increase water demand by approximately 1,037 AFY. Build out of the Project is estimated to be consistent with the 20-year time horizon typically associated with the General Plan³⁶; however, build out may occur sooner or even beyond the 20-year planning period. Build out sooner than or beyond the 20-year planning period would not impact the sufficiency of water for the City and the Project.

While groundwater supply is expected to remain relatively stable throughout the forecast period, the 20-year development phasing plan also allows for the potential to have water demands within the southern California region met from sources that are currently being planned, developed and implemented within the region, including but not limited to, additional conservation programs, recycled water, and desalted water, thereby providing reliability to the sources available to the City.

Supply Projections

Analysis of water supply projections for the City demonstrates that projected supplies will exceed demand through the year 2030. These projections consider land use based on the Metro East Mixed-Use Zone development intensities, projections from the City's 2005 UWMP, water development programs and projects, and water conservation. Analysis shows that groundwater and imported water are anticipated to remain stable to the City, based on studies and reports of the OCWD and Metropolitan, respectively.

The 20-year projection of water demand will be met by approximately 70 percent groundwater, based on an expected long-term BPP, and approximately 30 percent imported water confirmed reliable by Metropolitan. Additionally, analysis of normal, single-dry, and multiple-dry year scenarios also demonstrate the City's ability to meet or exceed demand during the 20-year planning period, even under reduced imported water supply conditions.

³⁶ Dependent on Metro East Mixed-Use Zone development applications and approval.

Additionally, the City has the opportunity to increase supply to meet demand, if extraordinary circumstances require, through the following measures: 1) production of groundwater above the BPP up to the basin safe yield; 2) increasing imported water purchases; and 3) increased water conservation measures.

Reliability of future water supplies to the region will be ensured through continued implementation of the local agency programs, OCWD's Long-Term Facilities Plan, and the combined efforts and programs among member agencies of Metropolitan, such as the Integrated Resources Plan and proposed Capital Improvement Program. Agencies include all water wholesalers and retailers, OCSD, the Santa Ana RWQCB, and SAWPA.

Collectively, the information included in this Water Supply Assessment identifies a sufficient water supply and reliability to the City, now and into the future, including a sufficient water supply for the Metro East Mixed-Use Zone.

7.0 REFERENCES

The following documents were used, in conjunction with discussions with the City of Santa Ana and EIP Associates, in preparing this water supply assessment:

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City of Santa Ana
Metro East Mixed Use Zone Water Supply Assessment

Technical Memorandum

Date: October 2, 2006
 Subject: **Metro East Mixed Use Zone Water Demand Projections**
 Prepared By: Saurabh Thapar, Dudek
 Reviewed By: Russ Bergholz, P.E., Dudek

Introduction

In support of the overall Water Supply Assessment (WSA) effort, Dudek has developed water demand projections for the Metro East Mixed Use Zone of the City of Santa Ana in five-year increments to the year 2030. The WSA is required to be included in the Environmental Impact Report (EIR) for the project.

The purpose of this technical memorandum is to develop the additional water demands that need to be served by the City as a result of creation of a mixed-use overlay zone, also known as the Overlay Study Area. Figure 1 below shows the Overlay Area.

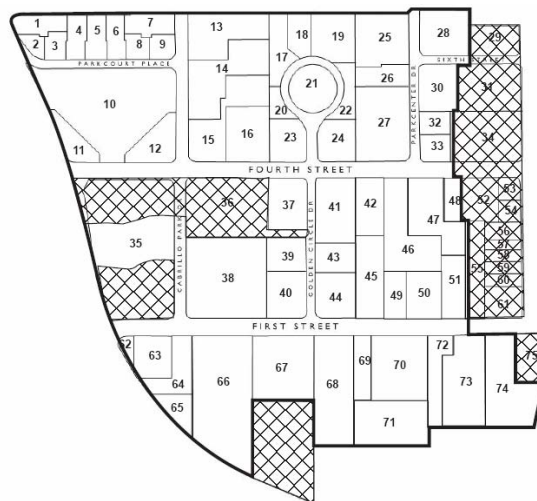
This technical memorandum will address the following:

- Existing water demands and land use for the Overlay Area.
- Water demand projections through build-out in five-year increments and ultimate land use for the Overlay Area.

Background

The City of Santa Ana proposes the creation of a mixed-use overlay zone, also known as the Overlay Area, over a portion of the City. The Overlay Area is located east of the Santa Ana Freeway (I-5) and west of State Route 55 (SR-55). The purpose of the overlay zone is to allow for development of mixed-use and/or residential land use within the Overlay Area. As a result of this potential development, the City will need to serve additional water demands.

Figure 1 – Overlay Area



Existing Water Demands

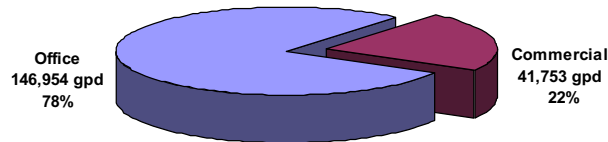
The City of Santa Ana Public Works Agency, Water Utility Division, is the water supplier for the project. Existing water billing information for the Overlay Area was originally provided by the City in March 2006. The revised Overlay Area has since been reduced slightly from the original Overlay Area at that time. Therefore, the billing records were checked against the new study area and hatched areas shown in Figure 1 were removed from the analysis. The single residential customer, the Village Apartments, which represented nearly 10 percent of the water demands, was one of the parcels removed as a result of the change in study area. As a result, only commercial and office land uses are represented in the new Overlay Area.

According to the City's billing records, the existing average water consumption for the Overlay Area is 0.19 million gallons per day (MGD) from 63 accounts. In order to estimate the existing water demand by customer type, several of the provided land use types were adjusted to fit to either residential, commercial or office. Auto Parks, Motels, and Retail Land Uses were all combined into Commercial Land Uses. Land use designations were not designated for about 20 percent of the water accounts. An internet search by address provided background for the various office, commercial or residential operation at each location. The following is a summary of the resulting land use and existing water demands for the study area:

- The Village Apartments, the only residential customer and the largest water demand customer with an average 77,888 gallons per day demand, was removed from the study area.
- Office land use accounts for 78 percent of the total water demands and totaled 49 of the existing 63 accounts. Many of the office customers were multi-story buildings.
- Commercial land uses consist of various restaurants, retail outlets, auto facilities, and motels and account for 22 percent of the total existing water demand from 28 accounts.

Figure 2 summarizes the existing water demands by Land Use type. Existing water demand for the study area totaled an average of 188,707 gallons per day (gpd), or 211.4 acre-feet per year; 126,954 gpd for office and 41,753 gpd for commercial.

Figure 2 – Summary of Water Demands



Unit Water Demands

In order to determine water demand from a future designated land use or potential building square footage, an assumption of the unit water demand by area was prepared. The term “unit water demand factor” refers to the average water demand per unit area or dwelling units. Dudek researched unit water demands currently used by the City of Santa Ana, Irvine Ranch Water District, US Department of Transportation, City of Anaheim, Palmdale Water District, Rincon Del Diablo Water District, and the City of Mountain View.

Unit water demand factors were assumed for all three land use categories (residential, office, and commercial) within the Overlay Area. The majority of residential land uses projected in the study area consists of very high density, multi-story apartments or condominium, with a density factor of over 30 dwelling units per acre.

Unit water demand factors assumed for each of the three land use categories in the Overlay Area are presented in Table 1.

Table 1 – Unit Water Demand Factors

Land Use Category	Unit Water Demand Factor
Residential	6,500 gpd/acre
Office	2,500 gpd/acre
Commercial	3,000 gpd/acre

Original Build-out Water Demands

The intent of the Metro East Mixed Use Zone WSA is to determine the overall water demand for the Overlay Area and an evaluation of the change in ultimate water demands from the City’s 2005 Urban Water Management Plan (UWMP) as a result of the change in the land use.

In order to accomplish this, a projection of the ultimate water demand of the study area based on the current UWMP has been developed. The study area currently contains a mixture of office and commercial land uses as described above. The 2005 UWMP projected water demand for the City’s entire water supply network to increase at a rate consistent with the projected population increase. For the study area, there are no existing residential land uses. Therefore, a parcel by parcel projection was conducted, considering existing water billing records and the development status of the parcel (if vacant or under developed).

To aid in the projection effort, the ultimate projection prepared by EIP Associates for the study area was used to estimate development potential. The EIP projection included development of residential, office and commercial space. Since residential is was not a planned land use for the study area, the proportion of water demand calculated from the EIP projection was removed. The resulting water demands for commercial and office were derived using the unit demand factors described above. The projected water demands were then compared to existing average day water billing. The higher of the two water demands was determined as the ultimate parcel water demand. Based on the EIP projection, comparing just commercial and office space, 64% of water demand is from Office, and 36% is from Commercial. Table 2 describes the projection results.

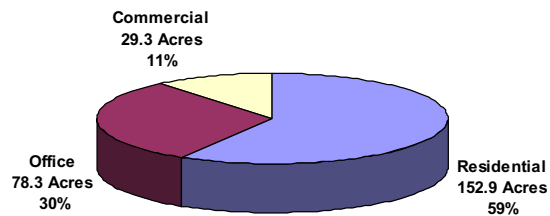
Table 2 – Original Build-Out Water Projection for Overlay Area

Year	Office (gpd)	Commercial (gpd)	Total (gpd)	Total (AFY)
Existing	146,954	41,753	188,707	211.4
2030	199,618	112,285	311,902	349.4

Growth and Redevelopment Potential

The relative growth and redevelopment of the Overlay Area was evaluated by EIP Associates. A detailed parcel-by-parcel evaluation was provided itemizing the existing development status of each parcel in the study area and the redevelopment potential of each parcel, broken down by either residential, office space or commercial. The data contained parcel information including the area and the dwelling units, floor area ratio, land use categories and percent growth projection in five-year increments. Figure 3 shows the percentage of projected build-out developed area by classification. The developed area includes acres of high rise buildings, particularly residential.

Figure 3 – Projected Developed Square Footage with Overlay Area



Projected Water Demands

Projected water demands for each of the land use categories in the Overlay Area were determined by multiplying the assumed water demand factors with the area. The equation used to calculate the ultimate water demands is as follows:

Ultimate Water Demands = Unit Water Demand Factor (gallons per day (gpd)/acre)*Area (acres)

Dudek utilized the percent growth projection provided by EIP Associates to determine the water demands for the Overlay Area through build-out (2030) in five-year increments. The existing demands established the starting point for the evaluation. The percent increase per 5-year increment was established by EIP Associates: 2010=17%, 2015=38%, 2020=59%, 2025=79%, and 2030=100%. The difference between existing and built-out water demand was multiplied by the 5-year percentage increase for each increment and added to the existing demand to derive the water demand total for each 5-year water demand. Table 3 summarizes the resulting projected water demand for the study area from existing to 2030.

Table 3 – Water Demand Projections in Five-Year Increment for Overlay Area

Year	Residential (gpd)	Office (gpd)	Commercial (gpd)	Total (gpd)	Total (AFY)
Existing	-	146,954	41,753	188,707	211.4
2010	168,984	148,521	49,588	367,092	411.2
2015	375,244	150,433	59,151	584,828	655.1
2020	581,504	152,345	68,714	802,563	899.0
2025	787,764	154,257	78,277	1,020,298	1143.0
2030	994,024	156,169	87,840	1,238,033	1386.9

gpd = gallons per day
 AFY = acre feet per year

Conclusion

Based on the projected re-development and growth of the study area, approximately 80 percent of all new water demands within the study area will come from high density residential developments. Overall, considering the potential development proposed within the study area, existing water demand for the Overlay Area is currently at 15% of ultimate build-out, with an estimated increase from 211 AFY to 1,387 AFY.

Comparing the latest water projection of the study area as presented in the City’s 2005 UWMP, there is an overall decrease in the anticipated office and commercial water demands over time as residential water demand increases significantly. Table 4 shows the relative difference for each land use type over the planning period and the cumulative increase in projected water demands within the study area as a result of the redevelopment.

Table 4 – Increase in Projected Water Demand for the Overlay Area Compared to the 2005 UWMP

Year	Residential (gpd)	Office (gpd)	Commercial (gpd)	Total (gpd)	Total (AFY)
2010	168,984	-7,386	-4,155	157,442	176.4
2015	375,244	-16,402	-9,228	349,615	391.6
2020	581,504	-25,417	-14,300	541,787	606.9
2025	787,764	-34,433	-19,372	733,959	822.2
2030	994,024	-43,449	-24,445	926,131	1037.5