Appendix H Water Supply Assessment

City of Santa Ana

Water Supply Assessment

for the proposed

Transit Zoning Code

(SD 84A and SD 84B)

January 2010

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1.0 Introduction

This document, prepared for the City of Santa Ana (City or Santa Ana) regarding the proposed Transit Zoning Code (SD84A and SD84B) project (proposed project or TZC), is a Water Supply Assessment (WSA) intended to satisfy the requirements of Senate Bill 610 (California Water Code Section 10910 et seq.). The regional and local context for the project's water demand is included in this document, to provide City decision-makers a regional framework on which to base a decision about the sufficiency of water supplies for the proposed project.

The proposed project site is located in Santa Ana in Orange County, California. The project is located in the central urban core of Santa Ana and comprises over 100 blocks and 421 acres, approximately 10 miles from the Pacific Ocean. The proposed project is generally bounded by First Street, Flower Street, Civic Center Drive, Grand Avenue, and Interstate 5 (I-5). More specifically, the proposed project is located in the area west of I-5, north of First Street, and between Grand Avenue and Flower Street and south of Civic Center Drive. The regional context of the proposed project is shown in Figure 1-1.

The proposed project is a 421-acre specific plan proposed by the City. Planned uses include residential neighborhoods, including single and multiple family dwelling units, neighborhood commercial uses, low-scale to intense industrial uses, and civic uses. The plan boundary includes the areas commonly referred to as the Government Center, Downtown, First Street, Lacy Neighborhood, Logan Neighborhood, the industrial area straddling the railroad tracks and the Santa Ana Train Station. As proposed, the TZC will add 387,000 square feet of retail uses, 15.5 acres of open space, and 4,075 residential units. In addition, implementation of the specific plan will result in the loss of 124,000 square feet of commercial uses, 21,000 square feet of civic uses, and nearly 1,000,000 square feet of industrial uses. Surface parking will also be reduced in favor of multi-level parking structures.

This report is organized following a basic hierarchy to describe each issue: regional context (Orange County Groundwater Basin and Metropolitan Water District of Southern California), local context (City of Santa Ana), and finally project-level analysis for the proposed TZC. The report organization is as follows:

1) Introduction
2) Water Supply Planning under SB 610 (Water Code 10910 et seq.)
3) Regional, local land-use planning and population and housing evaluation
4) Water supply setting – including surface and groundwater hydrology, regional and local supplies, and supply reliability in dry-years
5) Water demand – regional and local
6) Comparison of supply and demand
7) Conclusions of Analysis

The final WSA for this proposed project must be adopted by the City Council, and its conclusions incorporated into other environmental documents as necessary, including but not limited to the Environmental Impact Report, which is currently being prepared. The water supply analysis contained herein is one of many items to be considered before approval of the proposed project.

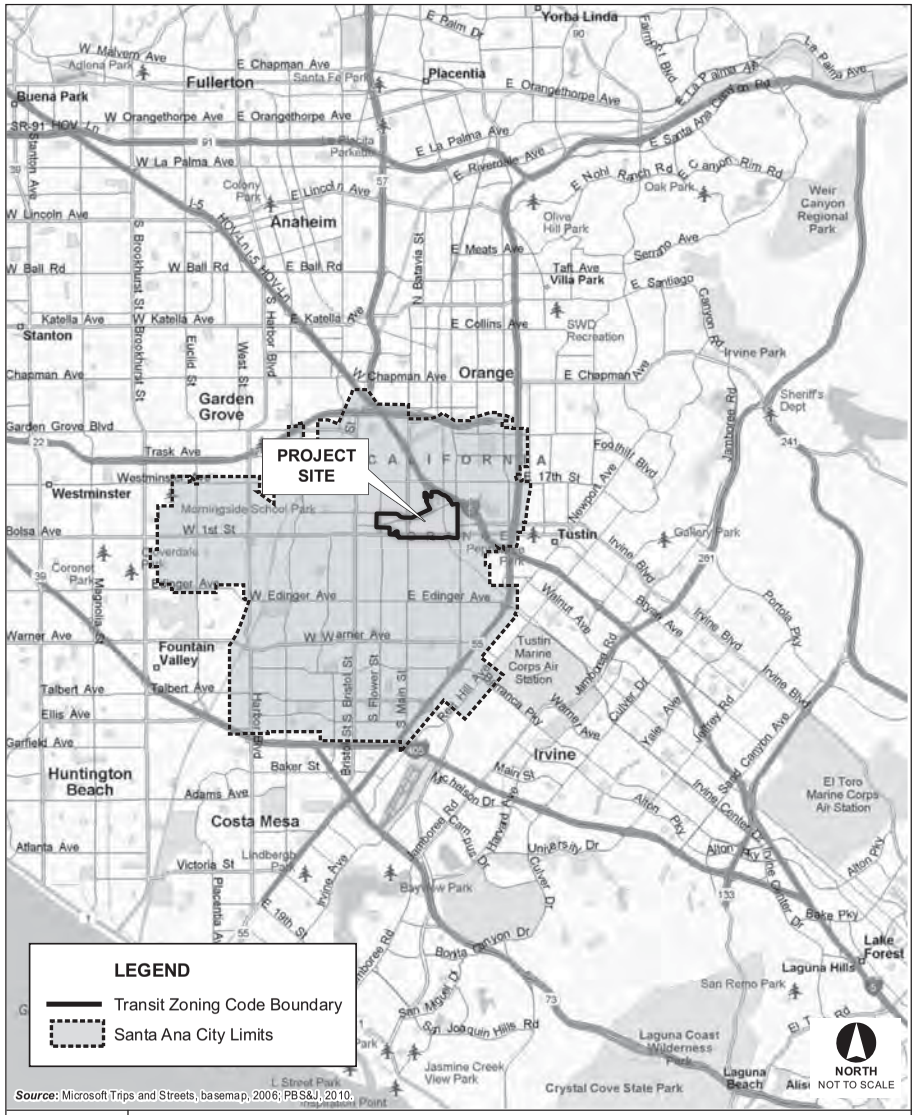


FIGURE 1-1
Regional Location Map

0D2136700 City of Santa Ana Transit Zoning Code (SD 84A and SD 84B) WSA

1.1 City of Santa Ana Public Works Agency

The City Public Works Agency provides water service to residents, business and other public agencies in within the city limits. The water service area is consistent with the City's boundary (see Figure 1-2) and includes the TZC area. The City utilizes imported treated water purchased from Metropolitan Water District of Southern California (Metropolitan) and groundwater to meet demands within its service area. For fiscal year 2008-09 (beginning July 1, 2008 and ending June 30, 2009), approximately 31 percent of the City's water supply came from imported water wholesaled by Metropolitan. Imported water is treated at the Robert B. Diemer Filtration Plant and Weymouth Filtration Plant before the water is delivered to the City.

The City is also a member of the Orange County Water District (OCWD). In general, approximately two-thirds of the City's water supply comes from groundwater wells accessing the Orange County Basin. For fiscal year 2008-09 (beginning July 1, 2008 and ending June 30, 2009), approximately 69 percent of the City's water supply came from groundwater pumped from the Orange County Basin. OCWD's allowable Basin Pumping Percentage (BPP) establishes the annual pumping percentage per OCWD member and may vary annually. The BPP is set uniformly and is a portion of each member's water supply that comes from groundwater pumped from the basin. OCWD members pay a Replenishment Assessment (RA) fee for water pumped from the basin. Groundwater production at or below the BPP is assessed the RA. Any production above the BPP is charged the RA plus the Basin Equity Assessment (BEA). Historically, the BEA is calculated so that the cost of groundwater production above the BPP is typically higher than purchasing imported potable supplies. This approach serves to discourage, but not eliminate, production above the BPP. However, currently the BEA is essentially the same rate as the imported water rate purchased through Metropolitan. Currently, the BPP is set at 62 percent, and groundwater pumped between 62 percent to a maximum restriction of 64 percent will be charged the sum of the RA and BEA, which, as stated above is essentially the same rate as the import water rate purchased through Metropolitan. The City has the ability to pump above the BPP since their production capability is significantly greater than the demands typically met with groundwater.

The City operates a water supply system composed of nineteen (19) wells, seven (7) imported water connections, and a variety of transmission and conveyance infrastructure. Wells vary in depth from 650 feet to 1,500 feet and range in production from 1,100 gallons per minute (gpm) to 3,600 gpm. The total system capacity of the City's groundwater wells is 45,863 gpm. This does not include two new wells, which as proposed, would increase system capacity by 5,500 gpm for a total system capacity of 51,363 gpm. The City maintains seven imported water connections to the Metropolitan system at the Orange County and East Orange County Feeder pipelines. The City provides water to its customers through 444 miles of transmission and distribution mains, eight reservoirs with a combined storage capacity of nearly fifty (50) million gallons, and seven (7) pumping stations.

The City is largely built-out; its utility systems are in place and generally fixed in nature. Increased development density resulting from land use objectives of the General Plan and the proposed project may require expansion of system capacities, accelerated maintenance and repair programs, or both. The City provides for such improvements in a systematic manner through its annual Capital Improvements Program. Implementation of the Land Use Element will be carefully coordinated with the Capital Improvements Program so as to ensure continuing adequacy of the public utility systems.

Source: City of Santa Ana, *Urban Water Management Plan*, November 7, 2005.

FIGURE **1-2**
City of Santa Ana Water Service Area

D2136700 Transit Zoning Code (SD84A&SD84B) WSA

1.2 Transit Zoning Code (SD84A and SD84B) Project Description

The Transit Zoning Code was initially drafted as a component of the larger Santa Ana Transit Zoning Code (SD84A and SD84B) (SATZC). The community process to draft the SATZC included over 100 outreach meetings and interviews held from April 2006 through February 2008. Following the completion of the community outreach process for the SATZC, but prior to the release of the revised draft plan to the public, the City was awarded a major transportation grant to study and design new transit infrastructure that would ultimately be constructed within the SATZC study area. Also during this time, the Santa Ana Redevelopment Agency (Agency) entered into a Predevelopment Agreement for planning and development purposes with The Related Companies of California, LLC and Griffin Realty Corporation, a California Corporation (jointly, the Developer) to redevelop Agency-owned properties generally located in the vicinity of Santa Ana Boulevard. Due to these major changes within the SATZC study area, and in response to community concerns regarding the scope of the SATZC itself, the Specific Plan was tabled. However, the zoning component of the SATZC (the Transit Zoning Code) was pulled out and further refined in order to provide the zoning necessary to support the long-term development of a successful transit program, as well as to provide a development framework for the redevelopment of the Agency properties.

The Transit Zoning Code provides new zoning for all of the properties contained within its boundary with the exception of those properties zoned M1 – Light Industrial or M2 – Heavy Industrial. These M1 and M2 properties would retain their existing zoning, but would be covered by an overlay zone that allows for the option of future mixed-use development to be exercised at the discretion of the property owner. The Transit Zoning Code provides for the integration of new infill development into existing neighborhoods, allows for the reuse of existing buildings, supports mixed-use development, provides a transit-supportive, pedestrian-oriented development framework to reduce vehicle trips, reduce greenhouse gas emissions, and support the addition of new transit infrastructure, and provides an economic development stimulus (Figure 1-3 – Transit Zoning Code Map).

Within the boundary of the Transit Zoning Code the Agency owns 49 parcels comprising approximately seven non-contiguous acres. The Agency/City is pursuing the potential acquisition of 16 additional properties within the immediate vicinity of the 49 parcels mentioned above for the purposes of completing the assemblage of properties on those blocks in which the Agency already has majority ownership, as well as to secure property to provide for additional open space. The acquisition of these additional properties may lead to demolition and/or relocation of existing structures, as well as the potential relocation of any existing residents.

The Agency and the Developer propose to redevelop these properties. The Developer concept for these properties includes the development of a maximum of 155 rental units (including a potential senior housing project) and a maximum of 65 for-sale units – a total of 220 new residential units. A component of this residential development will be affordable housing pursuant to the County of Orange's criteria for low-to-moderate income housing. The development proposal also includes the addition of approximately 1.5 acres of new public open space that would include a public park, a public tot lot, and a 10,000 square foot community building. The redevelopment of these properties requires the demolition of 15 structures, totaling approximately 30,000 square feet of building area, on 15 Agency-owned properties.

Santa Ana is in the process of preparing the Santa Ana Fixed Guideway Corridor Study in order to apply for future grant funding that would support the construction of a new public transit system. This system would provide for the expansion of transit services originating at the Santa Ana Regional Transportation Center (SARTC) and serving the Lacy Neighborhood, Downtown and Civic Center areas. Future expansion of the system would link to the Pacific Electric Right-of-Way, located on the City's western side, in order to provide service into the City of Garden Grove and

beyond. While the zoning standards contained within the Transit Zoning Code would provide a framework for the transit-supportive development necessary to generate adequate ridership for the successful development of the Fixed Guideway System, this EIR will not analyze the proposed Santa Ana Fixed Guideway Corridor

Study and its potential alignments have not been completed. The specifics of that plan will be analyzed in a separate EIR as part of the Santa Ana Fixed Guideway Corridor Study.

To accommodate this objective, the City will need to amend the current General Plan to permit these new land uses and amend the Zoning Code to establish development standards that implement the proposed project. These amendments will allow the City to provide a framework for the development of compact, transit-oriented development that contains a mix of residential, commercial, and professional uses in order to address the City's and the region's goals of providing sites for housing in already urbanized locations that are adjacent to transit, thereby reducing vehicle trips, stimulating investment in underutilized land, and improving the jobs/housing balance within the City. This will lead to potential development of approximately 4,075 residential units, 387,000 sf of retail development, and an additional 15.5 acres of open space within the City. Adoption of this proposed project would allow the City to consider subsequent actions consistent with these updates in the General Plan and Land Use designations. Table 1-1 lists the overall potential net change that would occur as a result of the proposed project area. The TZC land use map is shown in Figure 1-3.

Table 1-1: Summary of Transit Zoning Code (SD84A and SD 84B) Development Potential

Land Use Type	Potential Gross Development	Existing Uses to be Converted	Potential Net Development
Residential (units)	4,272	197	4,075
Retail (sf)	693,000	306,000	387,000
Industrial (sf)	90,000	1,080,000	(990,000)
Commercial (sf)	0	124,000	(124,000)
Civic (sf)	8,000	29,000	(21,000)
Open Space (sf)	680,000	0	680,000
Surface Parking Lots (sf)	67,000	1,839,000	(1,772,000)
Source: Transit Zoning Code (SD84A and SD84B) EIR, January 2010			

1.2.1 Development Zone Descriptions

The project area consists of approximately 100 individual blocks within the central area of the City. The Transit Zoning Code divides the area within its boundaries into separate zones that are based on transects of intensity within the Transit Zoning Code area that range from the most intense development and land use types to the least intense, with most zones providing for a significant mixture of land uses within them. This approach differs from conventional zoning maps that typically divide cities into zones that rigidly segregate uses into separate areas, and the use of the zones are based on development intensity (instead of land use zones) as the spatial basis for regulating development. The zone directly reflects the functions of, and interrelationships between, each part of the plan area. The Transit Zoning Code would allow for mixed-use development with an emphasis on residential, commercial, and open space as an alternative to the development options allowed under the existing zoning. The following descriptions highlight the future development standards of contained within the geographic areas covered within the project area.

Transit Village (TV) Zone – This zone is applied to areas adjacent to and north of the Santa Ana Regional Transportation Center, easterly to I-5. This zone is intended to provide standards for

compact transit-supportive mixed-use/residential development. This zone is characterized by a wide range of building intensities including mixed-use tower-on-podium buildings, commercial blocks, liners, stacked flats, and courtyard housing. The zone accommodates retail, restaurant, entertainment, and other pedestrian-oriented uses at street level, with offices and flats above in the mixed-use building types, at high intensities and densities. The landscape palette is urban with shading and accent street trees in parkway strips along Santa Ana Boulevard, and in sidewalk tree wells where on-street parking is provided. Parking may be accommodated on-street, in structures with liner buildings, and underground.

Government Center (GCD) District – This zone is applied to the Civic Center area west of the Downtown. This area accommodates a wide variety of civic uses, including Federal, State and local government offices and services, libraries, museums, community centers, and other civic assembly facilities. Building types vary according to their public purpose, are programmed by the City for their specific, are programmed by various government agencies for their specific sites, and therefore are not coded by the Transit Zoning Code. The landscape style is urban, emphasizing shading street trees in sidewalk tree wells, and in landscaped public plazas.

Downtown (DT) Zone – This zone is applied to the historical shopping district of Santa Ana; a vital, pedestrian-oriented area that is defined by multi-story urban building types (commercial blocks, live-work, stacked dwellings, and courtyard housing in the Downtown edges) accommodating a mixture of retail, office, light service, and residential uses. The standards of this zone are intended to reinforce the form and character represented by existing pre-World War II buildings and recognized as a National Historic District, through restoration, rehabilitation, and context-sensitive infill development. The standards also facilitate the replacement or improvement of post-war development that eliminated the pedestrian orientation of various downtown blocks (for example: parking structures with no features of pedestrian interest along their entire lengths). The landscape style is urban, emphasizing shading and accent street trees in sidewalk tree wells. Parking is accommodated on street, and may also be in structures with liner buildings, underground, and within block centers in surface lots not visible from streets.

Urban (UC) Zone – This zone is applied to the area surrounding Downtown, which services as a transitional area to the surrounding lower-intensity neighborhoods, and to other areas where mixed-use and multi-unit residential buildings create a pedestrian-oriented urban fabric. The zone provides for a variety of non-residential uses and a mix of housing types at medium intensities and densities. Besides accommodating community serving businesses, this zone may also serve the daily convenience shopping and service needs of nearby residents. Building types include mixed-use commercial blocks, stacked flats, live-work, rowhouses, and courtyard housing. The landscape style is urban, emphasizing shading street trees in sidewalk tree wells. Parking is accommodated on street and may also be in structures with liner buildings and underground in areas adjacent to the DT zone, and in surface lots away from street frontages.

Corridor (CDR) Zone – This zone is applied to properties fronting existing commercial corridors and provides standards to improve pedestrian orientation in a transit-supportive, mixed-use area. Mixed-use commercial block and live-work building types are at or near the sidewalk, and accommodate street level retail, service, and office, uses with office and residential above. The landscape style is urban, emphasizing shading street trees in sidewalk tree wells. Parking is accommodated on street, and in screened surface lots between buildings, or away from streets, with no more than half of the site frontage occupied by parking.

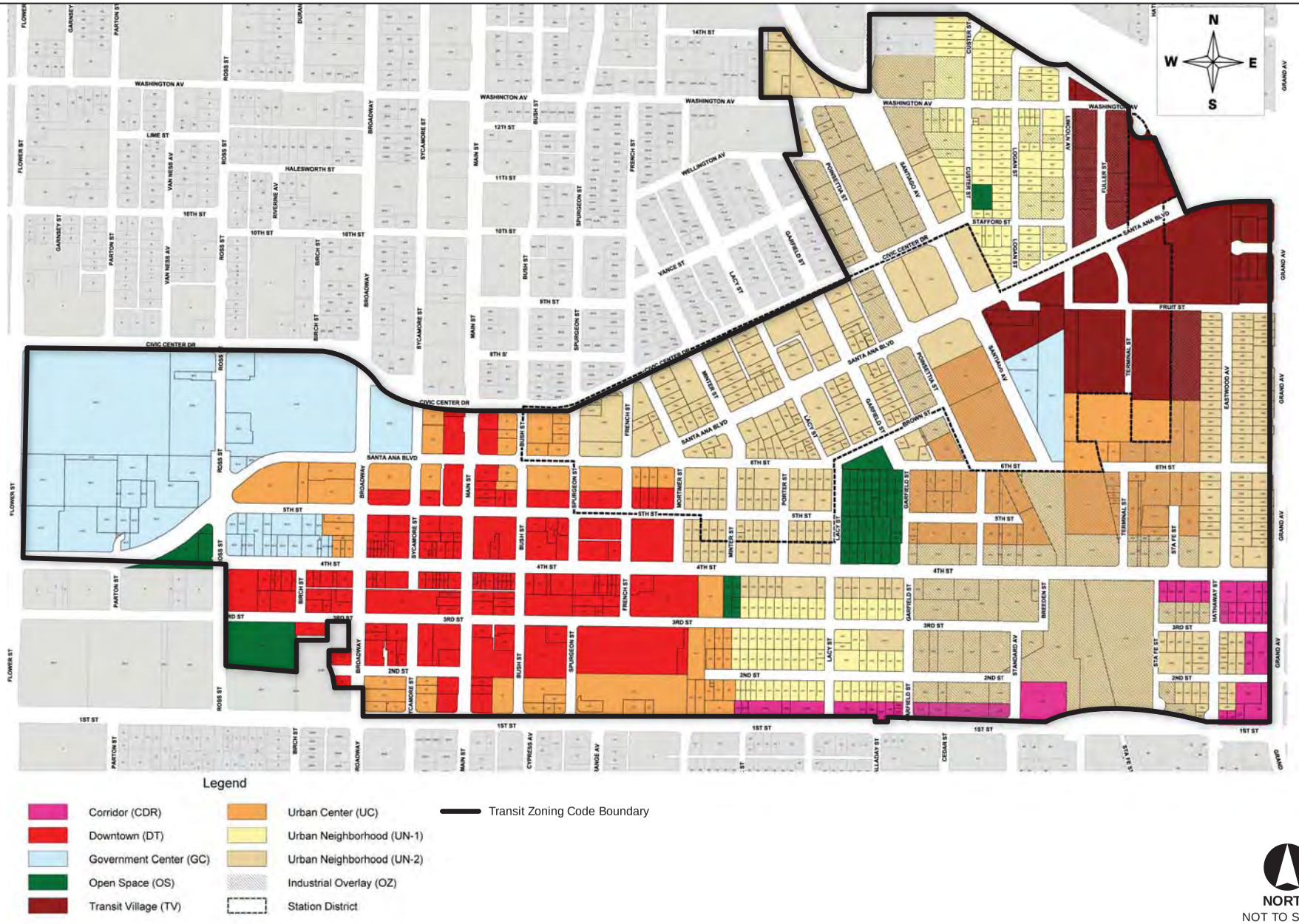
Urban Neighborhood 2 (UN-2) Zone – This zone is applied to primarily residential areas intended to accommodate a variety of housing types with some opportunities for live-work, neighborhood-serving retail, and dining establishments. Appropriate building types include single dwellings, duplexes, triplexes, and quadplexes, courtyard housing, rowhouses, and live-work. In some areas,

the more intense, hybrid building type is allowed where additional intensity is warranted while maintaining compatibility with neighboring properties. The landscape is appropriate to a neighborhood, with shading street trees in parkway strips, and shallow depth landscaped front yards separating buildings from sidewalks. Parking is on street, and in garages located away from street frontages.

Urban Neighborhood 1 (UN-1) Zone – This zone is applied to existing primarily residential areas and is intended to strengthen and stabilize the low intensity nature of these neighborhoods by accommodating housing types at lower densities. Appropriate building types include single dwellings, duplexes, triplexes, and quadplexes, and live-work. The landscape is appropriate to a neighborhood, with shading street trees in parkway strips and landscaped front yards separating buildings from sidewalks. Parking is on street, and in garages located away from street frontages.

Industrial Overlay (IO) Zone – This zone is applied to areas currently zoned Light Industrial (M1) and Heavy Industrial (M2) to allow the types of land use activity and development permitted by existing M1 and M2 zoning to continue until such time that the owner chooses to apply the new zones identified in the Transit Zoning Map. Until the property is rezoned as described above, property in the IO Zone shall be regulated by the existing provisions of the M1 and M2 zones contained within the Santa Ana Municipal Code (SAMC 41, Article III, Divisions 18 and 19), as applicable.

Open Space (OS) – This zone identifies areas reserved for community parks and other open spaces. Allowable structures in this zone are limited to those necessary to support the specific purposes of the particular open space area (e.g., sport-court enclosures and multi-purpose buildings in active parks and trails within passive parks.



***Source*:** City of Santa Ana GIS, January 8, 2010.

FIGURE **1-3**

Transit Zoning Code (SD 84A and SD 84B) Map

2.0 Water Supply Planning

California has many different processes through which the development and/or maintenance of water supplies are planned on a local and regional level. Urban Water Management Plans (UWMPs), Groundwater Management Plans (GMPs), Integrated Regional Water Management Plans (IRWMPs), Municipal Service Reviews (MSRs) and water resources components of General Plans all integrate regional planning of water supply and demand.

To complement these large-scale planning processes, California enacted Senate Bills 610 and 221 in 2002, both of which emphasize the interrelationships between land use and water supply planning, and require the incorporation of water supply and demand analysis at the earliest possible stage in the planning process for sizeable land use projects. These statutes primarily apply to the planning of water supplies and identification of sources for defined "projects" (Water Code, Section 10912) in the case of SB 610 and for individual residential subdivision projects of more than 500 units in the case of SB 221. SB 610 amended portions of the Water Code, including Section 10631, which contains the Urban Water Management Planning Act, and added Sections 10910, 10911, 10912, 10913, and 10915, which describe the required elements of a WSA to be prepared and relied upon during the California Environmental Quality Act (CEQA) process. WSAs are prepared in connection with the environmental review process for defined "projects" (generally very similar to "projects of statewide, regional, or area wide significance," as defined in "CEQA Guidelines" Section 15206), and provide information (along with EIR analysis) to be considered by agency decision-makers at the time of project approval. Nothing in SB 610 prevents a city or county from approving a proposed project even in the face of information concluding that there is not sufficient water supply for build-out of the project. SB 221, which requires completion of a Water Supply Verification (WSV) prior to the approval of certain major subdivision maps, amended Section 65867.5 and added Sections 66455.3 and 66473.7 to the California Government Code.[1] Under SB 221, cities and counties may not approve final subdivision maps absent a showing of water supply availability for the amount of development to be authorized by the tentative map. A condition requiring such a showing must be included within the approved tentative subdivision map. Under both laws, agencies are required to consider water demands over a 20-year planning horizon, taking into account normal, single dry, and multiple dry water year scenarios in light of the water provider's existing and planned future uses, including agricultural and manufacturing uses.

2.1 Water Supply Planning Under SB 610 and SB 221

As the "public water system" that supplies water to the City, Santa Ana is required to prepare WSAs and WSVs, under the requirements of Senate Bills 610 and 221, and the Government Code (Sections 65867.5, 66455.3 and 66473.7). There are three primary areas to be addressed in a WSA: (1) a description of all relevant water supply entitlements, water rights, and/or water contracts; (2) a description of the available water supplies and the infrastructure, either existing or proposed, to deliver the water; and (3) an analysis of the demand placed on those supplies, by the project, and relevant existing and planned future uses in the area. Where the description of existing supply water supply entitlements, water rights, and/or water contracts shows insufficient water supplies to serve the proposed project as well as existing and planned uses over the 20-year planning horizon, additional information is required to describe how and where sufficient supplies may be obtained. Such information must include the estimated costs, financing methods, and regulatory approvals needed to obtain new supplies, as well as a projected time frame for obtaining them. WSVs must also contain information regarding existing supplies, as well as more detailed confirmation that the appropriate infrastructure planning and funding is in place to fully commit water supplies to a project. In addition to these items, WSVs must contain more detailed confirmation that the appropriate infrastructure planning and funding is in place to fully commit water supplies to a project.

1 California Department of Water Resources, *Guidebook for Implementation of SB 610 and SB 221 of 2001*, 2003.

As stated previously stated, Senate Bill 610, which is applicable to certain large projects subject to CEQA or considered a "project" under Water Code Section 10912(a) or (b), builds on the information that is typically contained in a UWMP. The amendments to Water Code Section 10631 were designed to make WSAs and UWMPs consistent. A key difference between the WSAs and UWMPs is that UWMPs are required to be revised every five years, in years ending with either zero or five, while WSAs are required as part of the environmental review process for each individually qualifying project. As a result, the 20-year planning horizons for each type of document may cover slightly different planning periods. Additionally, not all water providers who must prepare a WSA under SB 610 are required to prepare an UWMP.

Especially pertinent to this WSA for the proposed project, and all projects to be served by the City are the provisions under Water Code Section 10912(f) that involve documentation of supply if groundwater is to be used as a source. As of 2009, Santa Ana acquired approximately 69 percent of its supplies from groundwater. Regional documents, including the OCWD's Groundwater Management Plan, OCWD's Long-Term Facilities Plan [(LTFP), Executive Summary of the LTFP is contained in Appendix A and data from OCWD's annual Engineer's Reports, are referred to in this document to provide information on the availability and understanding of groundwater in Orange County.

The SB 610 WSA process involves answering the following questions:

- Is the project subject to CEQA?
- Is it a project under SB 610?
- Is there a water supplier with jurisdiction over the subdivision?
- Is groundwater a component of the supplies for the project?
- Are there sufficient supplies available to serve the project over the next 20 years?

2.1.1 "Is the Project Subject to CEQA?"

The first step in the SB 610 process is determining whether the project is subject to CEQA. SB 610 amended Public Resources Code Section 21151.9 to read: "Whenever a City or county determines that a project, as defined in Section 10912 of the Water Code, is subject to this division [i.e., CEQA], it shall comply with part 2.10 (commencing with Section 10910) of Division 6 of the Water Code." The City has determined that the project is subject to CEQA. The information contained in this assessment will be used to inform and support the Environmental Impact Report (EIR) for the TZC project, and will be appended thereto.

2.1.2 "Is It a Project Under SB 610?"

The second step in the SB 610 process is to determine if a project meets the definition of a "Project" under Water Code Section 10912 (a). Under this section, a "Project" is defined as meeting any of the following criteria:

1) A proposed residential development of more than 500 dwelling units;
2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet (ft^2) of floor space;
3) A commercial building employing more than 1,000 persons or having more than 250,000 ft^2 of floor space;

4) A hotel or motel with more than 500 rooms;
5) A proposed industrial, manufacturing, or processing plant, or industrial park, planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 ft^2 of floor area;
6) A mixed-use project that includes one or more of these elements; or
7) A project creating the equivalent demand of 500 residential units.

Alternately, if a public water system has less than 5,000 service connections, the definition of a "Project" also includes any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of service connections for the public water system. The TZC project proposes a net residential growth of over 4,000 dwelling units, and is therefore subject to SB 610 analysis codified in Water Code Section 10910 et seq.

2.1.3 "Is There a Public Water System?"

The second step in the WSA process is to determine if there is a "public water system" that has or may have jurisdiction over the proposed subdivision. Section 10912 (c) of the California Water Code (Water Code) states: "[A] public water system means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections."

The City is a public water supplier with over 46,000 water service connections. The City has been identified as the water supplier with jurisdiction over the area and will provide water to the proposed project; therefore, the City must provide a WSA for this proposed project.

2.1.4 "Is There a Current UWMP that Accounts for the Project Demand?"

Step three in the WSA process involves determining if there is a current UWMP that considers the projected water demand for the project area. The Water Code requires that all public water systems providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet annually (afy) must prepare an UWMP, and the plan must be updated at least every five years on or before December 31 in years ending in five and zero.

Water Code Section 10910 (c)(2) states: "If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g) [i.e., the WSA]."

The City's 2005 UWMP did not account for the land use changes associated with the proposed TZC. Therefore, any qualifying projects not accounted in the 2005 UWMP requires preparation of a WSA that documents the City's current and projected supplies when compared to projected demands associated with new growth not covered in the 2005 UWMP including agriculture and industrial uses. When the 2005 UWMP was prepared, development in the City included the demands associated with the existing land uses; therefore, this WSA analyzes the change in water demand associated with the development under the TZC. The 2005 UWMP is used a foundational document for this WSA and is referenced as necessary.

2.1.5 "Is Groundwater a Component of the Supplies for the Project?"

The next step in the SB 610 analysis process involves documentation of supply if groundwater is to be used as a source. Groundwater is a major water supply source for the City and for the proposed TZC. As a result, this WSA will evaluate the sufficiency of the groundwater from the basin(s) from which the proposed project will be supplied to meet projected demand associated with the proposed project. Santa Ana is located in the Coastal Plain of Orange County Groundwater Basin (Orange County Basin), which is part of the larger South Coast Hydrologic Region. For the purpose of this WSA, the Orange County Basin is defined as the "basin from which the proposed project will be supplied", as specified in Water Code Section 10910(f)(2). Pursuant to Water Code Section 10910(f) the following items must be included in the assessment:

- A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree.
- A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.
- A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.
- An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.

2.1.6 "Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?"

Water Code Section 10910 (c)(4) states: "If the City or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the City or county for the project 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 existing and planned future uses, including agricultural and manufacturing uses."

As required, the next step in the SB 610 process is to prepare the assessment of the available water supplies, including the availability of these supplies in all water-year conditions over a 20-year planning horizon, and an assessment of how these supplies relate to project-specific and cumulative demands over that same 20-year period. In this case, the period is 20 years and covers the years 2010 to 2030.

The City, based on the analysis in this WSA (Section 6), concludes that are adequate supplies to serve the proposed project, including existing demand and planned future uses in the City's service area through 2030. The City produces approximately 30,000 afy of its water supplies through local groundwater wells in the Orange County Basin and the balance 13,000 afy comes from continued imported water purchases from Metropolitan.

Section 4 presents the City's water supplies; a demand analysis is discussed in Section 5. Section 6 contains supply and demand comparison and the conclusion of analysis is presented in Section 7.

2.1.7 "If, as a result of its assessment, the public water system concludes that its water supplies are, or will be, insufficient. Are there a plan(s) for acquiring additional water supplies pursuant to Water Code 10911(a)?"

The final step in the SB 610 process, if the water supplies are, or will be, insufficient, the city or county shall include in its water supply assessment its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies.

- Those plans may include, but are not limited to, information concerning all of the following:
- The estimated total costs, and the proposed method of financing the costs, associated with acquiring the additional water supplies.
- All federal, state, and local permits, approvals, or entitlements that are anticipated to be required in order to acquire and develop the additional water supplies.

Based on the considerations set forth in paragraphs (1) and (2), the estimated timeframes within which the city or county is required to comply with this part pursuant to subdivision (b), expects to be able to acquire additional water supplies.

3.0 Land Use Planning, Population, and Housing

This section provides a background on land use planning for Orange County and Santa Ana.

3.1 City of Santa Ana

The City's current General Plan was adopted by the City Council in 1982. It was developed to meet local planning needs through the year 2000. Although it has not been comprehensively updated since 1982, the Land Use Element was updated in 1998 and the Housing Element for years 2006 through 2014 was updated in 2009.

The Land Use Element serves as a long-range guide for land use and development in the City. The primary objective is to assist in the management of future growth, to improve the City's overall physical appearance, to minimize potential land use conflicts, and to facilitate growth and development reflecting the community's vision. Specifically, the Land Use Element designates the distribution, location, and extent of land uses for housing, business, industry, open space, recreation, and public facilities. Additionally, it establishes standards of population density and building intensity for each land use category covered by the General Plan.

The City is an almost fully developed city; consequently, the goals and policies of the Land Use Element largely focus on the conservation, maintenance, and rehabilitation of existing property. Any new development will necessarily consist of redevelopment and infill development on the remaining vacant and underutilized parcels. The City has adopted three Specific Plans: North Harbor Boulevard Specific Plan, Bristol Corridor Specific Plan, and Midtown Specific Plan. There are also a number of Redevelopment Plans, which together encompass over 5,000 acres that have been adopted by the City.

3.2 Transit Zoning Code (SD84A and SD84B) Objectives

The TZC implements a variety of goals and policies in the Santa Ana General Plan, particularly the Land Use and Urban Design Elements. The two near-term goals of the specific plan are to make the core competitive in the region, particularly for employment, tourism, and commerce, and to stabilize the local neighborhoods. The specific plan proposes a market-driven development strategy; general priorities are to invest in historic preservation, mobility and public transportation, shared parking, civic initiatives, public realm, employment, housing, and retail expansion. While the timing can change due to future market conditions, these general priorities shape the implementation of the proposed project.

The general land use of the TZC area includes six distinct districts. Two of the districts are residential: Lacy Neighborhood and Logan Neighborhood. Two are retail commercial districts: First Street Corridor and Downtown. The remaining two districts represent special uses in the Specific Plan area: Government Center and Rail Station District.

3.3 Relationship to the General Plan

The General Plan provides long-term guidance and policies for maintaining and improving the quality of life in, and the resources of, the community, both man-made and natural. The General Plan provides direction for the City's growth and development. As a policy document, the General Plan serves as a guide to the adoption of laws necessary to execute its intent.

The goals and policies of the TZC focus primarily on maintaining and revitalizing the City's existing residential neighborhoods, discouraging incompatible development into residential neighborhoods, and providing a variety of high-quality housing types for all economic segments of the community. Additionally, the policies of the TZC encourage a balance of land uses that promote livable communities. The proposed Transit Zoning Code (SD 84A and SD 84B) contains specific design and development standards to ensure quality development that will unify the existing project area and strengthen and enhance existing neighborhoods. Furthermore, the introduction of mixed-use development that incorporates residential uses with office and/or commercial uses would help promote a balance of uses. The Transit Zoning Code (SD 84A and SD 84B) does incorporate a range of housing types and sizes that would cater to both families and individuals in the City.

3.4 Population Evaluation and Housing Considerations

Data from the United States Bureau of the Census (U.S. Census) (American Community Survey), the California Department of Finance (DOF), the Southern California Association of Governments (SCAG), and the Santa Ana 2006–2014 Housing Element of the General Plan (Housing Element) were used to prepare this discussion as it relates to population and housing within Santa Ana and the proposed project.

3.4.1 Population

The population data provided by the DOF are computed and updated annually and therefore, are considered more reflective of current conditions than the population projections prepared by SCAG. For this reason, DOF data will be used in this analysis to provide existing conditions, where they are available. However, SCAG data are also presented for comparison purposes, and are relied upon for future population projections.

The City's population in 2009 was 355,662,[2] which represents a 0.011 percent increase over the 2008 population of approximately 351,521. Table 3-1 shows the population growth in the City since 2002, using data derived from the DOF reflecting U.S. Census sources and population estimates. As identified, the City's average annual growth has steadily increased since 2002, with increases between 2002 and 2009 representing 11,767 new residents. Annual increases have fluctuated over the last eight years – years 2003 and 2004 for saw population increases of over 3,300 and 4,100 respectively; conversely, 2006, 2007 and 2008 saw increases of 217, 324 and 876, respectively.

The 2008 SCAG Regional Transportation Plan (RTP) Update shows future population projections for Santa Ana, which are presented in Table 3-2. These projections are also confirmed locally by the Center for Demographic Research at California State University Fullerton (CSF).[3] (Appendix B of this WSA.)

2 State of California, Department of Finance, E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change—January 1, 2007 and 2008. Sacramento, California, May 2008.

3 California State University Fullerton Center for Demographic Research, Orange County Progress Report. August 2008.

Table 3-1: Population Growth: City of Santa Ana (2002–2009)

Year	Population	Average Annual Growth (persons/year)
2002	343,895	~
2003	347,224	3,329
2004	348,949	1,725
2005	350,104	1,155
2006	350,321	217
2007	350,645	324
2008	351,521	876
2009	355,662	4,141

Source: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

Table 3-2: SCAG Population Forecast for the City of Santa Ana

	2010	2015	2020	2025	2030
Population	364,683	371,043	376,353	378,397	380,356

Source: SCAG 2008, Growth Forecast.

3.4.2 Household Projections

A household is defined by the DOF and the U.S. Census as a group of people who occupy a housing unit. The number of households in a given area differs from the number of dwelling units because the number of dwelling units includes occupied and vacant units. The variance between households and dwelling units also reflects population segments living in-group quarters such as board and care facilities, and those who are homeless.

3.4.3 County Household Projections

A household size ratio in the range of 3.0 pph is consistent with the direction of the overall County-wide housing development, as a majority of the development within Orange County (and Southern California in general) is focused on infill redevelopment with higher density mixed-use projects. In addition, the County's existing pph ratio is 3.1. As noted by SCAG,[4] Los Angeles and Orange Counties are targeted to become significant magnets for housing growth as rising congestion and the availability of jobs discourage long commutes to outlying areas. With many new residents from areas with high urban densities, the new (forecasted) population would be more adaptive to urban living. The availability of infill areas will provide a needed increase in land available for housing. These areas will be transformed into new neighborhoods, complete with a range of housing options and excellent accessibility to jobs, entertainment, and cultural aspects of communities. Transportation corridors will guide development and encourage transit-oriented growth. This resurgence will provide housing for thousands of people through infill and recycling of certain properties. Implementation of the Transit Zoning Code (SD 84A and SD 84B) is consistent with these growth trends as identified by SCAG.

4 SCAG, 2008. Regional Transportation Plan, Growth Forecast.

3.4.4 City of Santa Ana Household Projections

Table 3-3 compares the number of households in Santa Ana for 2000 and 2009. The average household size in the City increased from 4.6 persons per household (pph) in 2000 to 4.7 pph in 2009, essentially a densification of pph. The average household size of 4.6 represents all occupied housing units in the City, including owner- and renter-occupied units. Implementation of the proposed project would result in an increase in mixed-use residential units. Mixed-use units tend to bring in higher numbers of renters compared to the existing single-family uses that are predominately owner-occupied throughout the rest of the City.

Table 3-3: Households in City of Santa Ana (2000 - 2030)

	2000	2009	2030 [c]
Households			
City of Santa Ana	74,588	75,856	77,717 (79,931 with project)
Average Household Size (pph)			
City of Santa Ana	4.6	4.7	3.0

Notes:
Household figures represent occupied housing units.
Source: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

3.4.5 Population and Housing Evaluation for Water Supply Planning

Population increases associated with future developments were accounted for in the SCAG 2008 projections and CSF; by 2030, the City population is expected to increase to 380,356, an increase of 24,694 over 2009 population numbers as shown in Table 3-4. This equates to an increase of approximately 0.32 annually.

In terms of dwelling units, using DOF numbers, dwelling units in 2009 were 75,856. Going forward, SCAG projects 77,717 total housing units by 2030 but this did not include all 4,075 dwelling units associated with the TZC project. Implementation of the proposed project would add another 2,214 dwelling units. With the additional dwelling units proposed in the TZC, housing units total approximately 79,931 (77,717 projected plus 2,214 units from TZC). Under this dwelling unit growth scenario, the City would increase its projected dwelling units by approximately 2,214 dwelling units, which is full build-out of the project. This equates to a dwelling unit increase of approximately 0.25 annually or 203 dwelling units annually.

As shown in Table 3-4, this WSA uses the annual population increases culminating at 380,356 persons by 2030 as a more reasonable projection of growth in the City. The benefit of utilizing this higher growth methodology is that it captures and includes all growth in the City including various pending projects, as well as other yet to be identified projects.

In terms of conservative water supply planning and for consistency purposes, this WSA uses the higher percentage increase of 0.32 annually to account for population increases due to densification within the city limits and demand increases proportionally. Conversely, for conservative water planning purposes, supplies are held constant according to the prescribed allocation rate. For example, Base Year supplies of 46,809 afy remain the same over the 20-year planning horizon and each Water Supply Allocation Plan Stage is presented in the same manner. In other words, water supply increases are not proportional to population rate increases.

Table 3-4: SCAG Population and Households Forecast for the City of Santa Ana

	2010	2015	2020	2025	2030	Change	% Annual Growth
Population[a]	364,683	371,043	376,353	378,397	380,356	24,694 persons	**0.32**
Households[a]	76,379	77,192	77,423	77,656	77,717	1,861 units	**0.25**
					(79,931 with TZC)	4,075 units with TZC)	

Source:
a. Table 3-2 SCAG Population Forecast for the City of Santa Ana
b. Table 3-3 Households in City of Santa Ana (2000 - 2030)

4.0 Water Supply

This section provides a water supply analysis on a regional scale. Because the Orange County groundwater basin is a shared resource, managed by OCWD, the District boundary defines the regional context for the following water supply analysis.

4.1 Regional Climate, Hydrology and Water Quality

4.1.1 Climate

The regional climate in Southern California reflects a combination of maritime and Mediterranean climates. In the valley, the maritime climate usually prevails causing a consistent temperature inversion layer, which results in fog, haze and smog. In summer, a high pressure zone generally prevents precipitation; winters are characterized by rain, while spring is known for its fogs. In the fall, Santa Ana winds occur, blowing from the Mojave Desert to the ocean. Maritime moisture is pushed out to sea; this is the height of the fire season.[5]

The more localized climate in Santa Ana is characterized as Mediterranean: semi-arid, mild winters, warm summers and moderate rainfall. The climate is consistent with coastal Southern California. Average maximum temperatures range from 68.2°F in January to 84.2°F in August. Average minimum temperatures range from 45.1°F in December and January to 63.0°F in August. Average annual precipitation is 12.6 inches. Nearly 93 percent of the average annual rainfall falls between November and April; over 60 percent falls between January and March. A summary of temperature and rainfall data for Santa Ana is included in Table 4-1.

Table 4-1: City of Santa Ana Climate Summary

	Maximum Average Temperature (°F)[a]	Minimum Average Temperature (°F)[a]	Average Monthly Rainfall (inches)[a]	ETo (inches)[b]	Irrigation (inches)[c]
January	68.2	45.1	**2.97**	2.18	0.0
February	69.5	46.5	2.81	2.49	0.0
March	70.4	48.2	2.13	3.67	2.0
April	72.8	51.3	0.99	4.71	4.8
May	74.8	55.2	0.22	5.18	6.3
June	78.0	58.7	0.07	5.87	7.4
July	83.0	62.1	0.01	6.29	8.0
August	84.2	63.0	0.07	6.17	7.8
September	83.7	61.1	0.24	4.57	5.5
October	79.3	56.5	0.32	3.66	4.3
November	73.7	49.6	1.31	2.59	1.6
December	68.9	45.1	1.73	2.25	0.7
Annual Average	**75.6**	**53.5**	**12.87**	**49.63**	**48.4**

Notes:
a. Source: Western Regional Climate Center – Santa Ana Fire Station, Ca. Data from 7/1/1948 to 3/30/2007.
b. Source: CIMIS Station 75: Monthly Average ETo. 2007-2009
c. Irrigation requirement assumes 15% leaching fraction and 90% irrigation efficiency.

5 Lebow, Ruth. Accessed September 2007. Southern California Climate. http://www.lalc.k12.ca.us/target/fragile_habitats/climate.html.

According to the Department of Water Resources (DWR), eleven droughts have occurred in California since 1850.[6] The year 1977 is recognized as the driest single year of California's measured hydrologic record. The State is currently experiencing a multi-year drought which began in 2007. Water year 2007, was a dry year throughout California, including the City, and parts of Southern California set new records for minimum annual precipitation. (DWR 2007, 2008) Years 2008 and 2009 brought some relief with higher than anticipated precipitation, but the rainfall was not sufficient to fully relieve drought conditions. Droughts exceeding three years are relatively rare in Northern California; however, even localized droughts in Northern California have extensive repercussions for water agencies in Southern California, particularly because most depend to some degree on State Water Project water to meet customer demand.

4.1.2 Groundwater Hydrology

Santa Ana is located in the Coastal Plain of Orange County Groundwater Basin (Orange County Basin or Basin), which is part of the larger South Coast Hydrologic Region. For the purpose of this WSA, the Orange County Basin is defined as the "basin from which the proposed project will be supplied," as specified in Water Code Section 10910(f)(2). The Basin is not adjudicated or identified as a basin in overdraft based on the DWR's official departmental bulletins, California's Groundwater Bulletin 118 Updated 2003 and Bulletin 160. 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 Basin. The Basin is considered in an overdraft condition by OCWD; however, the groundwater levels and amount of overdraft fluctuate over time.

The following information is taken from the *DWR Bulletin 118* individual basin descriptions, which describes the groundwater resources of the state.

> The Coastal Plain of Orange County Groundwater Basin (Orange County Basin) underlies a coastal alluvial plain in the northwestern portion of Orange County. The basin is bounded by consolidated rocks exposed on the north in the Puente and Chino Hills, on the east in the Santa Ana Mountains, and on the south in the San Joaquin Hills. The basin is bounded by the Pacific Ocean on the southwest and by a low topographic divide approximated by the Orange County - Los Angeles County line on the northwest. The basin underlies the lower Santa Ana River watershed.
>
> The Orange County Basin is dominated by a deep structural depression containing a thick accumulation of fresh water-bearing interbedded marine and continental sand, silt and clay deposits (DWR 1967). The proportion of fine material generally increases toward the coast, dividing the basin into forebay and pressure areas (DWR 1967; OCWD 1999b). Consequently, most surface waters recharge through the coarser, more interconnected and permeable forebay deposits. Strata in this basin are faulted and folded, and may show rapid changes in grain size. The Newport-Inglewood fault zone parallels the coastline and generally forms a barrier to groundwater flow. Erosional channels filled with permeable alluvium break this barrier at the Alamitos and Talbert Gaps, providing an opportunity for saline water to flow inland.
>
> The sediments containing easily recoverable fresh water extend to about 2,000 feet in depth (OCWD 1999b). Although water-bearing aquifers exist below that level, water quality and pumping lift make these materials economically unviable at present (OCWD 1999b). Upper, middle and lower aquifer systems are recognized in the basin. Well

6 California Department of Water Resources. Background: Droughts in California. <http://watersupplyconditions.water.ca.gov/background.cfm>, accessed September 2009.

yields range from 500 to 4,500 gallons per minute, but are generally 2,000 to 3,000 gallons per minute.

The Upper Aquifer System includes Holocene alluvium, older alluvium, stream terraces, and the upper Pleistocene deposits represented by the La Habra Formation. It has an average thickness of about 800 feet and consists mostly of sand, gravel, and conglomerate with some silt and clay beds. Generally, the upper aquifer system contains a lower percentage of water-bearing strata in the northwest and coastal portions of the area where clays and clayey silts dominate. Accordingly, recharge from the surface to the groundwater basin may be minor in these areas. Recharge to the upper aquifer system occurs primarily in the northeastern portions of the basin (DWR 1967). The upper aquifer provides most of the irrigation water for the basin (Sharp 2000; OCWD 1999a,b).

The Middle Aquifer System includes the lower Pleistocene Coyote Hills and San Pedro Formations which have an average thickness of 1,600 feet and are composed of sand, gravel, and minor amounts of clay. The primary recharge of the middle aquifer system is derived from the Santa Ana River channel in the northeast near the town of Olive (DWR 1967). The middle aquifer system provides 90 to 95 percent of the groundwater for the basin (Sharp 2000; OCWD 1999a,b).

The Lower Aquifer System includes the Upper Fernando Group of upper Pliocene age and is composed of sand and conglomerate 350 to 500 feet thick. Electric logs of this aquifer indicate that it would probably yield large quantities of fresh water to wells (DWR 1967), but it is not utilized for groundwater production at present (Sharp 2000).

There are three fault zones within this basin that impede groundwater flow (DWR 1967). The most prominent is the Newport-Inglewood fault zone, which trends northwest and is responsible for formation of the Newport-Inglewood uplift. This fault zone forms a barrier to groundwater flow to the southwest and marks the southwest edge of the thick aquifer materials important for groundwater production in the basin (DWR 1967). This barrier is breached by erosional channels filled with alluvium at the Alamitos and Talbert Gaps. Another northwest-trending system is the Whittier fault zone which forms the northeastern boundary of the basin along the Puente Hills. This fault forms a groundwater barrier except where it is breached by recent alluvial channels (DWR 1967). The Norwalk fault trends eastward along the southern edge of the Coyote Hills and is responsible for a lower groundwater level to the south (DWR 1967).

Recharge to the basin is derived from percolation of Santa Ana River flow, infiltration of precipitation, and injection into wells. The Santa Ana River flow contains natural flow, reclaimed water, and imported water that is spread in the basin forebay (OCWD 1999a,b). Historical groundwater flow was generally toward the ocean in the southwest, but modern pumping has caused water levels to drop below sea level inland of the Newport-Inglewood fault zone. This trough-shaped depression encourages sea water to migrate inland, contaminating the groundwater supply. Strategic lines of wells in the Alamitos and Talbert Gaps inject imported and reclaimed water to create a mound of water seaward of the pumping trough to protect the basin from seawater intrusion (OCWD 1999a,b).

Groundwater levels are generally lower than the level in 1969, when the basin is considered to have been full (OCWD 1999a,b). The level in the forebay has generally stabilized, whereas the southern coastal area has declined steadily through time (OCWD 1999a,b). Since 1990, the magnitude of yearly groundwater level fluctuation has approximately doubled near the coast because of seasonal water demand and short-term storage programs, but has stayed the same in the forebay (OCWD 1999a). Average groundwater levels for the Orange County Basin have risen about 15 feet since 1990, with average levels in the forebay area rising about 30 feet and average levels in the

coastal area dropping a few feet (OCWD 1999a). The total capacity of the Orange County Basin is 38,000,000 acre-feet (DWR 1967). As of 1998, storage of fresh water within the basin amounted to 37,700,000 acre-feet (OCWD 2000).

Orange County Water District manages this groundwater basin using a detailed model of the basin to determine potential effects of changes in pumping and recharge. The district strives to meet its water supply demand with about 75 percent groundwater (OCWD 1999b). The district operates the basin to maintain about 200,000 acre-feet of dry storage, though this fluctuates because of seasonal patterns in recharge and pumping. Average dry storage remained fairly steady during 1995 through 1998 (OCWD 1999b), but increased to more than 400,000 acre-feet by September 2002 (OCWD 2002) because of a cycle of less rainfall in the region. Orange County Water District (2000) reports a basin inflow of 258,413 acre-feet and an outflow of 342,823 acre-feet for the 1998-1999 water year. The inflow includes natural recharge (29,434 acre-feet), artificial recharge (222,755 acre-feet), and return of applied water (6,224 acre-feet). The outflow includes non-irrigation extraction (334,136 acre-feet) and irrigation extraction (8,687 acre-feet).

4.2 Regional Water Supplies

Regional water supplies are composed of groundwater managed by OCWD and imported water managed by Metropolitan. The City is fully dependent upon Metropolitan and OCWD for its long-term water supply; consequently, the City's water supply planning is predominantly based on the policies and regulations of these two agencies.

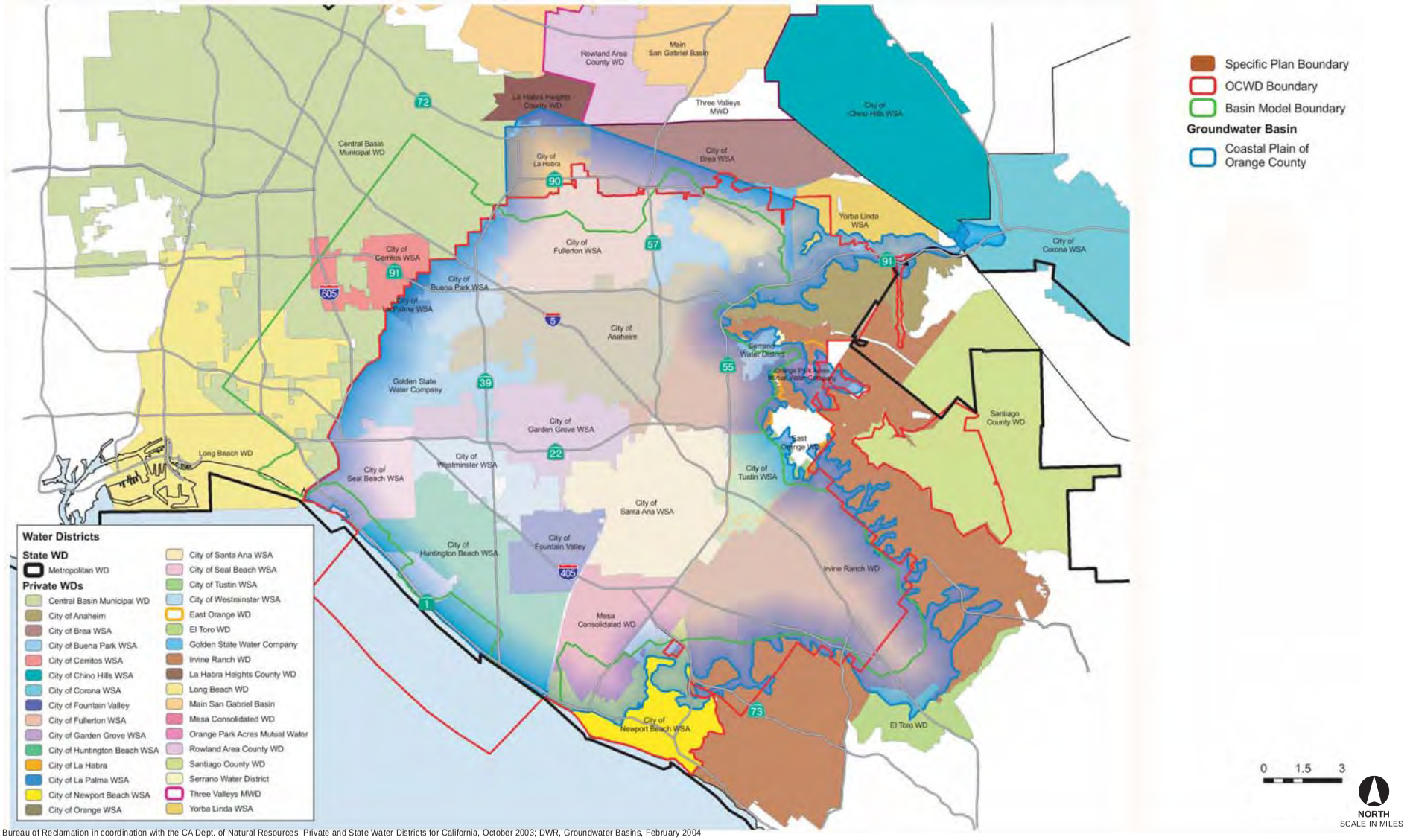
Regional supplies are analyzed at the groundwater basin level. Groundwater sufficiency, if used a supply source, must be documented using a basin-level approach (Water Code 10910(f)(5)). Figure 4-1 shows all users of the Orange County groundwater basin. The figure shows the groundwater basin boundary (as identified by DWR) and the boundaries of all cities and water districts that intersect the basin. The basin boundary represents all potential users of the groundwater basin because the OCWD Act[7] does not allow a city or water district to take groundwater produced in the basin and pump it outside the basin for use outside the District boundary. As a result, the OCWD boundary was used to define the regional scope of the supply and demand analyses. For consistency and comparison purposes, all supplies were analyzed at this level of detail.

4.2.1 Orange County Water District

4.2.1.1 Background

Orange County Water District was formed in 1933 by a special act of the California Legislature to protect the groundwater basin. OCWD has been internationally recognized for its supply-side management approach; this management strategy is focused on increasing supply, rather than restricting demand. Successful implementation of this approach has resulted in no pumping restrictions for producers within the basin. OCWD has been highly successful in managing the basin, particularly when compared to the other major groundwater basins in Southern California, nearly all of which have undergone a lengthy and costly adjudication process. This management strategy allows for increased flexibility and reliability in the acquisition of water supplies.

7 Orange County Water District Act. Revised January 2003.



Source: U.S. Bureau of Reclamation in coordination with the CA Dept. of Natural Resources, Private and State Water Districts for California, October 2003; DWR, Groundwater Basins, February 2004.

FIGURE **4-1**

Water Districts Overlying the Orange County Groundwater Basin

There are 23 major producers extracting water from the Orange County Basin, which is managed by OCWD in collaboration with the other water and wastewater agencies. The area managed by OCWD is shown in Figure 4-2. The District is neither a retail nor a wholesale water provider; rather, the District manages the groundwater basin through regional recharge programs. Recharge is accomplished with local and imported water supplies to offset pumping from the basin. In 2004 OCWD adopted a Groundwater Management Plan (GMP) in its capacity to ensure sufficient water supplies for present and future beneficial uses within Orange County. The GMP has objectives to help secure a long-term viable supply of groundwater; this management strategy, described in more detail below, is effectively based upon groundwater recharge programs including the forebay recharge facilities, seawater intrusions barriers, and in-lieu programs and water storage agreements with Metropolitan. An update to the OCWD GMP was released in May 2009. The Executive Summary of the 2009 Update of the GMP is contained in Appendix C.

4.2.1.2 Basin Management

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 overdraft in dry years. The basin is recharged primarily from local rainfall, baseflow from the Santa Ana River (much of which is 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 Orange County Basin is not operated on an annual safe-yield basis; basin storage may increase or decrease in any given year, but over the long-term the basin must be maintained in an approximate balance. Specifically, OCWD is expected to purchase enough water to replenish the average annual overdraft for the immediately preceding five years, plus an additional amount of water sufficient to eliminate the accumulated overdraft over a period of not less than 10 years, but not more than 20 years. This provides some flexibility in basin management.

OCWD manages the amount of production from the Orange County groundwater basin through the establishment of a BPP. The BPP represents the ratio of groundwater supply to the total water supply utilized by an agency to meet demands. In order to effectively manage the basin, the BPP is set based on the "estimate[d] amount of groundwater production the basin can annually sustain utilizing recharge water supplies the District can count of receiving."[8] Therefore, OCWD sets the BPP each year based on groundwater conditions, availability of imported water supplies, and basin management objectives. Established BPPs for 2002 through 2008 are shown below in Table 4-2. OCWD has set the BPP for fiscal year 2009/10 at 62 percent.

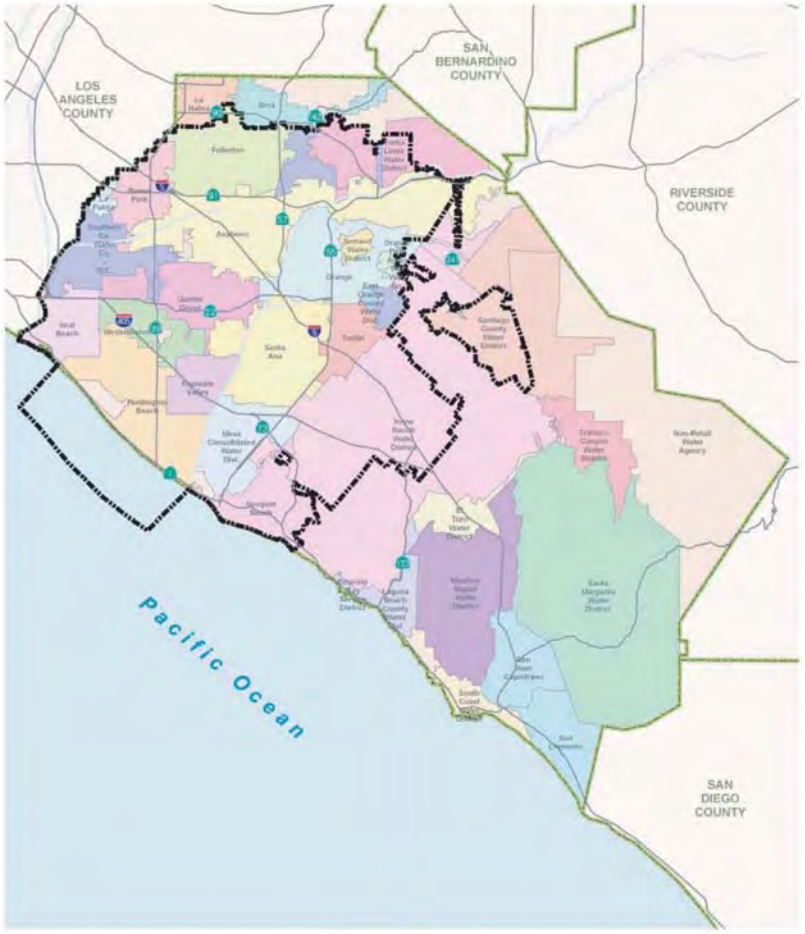
Table 4-2: Historical Basin Pumping Percentages

	2002	2003	2004	2005	2006	2007	2008
Annual BPP	75	75	66	66	64	64	64

Source: Orange County Water District Engineer's Report, 2000-01, 2001-02, 2002-03, 2003-04, 2004-05, 2005-06, 2007-08. Information from City staff.

While the BPP has been as high as 75 percent in recent years, the BPP was set at 66 percent for water year 2004/05, and then in 2005/06, OCWD reduced the BPP to 64 percent. Although Santa Ana maintained pumping within the BPP, other OCWD members did not. The cities of Huntington Beach, La Palma, and Tustin, along with Mesa Consolidated Water District acquired over 80 percent of their water supply from groundwater production. Such flexibility in producing over the BPP guarantees the City and other water utilities in Orange County the ability to provide water to their

8 Orange County Water District. 2004. Groundwater Management Plan, p. 4-1.



Source: Orange County Water District, *Groundwater Management Plan*, March 2004.

FIGURE **4-2**
Orange County Water District Boundary

0D2136700 Transit Zoning Code (SD84A and SD84B) WSA

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customers during periods of varying water availability. This will be increasingly important if supplies from Metropolitan become more uncertain or if drought scenarios become more common.

Pumping within the BPP is assigned a RA, which designates a cost per acre-foot of groundwater pumped; pumping over the BPP is assigned a BEA for every acre-foot pumped over the BPP in addition to the RA. Historically, the BEA came at a higher cost per acre-foot than the RA, making the cost of that water equal or greater to the cost of imported water. In this way, OCWD manages the basin through financial incentives and deterrents rather than defined pumping restrictions. However, currently the BEA is essentially the same rate as the imported water rate purchased through Metropolitan

OCWD's GMP summarizes the accumulated overdraft and water level elevations within the basin based on monitoring data collected since 1962. Accumulated overdraft represents the difference in storage between current conditions and conditions in 1969 when the basin was considered "full." Although the accumulated overdraft in June 2004 was approximately 400,000 acre-feet, the target is 200,000 acre-feet. With an accumulated overdraft of 200,000 acre-feet, the basin is considered 99.5 percent full with 40 million acre-feet of groundwater in storage. OCWD's 2007-2008 Engineer's report listed the accumulated Orange County Basin overdraft was 306,000 acre-feet.[9] (Summary and Findings from the 2007-2008 Engineer's Report is contained in Appendix D) Information received from OCWD on for June 30, 2009 shows the accumulated overdraft at 347,000 acre-feet.[10]

Furthermore, an accumulated overdraft condition minimizes the localized high groundwater levels, reduces groundwater losses to Los Angeles County, and increases the ability to recharge storm events from the Santa Ana River. As a worst-case scenario, 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 acre-feet. However, at this level of overdraft, there are increased risks of seawater intrusion, vertical migration of poor quality groundwater, and land subsidence. In addition, groundwater production during a drought or emergency situation would be severely limited.

4.2.1.3 Recharge Facilities

In addition to the BPP, 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. In addition, natural recharge occurs through direct precipitation, runoff, infiltration of irrigation return water, and subsurface groundwater flow to and from Los Angeles County and the ocean. Net natural recharge is approximately 60,000 acre-feet annually after subtracting losses to Los Angeles County, which assumes current groundwater level conditions. Artificial recharge occurs through developed percolation ponds; there are 17 major facilities which are grouped into four systems: the Main River System, the Off-River System, the Deep Basin System, and the Burris Pit/Santiago System. Each system is composed of a series of percolation spreading basins, which recharge Santa Ana River flows, Santiago Creek flows, and imported water purchased from Metropolitan. OCWD estimates an average annual recharge of 155,000 acre-feet of baseflow and 60,000 acre-feet of storm flows. In the past, OCWD has imported between 35,000 and 60,000 acre-feet of replenishment water to be used for recharging the basin. These artificial recharge facilities have the capacity to recharge 250,000 acre-feet annually.[11]

9 Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2007-2008.
10 Ray Burke, Acting Water Resources Manager for City of Santa Ana, personal communication, January 28, 2010.
11 Orange County Water District. 2004. Groundwater Management Plan, p. 2-7.

OCWD also indirectly recharges the basin by injecting water to prevent seawater intrusion. The seawater intrusion barriers include the Talbert and Alamitos Barriers. The Talbert and Alamitos Barriers are composed of strategically placed wells which inject recycled water, imported water, and groundwater into the basin. These facilities are primarily used to prevent seawater intrusion, but in doing so, effectively recharge the basin through their operation. 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 acre-feet annually of which 50 percent stays within the basin for replenishment. The estimated average annual recharge of the basin is approximately 324,500 acre-feet, but depends upon the amount of imported water purchased from Metropolitan each year. Over the last two years, Metropolitan has ceased replenishment water deliveries.

In 2005, the District produced a Draft LTFP aimed at addressing future increases in water demand within the District boundaries. The LTFP proposed 50 projects that could be implemented to achieve two primary goals: accommodate the additional water demands by increasing the basin's annual yield and protect water quality in the basin. If basin yield is not increased to meet future demands, OCWD will have to gradually reduce the BPP over time and the OCWD's customers will become more reliant upon imported water supplies. Because of the many challenges facing southern California water suppliers, this situation is not advantageous for the City, other Metropolitan and OCWD members as import supplies are not reliable.

The primary purpose of the LTFP as it relates to water supply is to increase the sustainable yield of the basin in a cost-effective manner. This goal is expected to be achieved through maximizing recharge, minimizing Santa Ana River outflow to the ocean, minimizing subsurface outflow from the basin, and minimizing areas of low or depressed groundwater levels. The various projects considered in the LTFP fall under five general categories: recharge facilities, new water supply facilities, basin management facilities, water quality management facilities, and operational improvement facilities. If all the projects in the LTFP were implemented, there would be an increase in annual recharge of roughly 156,000 acre-feet annually. This increase in recharge would allow a commensurate increase in pumping.

In addition to direct recharge, 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 OCWD, Metropolitan Water District of Orange County (MWDOC) and Metropolitan, which allows some Agencies to pump above the BPP without penalty of the BEA. By reducing pumping on the basin, the use of imported water supplies effectively acts as a form of indirect recharge to the basin.

4.2.1.4 Sustainable Basin Yield

The sustainable yield for the Basin, presented in Table 4-3 below, is based upon a hydrological budget developed by OCWD for the purpose of constructing the Basin Model and evaluating Basin production capacity and recharge requirements. The budget considers maximum recharge capacity for measured recharge, average annual precipitation for unmeasured recharge, and current accumulated overdraft conditions to determine subsurface flows along the coast and the Orange/ Los Angeles County line.

Table 4-3: Sustainable Yield of the Orange County Basin, 2005

Source	Average Recharge (acre-ft/year) 2005	2010
Measured Recharge		
Forebay Spreading Facilities	250,000	250,000
Talbert Barrier Injection	12,000	72,000
Alamitos Barrier Injection	2,500	2,500
Unmeasured Recharge		
All Sources	60,000	60,000
Total Sustainable Yield	**324,500**	**384,500**

Source: Orange County Water District Groundwater Management Plan, 2004, p. 2-7.

In the past recharge of the Talbert Barrier was supplied by imported water from Metropolitan. However, OCWD has implemented a Groundwater Replenishment System (GWR), which will use purified water to artificially recharge the basin. The planned GWR System is a jointly sponsored project by OCWD and the Orange County Sanitation District (OCSD) to increase the reliability and sustainability of local groundwater supplies through indirect potable reuse. Additionally, direct injection of purified water into the Talbert Barrier will protect the coastal aquifer from further degradation due to seawater intrusion. Phase 1 of the GWR System was completed in 2007, an estimated 72,000 acre-feet annually will be recharged through the barrier, resulting in a net growth in recharge capacity of 60,000 acre-feet annually. The major components of the GWR System are already at least 90 percent complete; therefore, maximum Phase 1 recharge capacity was assumed to be available by 2010 and is shown above in Table 4-3.

Further increases in basin sustainable yield are anticipated; the projects associated with increased basin yield are described in the LTFP. With implementation of all projects discussed in the LTFP, sustainable basin yield would be increased by 156,000 acre-feet annually; total sustainable yield of the basin would be 540,500 acre-feet annually. However, because these projects have not been approved or environmental analysis completed, these are not considered firm supplies for the purposes of this report.

4.2.1.5 Dry Year Sustainable Basin Yield

Groundwater production is likely to increase in dry years as imported supplies are reduced. While this is not quantified in OCWD's GMP, it is expected and allowable. There are no pumping restrictions placed on producers of the groundwater basin during average years, single dry years, or multiple dry years. Producers can obtain 100 percent of their supplies from the groundwater basin; however, this is typically not cost-effective and so is not the preferred choice. Importantly, the lack of pumping restrictions has significant benefits for water supply reliability for the local producers. Supplies for Santa Ana, and in fact all other water districts within the OCWD boundary, are 100 percent reliable in dry years within the BPP, due to the lack of pumping restrictions and the ability to maintain a basin deficit over multiple years. However, if a drought lasts long enough, or if the basin is significantly overdrafted when a drought begins, the basin groundwater pumping levels will drop and some wells would be inoperable. This is technically possible, but is obviously, an extreme condition.

As stated previously, the basin is not operated on an annual safe-yield basis; Basin storage may increase or decrease in any given year, but over the long-term the Basin must be maintained in an approximate balance. Specifically, OCWD is expected to replenish the average annual overdraft for

the immediately preceding five years, plus an additional amount of water sufficient to eliminate the accumulated overdraft over a period of not less than 10 years, but not more than 20 years.

4.2.2 Metropolitan Water District of Southern California

Metropolitan is a public agency formed by a Legislative Act in 1928 "for the purpose of developing, storing, and distributing water" to Southern California.[12] As a wholesaler, Metropolitan has no retail customers, and distributes treated and untreated water directly to its 26 member agencies, including the City. Some member agencies, such as the City, provide retail water service, while others provide water to the local area as wholesalers; some member agencies provide water both as a retailer and a wholesaler. Most Metropolitan water purveyors, including the City, use both surface water and groundwater to meet customer demand; however, some depend exclusively on Metropolitan's imported supplies. Metropolitan's service area is shown in Figure 4-3.

Metropolitan's service area encompasses the Southern California coastal plain and covers nearly 5,200 square miles, including portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Notably, Metropolitan's service area contains only 13 percent of the land area of those counties but nearly 90 percent of the county populations. The majority of water acquired by Metropolitan is imported from outside southern California, and originates from Northern California via the State Water Project (SWP) or from the Colorado River watershed via the Colorado River Aqueduct (CRA). Figure 4-4 shows Metropolitan's major facilities and conveyance systems. Other sources include local water supplies and water conveyed through the Los Angeles Aqueduct (although water from the Los Angeles Aqueduct is imported, Metropolitan considers it a local source because it is managed by the Los Angeles Department of Water and Power and not by Metropolitan). Water supplies delivered via the Los Angeles Aqueduct are not included in the water supplies to the City.

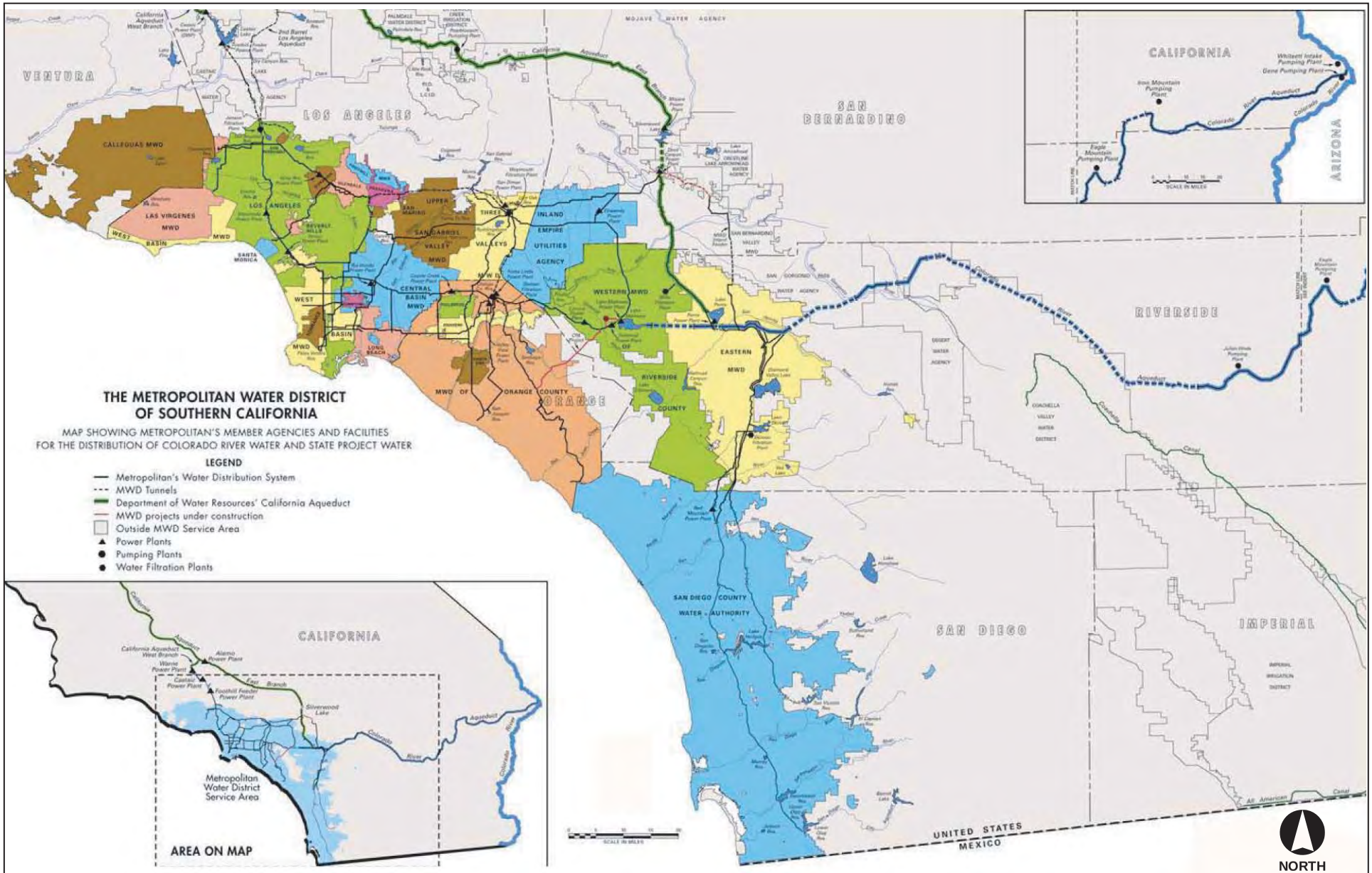
4.2.2.1 Metropolitan Water Supply Planning

Metropolitan faces a number of challenges in providing a reliable water supply for its member agencies throughout southern California. The main challenges include, among others: (1) population growth within the service area; (2) increased competition for low-cost water supplies; (3) variable weather conditions; and (4) increased environmental regulations.[13]

4.2.2.1.1 Metropolitan Regional Urban Water Supply Plan

Metropolitan is a water wholesaler, not an urban water supplier, and is therefore not required to develop a UWMP. However, due to competing demand on the SWP and Colorado River water sources, and concerns related to regional water operations, Metropolitan has prepared its Regional Urban Water Management Plan (RUWMP) in 2005. This document summarized the major planning initiatives undertaken by Metropolitan, including the Integrated Water Resources Plan (IRP), the IRP Update, the Water Surplus and Drought Management Plan, Strategic Plan and Rate Restructure. The RUWMP provides a policy framework, guidelines, and resource targets that define the future of Metropolitan.

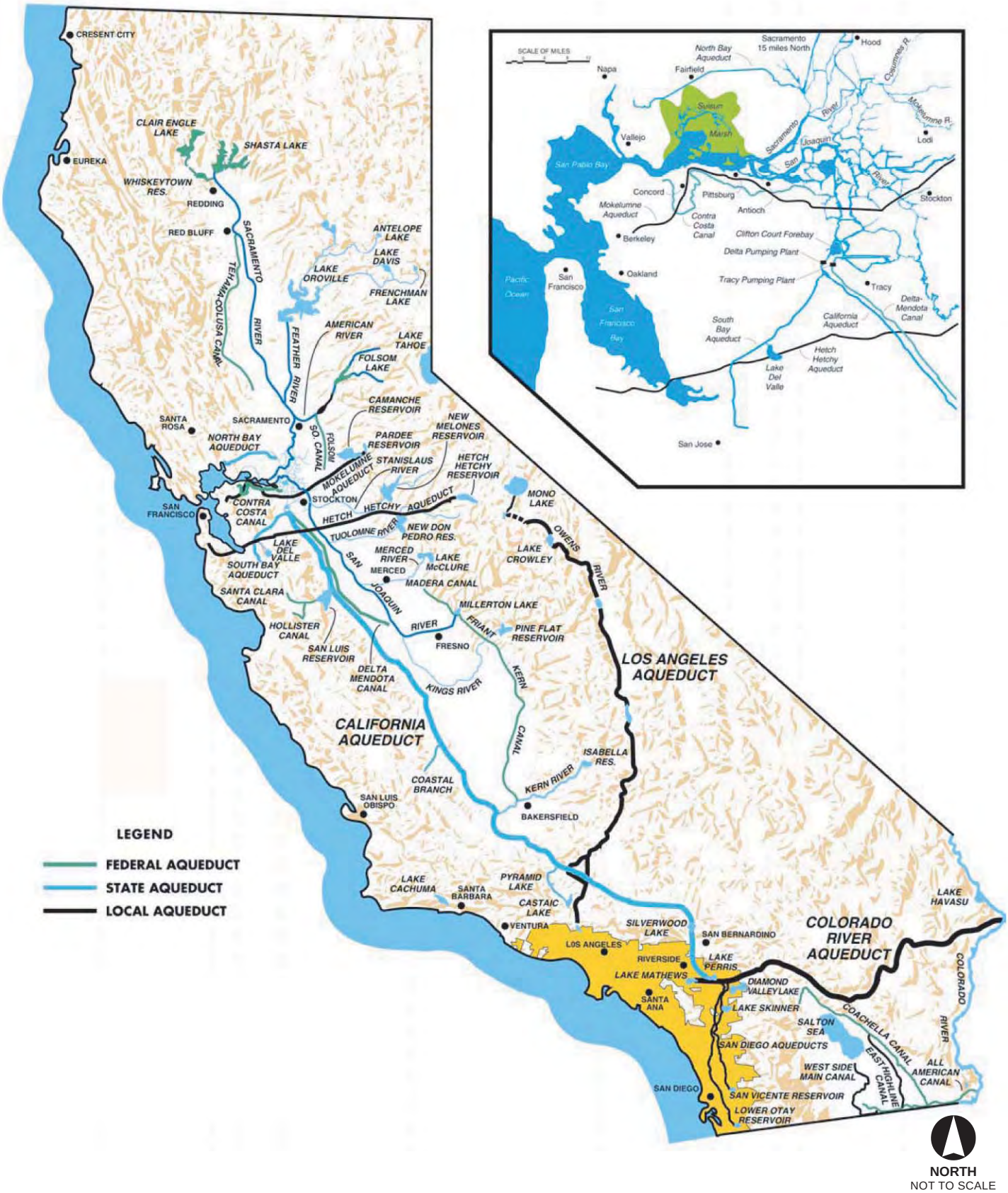
12 Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan, p. I-3.
13 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix A.



Source: Metropolitan Water District of Southern California, *Regional Urban Management Plan*, November 2005.

FIGURE **4-3**

Metropolitan Water District of Southern California Water Service Area



***Source*:** Metropolitan Water District of Southern California, *Regional Urban Management Plan*, November 2005.

FIGURE **4-4**

Major Water Conveyance Facilities in California

The RUWMP provides information on the SWP and CRA; historical, current, and projected water supplies and demand for customers in its service area; future water supply reliability; and information related to conservation, recycling, water storage and transfer agreements, and water quality. Recent court decisions and Biological Opinions (BOs) issued by the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service (USFWS) have forced the DWR to curtail pumping in the Delta to protect the threatened Delta smelt and certain salmonid species, thereby reducing the amount of water currently available to Metropolitan and other SWP contractors.

4.2.2.1.2 Metropolitan Integrated Water Resource Plan

The 1996 IRP established a goal of 100 percent reliability for full-service demand through 2020 and identified a Preferred Resource Mix to avoid over reliance on a single supply source. The 2003 IRP Update was based upon the Rate Restructure, Strategic Plan, and review of the 1996 IRP, and incorporated the more recent increase in participation by local agencies in developing local supplies and promoting conservation.

In 2004, the Metropolitan's Board adopted an updated IRP that reviewed the goals and achievements of the original IRP, identified changed conditions for water resource development and updated the resource targets through 2025. A key component of the updated IRP was the addition of a planning buffer. The planning buffer provided for the identification of additional water supplies, either imported and locally developed, to address uncertainty or unknowns in future supplies and demand from multiple factors, such as the levels of population and economic growth, changes to water quality regulations, new and unhealthy chemicals found in water supplies, endangered species affecting sources of supplies, and periodic and changes in climate and hydrology.[14]

Metropolitan is currently working on the next IRP update, to evaluate supply reliability while incorporating changed conditions and new trends and managing uncertainties. The IRP is expected in April 2010.

Preferred Resource Mix

Metropolitan's principal sources of water are the SWP and the Colorado River via a the CRA. The IRP's Preferred Resource Mix identifies a balance of local and imported water resources within Metropolitan's service area. Metropolitan expects that the resource targets and capital expenditure strategies for the Preferred Resource Mix will be continually reviewed and updated at least every five years to reflect changing demand and supply conditions. Other components of Metropolitan's Preferred Resource Mix also include the following: 1) Water Conservation; 2) Recycled Water; 3) Conjunctive Use; 4) Groundwater Recovery; 5) Water Transfers; and 6) Desalination. Each of these programs is described in more detail below.[15] For a complete discussion of Metropolitan's water resource planning programs, revenues and expenditures, see Appendix E of this WSA.

4.2.2.2 Colorado River Aqueduct

Once formed, Metropolitan's first accomplishment was construction of the CRA to convey water from the Colorado River to Southern California. Entitlements to Colorado River water were first defined in the 1931 Seven Party Agreement. Under the Seven Party Agreement, California's basic annual apportionment is 4.4 million acre-feet. This statewide apportionment is divided into seven priorities; Metropolitan holds the fourth priority to 550,000 acre-feet annually and fifth priority to 662,000 acre-feet annually. Deliveries began in the early 1940s and supplemented the local water supplies of the original Southern California member cities.

14 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix A.

15 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix A.

Metropolitan's dependable supply of Colorado River water was further defined in the 1964 U.S. Supreme Court decree and was limited to 550,000 acre-feet annually. Over time, however, this amount will be reduced slightly. In addition, this amount assumes no surplus or unused Arizona or Nevada entitlement is available and that California agricultural agencies use all of their contractual entitlement. As stated above, through the 1931 Seven Party Agreement, Metropolitan had priority rights to an additional 662,000 acre-feet annually depending upon the availability of surplus water. The reduction in dependable water supply occurred with commencement of the Colorado River deliveries to the Central Arizona Project.

Though less dependable than its fourth priority water, Metropolitan can obtain additional water, when available, under its fifth priority. This water comes from unused water by the California holders of Priorities 1 though 3, water conserved by the Conservation Program with Imperial Irrigation District, water saved under the Paso Verde Land Management Program, and water obtainable when the U.S. Secretary of the Interior determines surplus water is available or water apportioned to, but unused by, Arizona and/or Nevada is available. While this can add to the ultimate supply available to Metropolitan, it is not a dependable source of supply in all years.

In 1987, Metropolitan entered into an agreement with the United States Bureau of Reclamation (USBR) for an additional 180,000 acre-feet annually of surplus water. Also, a minimum of 80,000 acre-feet annually is received through a conservation program entered into with Imperial Irrigation District. In 1999, the Colorado River Board developed "California's Colorado River Water Use Plan" also known as the "California Plan". The California Plan provided guidance as to how California would transition to using only 4.4 million afy and curb its reliance on surplus water. Under this California plan, Metropolitan is limited to its fourth priority right of 550,000 acre-feet annually. Further, Priorities 1 through 3 cannot exceed 3,850,000 acre-feet annually; Priorities 1 through 4 cannot exceed California's total apportionment of 4,400,000 acre-feet annually.

In 2003, the Quantification Settlement Agreement (QSA) was authorized by representatives from Metropolitan, Imperial Irrigation District, CVWD, and other involved parties. This agreement quantified the use of water under the third priority of the Seven Party Agreement and allows for implementation of agricultural conservation, land management, and other programs identified in Metropolitan's 1996 Integrated Resources Plan. The QSA helps California reduce its reliance on Colorado River water above its normal apportionment. In late December 2009, when this WSA was being prepared, a Sacramento County Superior Court had just ruled that the QSA had been approved unlawfully. Specifically, Judge Roland Candee held that contract language that amounted to a "blank check" requiring the State of California to fund Salton Sea restoration violated Article XVI, Sections 1 and 7, of the California State Constitution. In light of this ruling, the court did not address related challenges to the QSA based on the alleged violations of CEQA. At present, it is impossible to know whether Metropolitan and other parties adversely affected by this decision will appeal it and whether, if they do, they will succeed. For the time being, then, the reliability of the additional water for Metropolitan made available through the QSA is in doubt.

Other agreements are in place to provide Metropolitan with additional water supplies and water supply reliability. Under the Palo Verde Irrigation District (PVID) Land Management, Crop Rotations, and Water Supply Program, farmers in PVID are paid to reduce water use by not irrigating a portion of their land. Water savings are made available to Metropolitan; a minimum of 26,000 acre-feet annually is specified under the agreement, but when fully implemented, is it expected to provide 111,000 acre-feet annually to Metropolitan. Importantly, PVID holds first priority rights to Colorado River water under the Seven Party Agreement; consequently, this is a reliable source of water for Metropolitan.

4.2.2.3 State Water Project

The SWP, owned by the state and operated by the DWR, is the second source of Metropolitan's imported water supply. Initially, DWR contracted to deliver water in stages to 32 contractors with an ultimate delivery of 4.23 million acre-feet annually. There are currently 29 SWP contractors receiving water; Metropolitan is the largest contractor with a contracted Table A amount of 1,911,000 acre-feet annually.[16] Deliveries to Metropolitan began in 1972.

The initial facilities were designed to meet the initial needs of the contractors. Additional facilities were planned for the future when increased demand created a necessity for enhanced conveyance. Each contractor's SWP contract provided for a buildup in Table A over time, with most contractors reaching their maximum by 1990. Major improvements have since been made to the system; however, there are still significant capacity constraints in the system that limit the delivery capability of the full contracted Table A amounts. In addition, demand on the SWP have increased resulting in an overall demand for SWP water that exceeds the dependable yield. For this reason, Metropolitan has developed groundwater storage programs in the Central Valley to supplement the available water supply.

On an annual basis, each of the 29 SWP contractors request an amount of SWP water based on their anticipated yearly demand. The amount of Table A deliveries approved by DWR vary annually based on contractor demand, Sierra Nevada snowpack, reservoir storage, operational constraints, projected carryover storage, and the Sacramento-San Joaquin Bay Delta regulatory requirements. SWP annual delivery of water to contractors has ranged from 552,000 acre-feet annually to 3,500,000 acre-feet annually. Historically, the SWP has been able to meet all contractors' requests for Table A water except during the droughts of 1977, 1990-1992, and 1994.[17] In many years, surplus water has been delivered to contractors. Deliveries to Metropolitan reached a high of 1,792,000 acre-feet in 2004 but because of low-precipitation and judicial decisions to protect threatened or endangered Delta species, deliveries were reduced to 1,040,000 acre-feet in 2008.

The Monterey Amendment, executed by DWR and the SWP contractors in 1995 and 1996, addressed the allocation of SWP water in times of shortage. Basically, DWR and SWP contractors agreed to revise long-term contracts governing the supply of water under the SWP. The revision included the elimination of the original contracts' provision for reallocation of water among contractors in the event of permanent water shortage and transfer of title to a water storage facility by DWR.

However, during validation and mandamus proceedings, two citizens groups (Planning and Conservation League and the Santa Barbara Citizens Planning Association) and Plumas County challenged those revisions. Among their arguments challenging the adequacy of the EIR for the Monterey Amendment was an assertion that DWR, and not the Central Coast Water Authority, should have been the lead agency for preparation of the EIR under CEQA. The trial court determined that the DWR, not the joint powers water agency, should have served as lead agency in preparing the EIR, but that the error was harmless as the EIR was sufficient. The trial court also dismissed the validation claim for failure to name and serve indispensable parties. The Court of Appeal reversed and remanded, directing the trial court to issue a writ of mandate vacating the certification of the EIR and to retain jurisdiction until the DWR should certify an EIR in accordance with CEQA. The appellate court held that the trial court had correctly determined that DWR, not the Central Coast Water Authority, had the statutory duty to serve as lead agency in preparing the EIR,

16 California Department of Water Resources, Bay-Delta Office. 2005. *The State Water Project Delivery Reliability Report*, Table C-1: Maximum Annual SWP Table A Amounts.

17 Metropolitan Water District of Southern California. 2005. *The Regional Urban Water Management Plan*, p. A.2-13.

but that the trial court erred in finding the EIR sufficient. The Court of Appeal further held that the EIR was defective in its failure to adequately consider a no project alternative in regard to proposed elimination of the original water contracts' provision for reallocation of water among contractors in the event of permanent water shortage. The absence of a thorough examination of the environmental impacts of the original contractual solution to permanent water shortages deprived both public agencies and the public of information essential to understanding the environmental consequences of the provision's elimination, including the effect on land planning decisions. Crucial to the court's reasoning was its observation that the "entitlements" shown in typical state water contracts (also known as the "Table A" amounts) were based on the original expectations for the SWP, which assumed the construction of water-producing facilities (e.g., storage beyond Feather River water stored behind Oroville Dam in Butte County) that never occurred and likely never will occur. Thus, a portion of these "entitlements" was "paper water" rather than real water. The court was concerned that land use planning agencies often believed, incorrectly, that SWP "entitlements" represented 100% "wet" water. The court also held that the trial court erred in dismissing the validation action, since there are no indispensable parties in a validation proceeding beyond the public agency whose action is challenged.[18] Currently, the Monterey Amendments EIR is being revised to reflect the Court of Appeal decision. The Draft EIR was circulated in 2009 and the Final EIR should be available in early 2010. If the EIR is valid and certified, the Monterey Amendment allows Metropolitan to use a portion of the San Luis Reservoir's capacity for carryover storage into the following year, which increases the SWP annual delivery. In the meantime, DWR and its contractors have ceased to use the term "entitlements" to describe the Table A amounts in state water contracts, and all concerned now recognize that, in the vast majority of hydrological year types, far less than the Table A amounts will be available for delivery to contractors.

There are also several transfer and exchange programs that increase Metropolitan's SWP supplies. Metropolitan formed an agreement with the Desert Water Agency (DWA) and Coachella Valley Water District (CVWD) in 1967 for an exchange of water supply. DWA and CVWD have rights to SWP water, but do not have any physical connections to the SWP conveyance facilities. However, both agencies are adjacent to the CRA. Under the exchange program, Metropolitan has agreed to exchange an equal quantity of its Colorado River water for DWA and CVWD's SWP water. This program increased Metropolitan's SWP Table A Amount by 61,200 acre-feet annually. In addition, Metropolitan has been delivering water in advance of the amount needed under the exchange agreements, allowing these agencies to store water. This water can be called on by Metropolitan during dry years. When supplies are needed, Metropolitan can receive its full Colorado River supply in addition to the SWP allocation from DWA and CVWD, while those two agencies rely on the stored water to meet demand.

4.2.2.4 State Water Project Reliability

In 2005, the DWR published The State Water Project Reliability Report. This report was updated in 2007 (see below). The purpose of this document was to present current information regarding the annual water delivery reliability of the SWP for existing and future levels of development assuming historical patterns of precipitation and for a range of hydrologic conditions. The analyses assume that current regulatory and institutional limitations regarding water quality, fish protections, and flows will exist in 2025; and that no facility improvements, expansions, or additions will be made to the SWP; and conveying water through the Sacramento-San Joaquin Delta will not be significantly interrupted.

18 Planning and Conservation League, <http://www.pcl.org/pcl_files/TextPCLvsDWR-tonyrossman.pdf>, accessed December 17, 2009.

The results of five computer simulations are included in the report. A discussion of the analysis tool (the CalSim II computer simulation model) can be found in the report. Studies 1, 2, and 3 are from the 2002 edition of the report and are included for comparison purposes only. Studies 4 and 5 are the updated studies conducted specifically for the 2005 report. The assumptions in the updated studies differ from the earlier studies in three main categories: the assumed level of development, the assumed SWP demand, and the base model assumptions. A description of these differences can be found in the report. The Reliability Report provides estimates for SWP Table A deliveries from the Delta. Estimates are provided for average, maximum, and minimum deliveries. Average deliveries are expected to be 68 percent and 77 percent of maximum Table A amounts in 2005 and 2025, respectively. Maximum deliveries are projected to be 93 percent and 100 percent of maximum Table A amounts in 2005 and 2025, respectively. Minimum deliveries are anticipated to be 4 and 5 percent of maximum Table A amounts in 2005 and 2025, respectively. Projected average and maximum deliveries in the 2005 report are similar to those projected in the 2002 report. However, minimum deliveries are significantly lower than those estimated by the 2002 report (19 and 20 percent for 2001 and 2021, respectively). The lower minimum delivery is primarily due to modification of the delivery-carryover storage rule. The modified rule reduces delivery by about 80 percent whenever carryover storage is projected to be less than about 860,000 acre-feet. The modified rule was developed to reduce the number of years storage in Oroville Reservoir (the start of the SWP facilities) reaches a very low level. The minimum delivery occurs in 1977, the driest year in the 73-year simulation. Estimates for multiple dry year deliveries during two, four, and six-year drought conditions are also included in the Reliability Report. Metropolitan's RUWMP took these studies into consideration and subsequently calculated its SWP supply in average, single dry, and multiple dry years based on the projections contained in the Reliability Report.

Since the 2005 SWP Delivery Reliability Report, DWR has updated its estimate of current (2007) and future (2027) SWP delivery reliability and has expanded the conditions under which reliability is quantified. The additional conditions are the future changes in hydrology due to potential climate change and restrictions on SWP and Central Valley Project (CVP) pumping in accordance with the interim operation rules imposed by the December 2007 Federal Court order (described below). However, to the extent that these factors can be and are changed by actions over the next few years, this estimate of water delivery reliability will also change.[19] For hydrologic year types with deliveries provided in a range, the average value was used to determine the overall water supplies available. Recent court decisions have forced the DWR to curtail pumping in the Delta to protect the threatened or endangered Delta species, thereby reducing the amount of water available to Metropolitan and other SWP contractors.

The above-mentioned federal court decision related to the 2005 BO prepared by the USFWS under the Endangered Species Act (ESA) for the "Operations Criteria and Plan" (OCAP), which governs the joint operation of the SWP and the federal CVP. That BO concluded that CVP/SWP operations would not jeopardize protected Delta smelt populations. On May 25, 2007, Judge Oliver Wanger of the U.S. District Court for the Eastern District of California found that the Delta smelt BO was adopted in violation of the ESA. On August 31, 2007, the same judge established interim operating rules to protect Delta smelt until USFWS rewrites the BO. The interim operating rules set in-Delta flow targets in Old and Middle Rivers (OMR) from late December through June that restricted CVP and SWP pumping in 2008 and until the Delta smelt BO is rewritten.[20]

In December 2008, USFWS released a new BO concluding that CVP and SWP operations would jeopardize the continued existence of endangered Delta smelt. USFWS further detailed a "reasonable and prudent alternative" (RPA) to the proposed OCAP protocol that would, it claimed, protect the Delta smelt and its habitat from the adverse effects of pumping operations. The RPA

19 California Department of Water Resources. Draft The State Water Project Delivery Reliability Report 2007. p. 1.

20 California Department of Water Resources. Draft The State Water Project Delivery Reliability Report 2007. p. 7.

would restrict Delta pumping operations and would thus limit deliveries of water to CVP/SWP contractors south of the Delta. Extrapolating from the text of the RPA there are several Actions (1, 2, and 3) that will affect Delta exports by virtue of limitations on OMR flows, and Action 4 requiring additional X2[21] flows in the fall months that will affect reservoir releases.

In October 2004, shortly before USFWS issued its OCAP BO for Delta smelt, the NMFS of the National Oceanic and Atmospheric Administration (NOAA) issued its own OCAP BO for certain salmonid species. Like the 2005 USFWS OCAP BO, NMFS also concluded that CVP/SWP operations were not likely to jeopardize the continued existence of the Sacramento River winter-run chinook salmon, spring-run chinook salmon, and Central Valley steelhead populations. In April 2008, Judge Wanger struck down that BO following a lawsuit filed by Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, and others. The court found that NOAA Fisheries failed to analyze multiple factors and the 2004 BO was remanded to NOAA Fisheries and USBR for further consultation.

In June 2009, NMFS released a new BO concluding that CVP and SWP operations would jeopardize the continued existence of endangered Sacramento River winter-run chinook salmon, threatened Central Valley spring-run chinook salmon, threatened Central Valley steelhead, threatened Southern Distinct Population Segment (DPS) of North American green sturgeon, and Southern Resident killer whales. NOAA Fisheries further detailed a RPA to the proposed OCAP protocol that would, it claimed, protect these species and their habitat from the adverse effects of the CVP/SWP. The RPA would restrict Delta pumping operations and NOAA Fisheries estimated that deliveries of water to CVP/SWP contractors south of the Delta would be reduced by 5 to 7 percent of average annual exports. The RPA includes multiple actions applied to various CVP-influenced watersheds.

Various state water contractors, including Metropolitan, have challenged both new BOs in court under various theories. As of the end of 2009, the eventual outcome of these proceedings was in doubt, though the contractors had won some preliminary victories in Judge Wanger's court. The judge had not yet issued any remedies that would alter pumping limitations imposed pursuant to the two BOs.

In the meantime, DWR, Metropolitan, and various other SWP and CVP contractors have embarked on the preparation of an ESA Habitat Conservation Plan known as the Bay Delta Conservation Plan (BDCP), which will also function as a Natural Communities Conservation Plan (NCCP) under California law. The BDCP is a comprehensive effort to develop a restoration program to improve Delta conditions for aquatic species and provide increased water supply reliability for CVP/SWP Delta export operations. Operations modeling and CEQA compliance are underway. At this time, it is not possible to predict what the final version of the BDCP will look like; it may or may not include a major new isolated conveyance facility (e.g., an around Delta canal) intended to reduce the extent to which both the CVP and the SWP will have to continue relying on pumps in the south Delta that, while putting water into the Delta Mendota Canal (federal) and the California Aqueduct (state), cause harm to the Delta smelt and other threatened or endangered species. At present, the so-called BDCP Steering Committee, a multi-party group of water users, non-profit environmental organizations, and others, has not yet completed its deliberations regarding the "project" to be proposed for inclusion in BDCP and associated CEQA and NEPA documentation. Depending on its final form, the BDCP may require USFWS and NFMS to revisit the terms of the above-described BOs for Delta smelt and various salmonid species.

21 X2 is the location of the 2 parts per thousand salinity contour (isohaline), one meter off the bottom of the estuary, as measured in kilometers upstream from the Golden Gate Bridge. The abundance of several estuarine species has been correlated with X2. Maintaining the location of X2 is accomplished via Project reservoir releases that increase inflow to the Delta thus "pushing" X2 towards the Golden Gate Bridge.

Taken together, all of the above-described lawsuits and regulatory actions have reduced the amounts of SWP water that Metropolitan and other south-of-Delta contractors can expect to receive for the foreseeable future. The hope is that, upon its completion, the BDCP will include sufficient restoration measures and other ecologically beneficial features to permit SWP exports to return to its historical deliveries prior to the pending litigation over Delta smelt and the various salmonid species.

4.2.2.5 Metropolitan's Five Year Supply Plan

In April 2008, Metropolitan staff began working with Metropolitan's member agencies on a Five-Year Supply Plan (Contained in Appendix E of this WSA is the Metropolitan Water District of Southern California, November 2009 Series E Bond Statement) to identify specific resource and conservation actions over the next five years to manage water deliveries under continued drought conditions and court-ordered restrictions. The Five Year Supply Plan focuses on six categories of resource options to improve Metropolitan's reliability from 2009 through 2013.[22] The Five Year Supply Plan was put in place to procure water supplies in response to increased restrictions and drought on the SWP and long term drought on the Colorado River. The supplies and actions identified under the Five Year Supply Plan will continue to be developed until long-term improvements contained in the forthcoming IRP can be implemented.[23]

Background

Over the last seven years (2002 through 2008), water received by Metropolitan from the SWP, included supplies from water transfers, groundwater banking and exchange programs varied from as low as 1,040,000 acre-feet in 2008 to as high as 1,794,000 acre-feet in 2004. Below-normal precipitation in the northern California in the winter of 2007 and spring of 2008 ended with record dry conditions during March and April of 2008. At this point, Metropolitan's SWP allocation in 2008 was 35 percent of its contracted amount, or 669,000 acre-feet. However, in actuality Metropolitan received approximately 1,040,000 acre-feet of water by using the SWP's California Aqueduct as a conveyance facility. In an effort to bolster its total supplies in 2008, Metropolitan combined its SWP allocation (669,000 acre-feet) with and other deliveries (371,000 acre-feet) including water transfers, groundwater banking and exchange programs delivered via the California Aqueduct.

Following two dry years and the uncertain hydrology projected for 2009, DWR's October 2008 initial allocation estimate to SWP contractors for calendar year 2009 was set at 15 percent of contracted amounts. This estimate was adjusted to 40 percent of contracted amounts as of May 20, 2009, respectively. Since May 20, 2009, the SWP allocation has remained at 40 percent of contracted amounts. This allocation reflects that water storage in the State's major reservoirs, runoff projections remain below average, and regulatory restrictions on water exports from the Bay-Delta to protect listed fish species have also reduced water deliveries from the SWP. Under the 40 percent allocation of contracted amounts, Metropolitan will receive approximately 765,000 acre-feet from its basic allocation and approximately 923,000 acre-feet of total water from the SWP, including supplies from water transfers, exchanges and related Five-Year Supply Plan actions that will be delivered through the California Aqueduct.[24]

As recently as December 2009, DWR stated that SWP deliveries will be about 5 percent of normal year supplies. It should noted that DWR's late fall SWP delivery estimates generally underestimate annual deliveries, as presented above in October 2008, DWR stated that SWP deliveries were expected at about 10 to 15 percent of normal year supplies, by late spring 2009 after DWR adjusted

22 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.
23 Personal Communication with staff of Metropolitan Water District of Southern California, December 18, 2009.
24 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.

the delivery amount to 40 percent of normal. DWR's first snow survey for winter 2010 indicated snow levels at 86 percent of normal years.

As stated above, the Five Year Supply Plan focuses on six categories of water resource options. These six options include:

Water Conservation. The Five Year Supply Plan contains three water conservation strategies to increase and accelerate conservation savings by increasing the use of water efficient devices, affecting water use practices in Southern California and reducing prohibited uses of water: (1) increase outreach to heighten the public's awareness of the need to conserve, (2) increase resources and support for water use ordinances and conservation-based rate structures to motivate conservation, and (3) accelerate the installation of water efficient devices.[25]

Colorado River Transactions. Metropolitan is pursuing additional supplies such as the emergency short-term fallowing program within PVID. Metropolitan's Board authorized participation with the USBR in pilot operation of the Yuma Desalting Plant that could yield up to 27,000 acre-feet in 2010. New initiatives also include expansion of the 2004 storage and interstate release agreement with Southern Nevada Water Agency, an agreement with CVWD, a water exchange with Arizona, and a fallowing program with California Indian tribes. Metropolitan estimates that these programs on the Colorado River could provide an additional 140,000 acre-feet of Colorado River Aqueduct supply in 2009, with the potential to increase in the following years.[26]

Near-Term Delta Actions. Near-term Delta actions being developed include measures that protect fish species and reduce supply impacts, such as habitat and hatchery projects, and physical and operational actions with the goal of reducing conflicts between water supply conveyance and environmental needs. The proposed Two-Gate System would provide movable barriers on the OMR to modify flows and prevent vulnerable fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish habitat while allowing up to an estimated additional 150,000 afy of water supply export from the Bay-Delta in years when the allocation for SWP contractors exceeds 35 percent. The Two-Gate System is subject to operational studies; monitoring; environmental documentation and compliance; acquisition of right-of-way; and completion of design and construction.[27] For conservative water supply planning purposes, Metropolitan does not include this 150,000 acre-feet in its Five Supply portfolio. However, in calendar year 2009, SWP allocations were 40 percent: therefore, if the Two-Gate system were operational Metropolitan would have access to an additional 150,000 as shown in Table 4-4. Current plans of the USBR and other proponents of the Two-Gates project are to have it constructed and operational by late 2010.

Table 4-4 shows Metropolitans Five Year Supply yields, these yields are assumed to be available under the current dry year conditions and extending over the next five years.

25 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.
26 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.
27 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.

Table 4-4: Estimated Yield of Five Year Supply Plan (acre-feet/year)

Year	2009	2010	2011	2012	2013
Water Conservation	235,000	235,000	235,000	235,000	235,000
Colorado River Transactions	140,000	176,000	176,000	176,000	176,000
Near Term Delta Actions[a]	0	0	0	0	0
SWP Transactions	34,000	43,000	43,000	38,000	33,000
Groundwater Recovery	3,000	17,000	17,000	28,000	28,000
Local Resources	0	5,000	20,000	40,000	60,000
Total	412,000	476,000	491,000	517,000	532,000
Supply from Near Term Delta Actions[a]	150,000	150,000	150,000	150,000	150,000
Total with Near Term Delta Actions	562,000	626,000	641,000	667,000	682,000

Notes:
a. Two-Gate System is estimated to provide up to 150 taf with the SWP allocation is greater than 35 percent. Potential yield is held at "0" because of this contingency.
Source: Metropolitan Water District of Southern California Bond Statement November 20, 2009.

State Water Project Transactions. DWR's Drought Water Bank facilitates transfers from willing sellers located upstream of the Bay-Delta to buyers through the SWP and CVP. Prospective buyers submitted expressions of interest to DWR in October 2008. Purchases from the Drought Water Bank are contingent on acquisition by DWR of supplies from willing sellers. Delivery of Drought Water Bank transfers are contingent on sufficient capacity for export of this water through the Bay-Delta. Metropolitan took delivery of 29,000 acre-feet from the Drought Water Bank in 2009.[28]

Groundwater Recovery. Groundwater that requires treatment and recovery for consumptive use is a resource that has the potential to yield significant amounts of supply. Based on groundwater inventories conducted by Metropolitan and the member agencies, it is estimated that there is over 300,000 acre-feet of groundwater that could be treated and recovered in Metropolitan's service area. Additionally, it is estimated that the Hayfield groundwater basin located adjacent to the Colorado River Aqueduct has 70,000 to 100,000 acre-feet that could be extracted over the next five to ten years. In addition, more than 300,000 acre-feet of recovered groundwater accumulated from agricultural drainage in the San Joaquin Valley could be made available to Metropolitan if Metropolitan funds groundwater treatment facilities.[29]

Local Resources. Metropolitan is working to determine which local projects could be expanded and/or accelerated with a potential to be on line within the next five years. Local projects include recycled water treatment plants, groundwater recovery plants, desalination plants, and new hookups to existing recycled plants. Over 50 potential projects have been identified. No yield is anticipated for 2009, but the combined annual yield for these efforts has the potential to grow to approximately 122,000 acre-feet by 2013.[30]

4.2.3 Dry Year Imported Water Supplies

Metropolitan's single dry year supply, shown in Table 4-5, is estimated based on 1977 hydrology and the assumption that historic hydrology will repeat itself. The California Aqueduct supplies include Metropolitan's SWP allocation, DWA and CVWD supplies, San Luis Carryover water (including DWA and CVWD carryover supplies), and supply from the four Central Valley Storage and Transfer agreements. Colorado River Aqueduct supplies include Metropolitan's fourth priority water supplies,

28 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.
29 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.
30 Metropolitan Water District of Southern California, November 2009 Bond Statement, Appendix E.

supplies obtained through the conservation program with Imperial Irrigation District, and PVID's Land Management Program. In-basin storage is utilized in dry years to meet demand; these supplies come from stored water in Diamond Valley Lake, Lake Skinner, Lake Mathews, groundwater conjunctive use, and flexible storage in Castaic Lake and Lake Perris. Additional supplies under development may be available in the future, but are not considered firm supplies, and so are not considered in this analysis.

Table 4-5: Projected Metropolitan Imported Supplies in Single Dry Years (acre-feet/year)

	2010	2015	2020	2025	2030
In-Basin Storage	1,149,000	1,161,000	1,113,000	1,066,000	1,017,000
California Aqueduct	777,000	777,000	777,000	777,000	777,000
Colorado River Aqueduct	722,000	699,000	699,000	699,000	699,000
Metropolitan Supply	**2,648,000**	**2,637,000**	**2,589,000**	**2,542,000**	**2,493,000**

Source: Metropolitan Water District of Southern California Regional Urban Water Management Plan, 2005, p. II-12. Additional detailed supply information is available on pages A.3-34 through A.3-48.

Multiple dry year supplies for Metropolitan, shown in Table 4-6, are estimated based on 1990-1992 hydrology and the assumption that historic hydrology will repeat itself. The same supply sources are utilized, but in differing amounts than in a single dry year. For instance, based on supplies under the Delta's Interim Operating Rules water is available through the California Aqueduct in multiple dry years, and less of the San Luis carryover water is necessary to meet projected demand. The Colorado River Aqueduct supply amounts are not anticipated to vary from single dry to multiple dry years. In-basin storage is reduced in multiple dry years, particularly water available through Metropolitan's surface storage and the Castaic Lake and Lake Perris flexible storage programs.

Table 4-6: Projected Metropolitan Supplies in Multiple Dry Years (acre-feet/year)

	2010	2015	2020	2025	2030
In-Basin Storage	514,000	518,000	502,000	487,000	470,000
California Aqueduct	912,000	912,000	912,000	912,000	912,000
Colorado River Aqueduct	722,000	699,000	699,000	699,000	699,000
Total Dry Year Supply	**2,148,000**	**2,129,000**	**2,113,000**	**2,098,000**	**2,081,000**

Source: Metropolitan Water District of Southern California Regional Urban Water Management Plan, 2005, p. II-13. Additional detailed supply information is available on pages A.3-34 through A.3-48.

4.2.3.1 Central Valley Storage and Transfer

Metropolitan has also entered into several storage and transfer programs in the Central Valley, discussed below. These storage programs consist of partnerships with Central Valley agricultural districts. These partnerships allow Metropolitan to store its SWP water during wetter years for use in future drier years. As an example, Metropolitan has entered into a water banking and exchange agreement with Semitropic Water Storage District. In years of surplus water, Metropolitan can deliver excess SWP water to Semitropic through the California Aqueduct. During dry years, Metropolitan can withdrawal this stored water. Under the agreement, Metropolitan can store up to 350,000 acre-feet in Semitropic's basin; the ability to withdraw ranges from a minimum of 31,000 afy (peak four-month period) to a maximum 170,000 acre-feet annually (over a 12-month period). The average annual supply capability for a single or multiple dry year is 107,000 acre-feet.

Similarly, Metropolitan has entered into an agreement with Arvin-Edison Water Storage District. Metropolitan can store available water in the Arvin-Edison groundwater basin, either through direct spreading operations, or through deliveries to growers in-lieu of surface supplies. Under the

agreement, Metropolitan can store up to 250,000 acre-feet of water in the basin, with an option to increase that storage amount to 350,000 acre-feet. During dry years, Metropolitan can recover stored water through direct pumping of the groundwater basin or through exchange. Metropolitan's ability to withdraw this stored water ranges from a minimum of 40,000 acre-feet annually (peak four-month period) to a maximum of 110,000 acre-feet annually over a 12-month period. The average annual supply capacity for a single or multiple dry year is 90,000 acre-feet.

Metropolitan has also entered into Principles of Agreement with Kern Delta Water District (District) for development of a dry year supply program. When available, water is stored in the District's groundwater basin, either through direct spreading activities or through deliveries to farmers. Metropolitan has the ability to store up to 250,000 acre-feet of water and withdrawal through direct pumping of exchange at a rate of 50,000 acre-feet annually.

In addition to the previously discussed transfer and exchange programs, Metropolitan is able to purchase a dependable annual supply, as well as an additional supply for dry year needs, from San Bernardino Valley Municipal Water District (San Bernardino). The purchased SWP supply is provided to Metropolitan through either direct deliveries of SWP water or recaptured SWP water previously stored in the San Bernardino groundwater basin. Under the agreement, Metropolitan purchases a minimum of 20,000 acre-feet annually of San Bernardino's SWP allocation, and has the option to purchase additional SWP allocation, if available.

There are also supplies under development for the California Aqueduct, which include about 60 water supply and system improvement projects; however, because these are not firm supplies, they are not included in this analysis.

4.2.4 Current Conditions

California is currently facing a significant water crisis. After experiencing two years of drought and the driest spring on record, water reserves are low. With the Sacramento-San Joaquin Delta ecosystem waning, court-ordered restrictions on water deliveries from the Delta have reduced supplies from the state's two largest water systems by 20 to 30 percent. Drought conditions in the Colorado River Basin and a Sierra snow-pack that is more unreliable due to global climate variation are leaving many communities throughout California facing mandatory restrictions on water use and/or rising water bills. In June 2008, the Governor issued Executive Order S-06-08 declaring a statewide drought, which directed state agencies and departments to take immediate action to address drought conditions and water delivery reductions that exist in California. The governor also issued a Central Valley State of Emergency Proclamation for nine Central Valley counties (Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern) to address urgent water needs.

4.2.5 Metropolitan Water Supply Allocation Plan

For years in which Metropolitan's supplies are insufficient to meet firm demand, imported supplies to the City were determined using the Water Supply Allocation Plan [(WSAP) Appendix F]. Due to dry conditions affecting Metropolitan's service area and uncertainty regarding future pumping operations from the SWP due to fishery protection measures in the Sacramento-San Joaquin Delta, Metropolitan is faced with the possibility that it may not have access to the supplies necessary to meet total firm demand in the future and may have to allocate shortages in supplies to the member agencies. In preparing for this possibility, Metropolitan has worked with member agencies to put together the WSAP. The WSAP includes sample calculations for determining a particular member

agency's allocation, as well as estimated retail and wholesale reliability for member agencies based on a given percent reduction in total supply (shortage percentage).

On February 12, 2008 the Metropolitan Board of Directors officially adopted the WSAP. The WSAP includes estimated retail and wholesale reliability for member agencies based on shortage percentage. The shortage percentages, which correspond to designated shortage levels outlined in the WSAP, cover 5 percent increments from 5 to 50 percent. Under each shortage level, there are specific wholesale minimum allocations for each member agency. These allocations are based on factors such as impact on retail customers and level of investment in Metropolitan's facilities. The WSAP also includes graphs and tables showing an estimate of the wholesale minimum allocations for each of the member agencies in a Level 2 Regional Shortage (10 percent), Level 4 Regional Shortage (20 percent), and in a Level 6 Regional Shortage (40 percent). The reductions were linearly interpolated to determine the effects of a 5, 15, 25, 30, and 35 percent regional shortage. Projected regional shortages were rounded to the next highest five percent increment; for example, a two percent regional shortage would prompt the water shortage allocation for a five percent shortage.

To determine the minimum retail allocations of supplies during years of insufficient water, the wholesale reliability percentages were applied to the projected imported supplies in normal, single dry, and multiple dry years. Reductions in imported water from Metropolitan are to be passed on to its wholesale and retail customers.

As explained above, based on the calculated supply of imported water supplied by Metropolitan and estimated allocations to wholesalers and retailers as set forth in the WSAP, projected imported water supplies are sufficient to meet firm demand in both normal and single dry years through 2025. However, after 2025 supplies under the WSAP supplies are no longer sufficient to meet firm demand. According to the WSAP methodology, projected supplies are insufficient to meet firm demand under multiple dry years. The analysis assumed that the probability of multiple dry year events could occur in any given year. Table 4-7 shows the WSAP Base Year Supplies within a 65 percent BPP and the balance of supplies (35 percent) coming from Metropolitan and the estimated supply under the current 62 percent BPP.

Table 4-7: Metropolitan WSAP Base Year Supplies (acre-ft/year)

Regional Shortage Level Stage	Regional Shortage Percentage	Wholesale Minimum Allocation	MWD WSAP Supply Worksheet with adjustments (65% BPP:35% import)	MWD WSAP Supply Worksheet with adjustments (62% BPP:38% import)
1	5%	92.5%	15,300.0	16,612.0
2	10%	85.0%	14,222.0	15,442.0
3	15%	77.5%	13,522.0	14,717.0
4	20%	70.0%	12,570.0	13,695.0
5	25%	62.5%	11,618.0	12,673.0
6	30%	55.0%	10,667.0	11,652.0
7	35%	47.5%	9,715.0	10,630.0
8	40%	40.0%	8,763.0	9,608.0
9	45%	32.5%	7,811.0	8,587.0
10	50%	25.0%	6,860.0	7,565.0

Source: Metropolitan Water District of Southern California. WSAP Allocation Schedule for City of Santa Ana, 2009.

4.3 Imported Water Supply to the City

This WSA was prepared during a very unique period in California's water history. Water year 2007, was a dry year throughout California, with parts of Southern California setting new records for

minimum annual precipitation.[31] As previously stated, statewide water supplies are currently limited by below-normal precipitation in much of the state, nine dry years in the Colorado River and a regulatory drought due to SWP pumping restrictions. These circumstances continue to threaten statewide water supplies; however, the statewide supply situation is subject to change and could return to normal or above-normal year precipitation in the near-term and then extend over many years. This assumes that water year history will repeat itself and these cyclical wet hydrologic periods return. In addition, forthcoming case law or new diversion strategies could lift the SWP pumping restrictions; thereby, returning the system to firm delivery capacity.

The City obtains imported water from Metropolitan, which treats water received from the Colorado River via the CRA and from the SWP via the California Aqueduct. The amount of water delivered to the City by Metropolitan currently accounts for about 31 percent of the total water used in the City. Table 4-8 shows the treated water supplies purchased by the City from Metropolitan over the last eight years. Metropolitan's average annual delivery to the City over the last eight years is approximately 11,200 acre-feet.

Table 4-8: City of Santa Historical Metropolitan Purchases

Water Year	MWD Direct Supply	MWD In-Lieu Supply
2002/03	12,336	4,967
2003/04	12,184	7,792
2004/05	15,165	4,013
2005/06	15,989	6,019
2006/07	14,344	4,083
2007/08	8,517	0
2008/09	12,753	0
Total	**78,535**	**26,874**
Average of last 8 years	**11,219.3**	**3,839.1**

Source: Santa Ana Historical Production Records, January 2010.

Metropolitan has a two-tier rate structure with a penalty rate charge under dry year conditions. The City's Tier 1 Annual Limit with Metropolitan is 12,129 afy and its Purchase Order Commitment currently stands at 80,858 afy,[32] which allows the City to purchase imported water at the Tier 1 rate over a 10-year period. Annual purchases above 12,129 acre-feet are subject to Tier 2 pricing. This rate and delivery structure allows the City to buy water to meet demand although subject to different costs, which explains deliveries above the City's Tier 1 Annual Limit.

4.3.1 Groundwater Supply for the City

OCWD's allowable BPP establishes the annual pumping percentage per OCWD member and may vary annually. The BPP is set uniformly and is a portion of each member's water supply that comes from groundwater pumped from the basin. OCWD members pay an RA fee for water pumped from the basin. Groundwater production at or below the BPP is assessed the RA. Any production above the BPP is charged the RA plus the BEA. Historically, the BEA is calculated so that the cost of groundwater production above the BPP is typically higher than purchasing imported potable supplies. This approach serves to discourage, but not eliminate, production above the BPP. However, currently the BEA is essentially the same rate as the imported water rate purchased

31 California Department of Water Resources. California Drought: An Update. April 2008. <http://www.water.ca.gov/drought/docs/DroughtReport2008.pdf>, accessed January 2009.

32 Metropolitan Water District of Southern California. Tier 1 Allocation Schedule.

through Metropolitan. Currently, the BPP is set at 62 percent, and groundwater pumped between 62 percent to a maximum restriction of 64 percent will be charged the sum of the RA and BEA, which, as stated above is essentially the same rate as the import water rate purchased through Metropolitan.

4.4 Total Supplies within the City of Santa Ana

Total potable supplies within the City are primarily composed of local groundwater and imported water is also an important source of supply. The WSAP formula was used to determine water supplies to the City under the current hydrologic conditions. For conservative water supply planning purposes, these same supply quantities were then extended over the 20-year planning horizon and are subsequently held constant according to the prescribed allocation rate. For example, Base Year supplies of 46,809 afy remain the same over the 20-year planning horizon and each WSAP Stage is presented in the same manner.

Table 4-9 shows the supplies available to the City under WSAP Base Period model (no reductions), under this supply scenario commencing in July 2009 through 2010, the City could expect to receive 46,809 afy. Table 4-10 shows the change in WSAP allocation according to the 62 percent BPP that is currently in place as of fiscal year 2009/10. However, as previously discussed, due to statewide water supplies reductions, under WSAP Stage 2, the City can expect to receive less than the Base Year water supply allocation.

Table 4-9: WSAP Base Year Supplies with 65% BPP and 35% MWD[a] (acre-feet/year)

Water Supply Source	2010	2015	2020	2025	2030
Imported Water (35%)[b]	16,377	16,377	16,377	16,377	16,377
Groundwater (65%)[c]	30,432	30,432	30,432	30,432	30,432
Total[c]	**46,809**	**46,809**	**46,809**	**46,809**	**46,809**

Notes:
a. MWD WSAP Base Year Water Supply Allocation. Assumes 35% Imported Water from MWD and 65% BPP of Groundwater from OCWD.
b. Table 4-7 Metropolitan WSAP Base Year Supplies (acre-ft/year)
c. OCWD 2009 BPP is currently set at 62 percent, and groundwater pumped between 62 percent to a maximum restriction of 64 percent.

Table 4-10: WSAP Base Year Supplies with 62% BPP and 38% MWD[a,b] (acre-feet/year)

Water Supply	2010	2015	2020	2025	2030
Imported Water (38%)	17,781	17,781	17,781	17,781	17,781
Groundwater (62%)[c]	29,028	29,028	29,028	29,028	29,028
Total	**46,809**	**46,809**	**46,809**	**46,809**	**46,809**

Notes:
a. MWD WSAP Base Year Water Supply Allocation. Assumes 38% Imported Water from MWD and 62% BPP of Groundwater from OCWD.
b. Table 4-7 Metropolitan WSAP Base Year Supplies (acre-ft/year)
c. OCWD 2009 BPP is currently set at 62 percent, and groundwater pumped between 62 percent to a maximum restriction of 64 percent.

4.4.1 Additional Dry Years

Projected supplies over single dry and multiple dry years are shown in Table 4-11. For water supply planning purposes, this WSA projected further WSAP reductions the following year and over consecutive dry years. For example, as shown in Table 4-11, if next year is another dry year, Metropolitan could initiate Stage 3 of the WSAP and reduce deliveries accordingly. If this were the case, imported water supplies to the City would be curtailed by 705 acre-feet, reduced to 14,717

acre-feet, which is 43,745 afy in total supplies. The analysis assumed that the probability of multiple dry year events could commence in any given year and extend over multiple dry years.

Table 4-11: City of Santa Ana Supplies: WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2010 – 2030)

	Base Year Supply[a]		Stage 2 WSAP (2009-2010) Dry Year[b]		Multiple Dry Year[b] Event (Stages 2 and 3 Effective)					
					Consecutive Dry Year 1[c]		Consecutive Dry Year 2[d]		Consecutive Dry Year 3[d]	
	afy	%	afy	%	afy	%	afy	%	afy	%
Santa Ana Allocation	46,809	100	44,470	90	44,470	90	43,745	85	43,745	85

Notes: Developed by PBS&J for additional dry year planning
a. MWD WSAP Base Year Water Supply Allocation. Assumes 38% imported water from MWDOC and 62% BPP of groundwater from OCWD.
b. PBS&J developed additional dry year planning projections based on Stage 2 and Stage 3 Allocations.
c. Stage 2 Allocation in effect beginning in Dry Year 1 – Same as Single Dry Year.
d. Stage 3 Allocation in effect after Dry Year1 and due to the WSAP model WSAP Stage remains in effect over the next year as well.
Developed by PBS&J for Water Supply and Demand Planning Purposes.
Source: Metropolitan WSAP April 2009 for City of Santa Ana

There are several Water Shortage Contingency Plans which guide the management of water resources in dry year conditions. Metropolitan has a Water Surplus and Drought Management Plan [(WSDM Plan) Appendix G], which addressed both surplus and shortage contingencies. The plan guides the operations of water resources to ensure regional reliability through a series of surplus and shortage stages and associated actions. Details about this plan are included in Metropolitan's RUWMP. The City has developed a Water Shortage Contingency Plan, contained in its UWMP. The Plan contains information related to water shortage stages and actions, and the three-year minimum water supply. OCWD manages the groundwater basin to handle drought conditions; these management activities include maintaining sufficient water in storage, operating the basin at a lower level when necessary, and possessing a plan to refill the basin. In addition, OCWD and MWDOC jointly plan for the maximum flexibility in the overall water supply, including groundwater, imported water, recycled water, conservation, and ocean water desalination. The City also has an Emergency Water Conservation Plan (EWCP), which provides procedures, rules, and regulations for mandatory water conservation, based on phases and associated actions. The EWMP and the City's Resolution adopting the Water Conservation Ordinance is contained in Appendix H.

The EWCP contained in Section 7 of the City's 2005 UWMP is the dry year shortage contingency plan that allows the City to reduce water deliveries to customers and implement demand reductions during periods of water shortage. Pursuant to the Urban Water Management Planning Act (Water Code Section 10632), water suppliers with an existing dry year shortage contingency plan can implement subsequent stages of demand reduction measures listed in its UWMP as a strategy to balance supply and demand. Therefore, when a supply deficit occurs, the City would follow its adopted water shortage contingency plans to implement drought-planning sequences and associated operating procedures that trigger different levels of water delivery reduction rationing relative to current water supplies. These delivery reductions within its service area allow the City to balance supply and demand over an extended period.

5.0 Water Demands

Analysis of water demand is based on the same regional area as the analysis for supplies. The following analysis addresses the greater regional demand context within the OCWD boundary; the land use data was provided by the City and the project-specific analysis demand calculations are based on demand factors from similar development facilities in Santa Ana, Southern California and other parts of the state. (Appendix I for a comprehensive demand discussion on a larger scale.)

5.1 Demand in Metropolitan's Service Area

Metropolitan defines "firm demands" as projected firm sales plus 70 percent of projected Interim Agricultural Water Program sales. Demand projections are based on growth forecasted in the 2004 SCAG RTP and the San Diego Association of Governments 2030 forecasts. Metropolitan calculates firm demands as total demands (retail municipal and industrial as well as agricultural demands) less conservation and local supplies (groundwater, recycled water, local surface supplies used by member agencies). Metropolitan projected firm demands from 2010 to 2030 are shown in Table 5-1.

Table 5-1: Projected Metropolitan Firm Demands in Average, Single Dry and Multiple Dry Year Types (acre-feet/year)

	2010	2015	2020	2025	2030
Firm Demands in an Average Year	2,170,200	2,170,492	2,313,613	2,401,926	2,482,325
Firm Demands in a Single Dry Year	2,344,792	2,380,767	2,363,375	2,363,261	2,344,232
Firm Demands in a Multiple Dry Year	2,234,558	2,228,203	2,363,908	2,447,761	2,534,113

Source: Metropolitan Water District of Southern California, Personal Communication with Brandon Goshi, July 21, 2009.

5.2 Water Demands in the Orange County Groundwater Basin

Regional projected demand in OCWD's service area shown in Table 5-2, is based upon demand estimated by the individual producers and were submitted to the MCDOC as part of its Annual Survey in spring 2008. Demands of water agencies located outside of the Orange County Groundwater Basin were removed from the dataset. Non-potable demands were also removed from the dataset. Dry year demands are typically higher than normal year demands, which is largely due to lack of rainfall and the subsequent need for increased water for landscaping in dry years. However, under the current dry year situation, based on demand reduction measures necessary to support supply reductions, dry year demand is assumed not to increase. In fact, in dry years demand should actually decrease due to water saving efforts; however, due the speculative nature of conservation achievements, and in order to be conservative, increases in demands are relative to population increases within the City described in Section 3 and not a function of below-normal precipitation. A discussion of the Conservation efforts and achievements is presented in Section 6.

Table 5-2: Total Projected Demand within the Basin in an Normal Year (acre-feet/year)

	2010	2015	2020	2025	2030
Total Demand[a]	500,961	527,828	543,464	550,830	552,797

Note:
a. Includes Anaheim, Fullerton and Santa Ana.
Source: Water Demands in the OCWD Basin. Projections by the Retail Agency. Draft. 2008. Provided by MWDOC staff upon request.

5.2.1 City of Santa Ana Demands

In Santa Ana, water demand is not dissimilar from other municipal water providers, insofar as demand occurs as a result of consumptive uses by consumers. However, for Santa Ana, on an annual basis demand equals supply, due to the fact that unaccounted-for system losses are aggregated with distribution deliveries and due to the presence of a large groundwater basin it is not necessary for the City to maintain any large above ground storage reserves for consumptive uses (storage is provided for fire suppression purposes).

5.2.1.1 Historical Demands

Historical demand is presented in Table 5-3. Over the last ten years the citywide demands have decreased. Demand in 2008 was 41,136 acre-feet. Demand decreases could be contributed to conservation efforts, economic downturn and annual population decreases. The average annual demand over this period was 46,576 afy and the last 5-year average (2004-2008) was 43,943 acre-feet.

Table 5-3: City of Santa Ana Historical Demands (1999 - 2008)

Fiscal Year	Water Demand (acre-feet/year)
1999/00	51,125
2000/01	50,403
2001/02	49,485
2002/03	47,018
2003/04	48,019
2004/05	44,921
2005/06	44,406
2006/07	46,248
2007/08	43,004
2008/09	41,136
Last 5 Year Average	**43,943**
10 Year Average	**46,576**
Base Year Demand[a]	**46,809**

Notes:
a. Metropolitan WSAP April 2009 Base Year Demand for City of Santa Ana.
Source: Santa Ana Historical Production Records, January 2010

5.3 Transit Zoning Code (SD84A and SD84B) Project Demands

5.3.1 Existing Project-Site Demands

The proposed project site is currently developed with existing residential, retail, commercial, industrial, and civic uses. Estimated water use was calculated using a land use-based approach, shown in Table 5-4. To determine the water demand of the various land uses, water use demand factors were formulated based on data from the City's UWMP and an American Water Works Association publication *Forecasting Urban Water Demand*. As it currently exists, the total existing water demand for the proposed project site is approximately 994.37 acre-feet annually.

Table 5-4: Existing Water Demand for the Project Area

Land Use	Square Footage	Dwelling Units	Acreage	Demand Factor	Total Demand (acre-ft/year)
Retail	306,000	--	–	0.10 gpd/sf[a]	34.28
Commercial	1,456,926	--	–	0.09 gpd/sf[a]	146.88
Industrial	1,080,000	--	–	0.08 gpd/sf[a]	96.78
Civic	417,108	--	–	0.11 gpd/sf[a]	51.39
Green	21,780	--	0.5	4.0 acre-ft/acre[b]	2.00
Subtotal Non-Residential					***331.33***
Single Family Residential	–	1,120	–	0.55 afa/DU[c]	616.00
Multiple Family Residential	–	280	--	150 gpd/DU[d]	47.05
Subtotal Residential	**–**	***1,400***	**–**	**---**	***663.05***
Total Existing Demand					**994.37**

Notes:
a. Billings, Bruce R. and C. Vaughn Jones. Forecasting Urban Water Demand. 1996. American Water Works Association.
b. Based on calculated irrigation demand, Table 4-1: City of Santa Ana Climate Summary.
c. City of Santa Ana Urban Water Management Plan, 2005, average residential water use per dwelling unit, 2010-2030.
d. Utah Department of Natural Resources. Identifying Residential Water Use, 2001, national average (outside state of Utah).

5.3.2 Transit Zoning Code (SD84A and SD84B) Project Demands

To determine the water demand of the proposed project, water use demand factors were formulated based on the sources described above. As shown in Table 5-5, the water demand of the entire Specific Plan area is anticipated to be 1,125.37 acre-feet annually. This is a net increase in water demand as compared to existing uses of 131 acre-feet annually. The associated change in water demand is shown in Table 5-6.

Table 5-5: Transit Zoning Code (SD84A and SD84B) Water Demand

Land Use	Square Footage	Dwelling Units	Acreage	Demand Factor	Total Demand (acre-ft/year)
Retail	693,000	--	--	0.10 gpd/sf[a]	77.63
Commercial	1,332,926	--	--	0.09 gpd/sf[a]	134.38
Industrial	90,000	--	--	0.08 gpd/sf[a]	8.07
Civic	8,000	--	--	0.11 gpd/sf[a]	0.99
Green	680,000	--	15.5	4.0 ft/acre/year[b]	62.00
Subtotal Non-Residential	***2,803,926***				***283.05***
Single Family Residential	-	326	-	0.55 afy/DU[c]	179.30
Multiple Family Residential	-	3,946	-	150 gpd/DU[d]	663.01
Subtotal Residential		***4,272***			***842.31***
Total Demand					**1,125.37**

Notes:
a. Billings, Bruce R. and C. Vaughn Jones. Forecasting Urban Water Demand.1996.American Water Works Association.
b. Based on calculated irrigation demand, Table 4 -1: City of Santa Ana Climate Summary.
c. *City of Santa Ana Urban Water Management Plan*, 2005, average residential water use per dwelling unit, 2010-2030.
d. Utah Department of Natural Resources. *Identifying Residential Water Use, 2001*, national average (outside state of Utah).

Table 5-6: Net Change in Water Demand for the Transit Zoning Code (SD84A and SD84B) Area

	Million Gallons/Day	Total Demand (acre-ft/year)
Total TZC Project Demand[a]	346.5	1,125.4
Total Existing Project Area Demand[b]	324.0	994.4
Net Change in Demand	**22.5**	**131**

Notes:
a. Table 5-5: Transit Zoning Code (SD84A and SD84B) Water Demand
b. Table 5-4: Existing Water Demand for the Transit Zoning Code (SD84A and SD84B) Area

5.3.3 Projected Dry Year Demands

In dry years for consistency purposes, the proposed TZC project demand is not anticipated to change, as shown in Table 5-7. It should be noted that conservation efforts achieved in the proposed project area could result in less demand; however, due to the unknown nature of the demand reduction achievements and for conservative water planning, no change in demand would as a result of single dry or multiple dry years. Demand shown below are for full build-out in 2030.

Table 5-7: Normal, Single Dry and Multiple Dry Year Demands (acre-feet/year)

	Normal Year Demand	Single Dry Year Demand	Multiple Dry Year Demand		
			Year 1	Year 2	Year 3
Total TZC Project Demand	1,125	1,125	1,125	1,125	1,125

Source: Total demand at build-out calculated from Table 5-5: Transit Zoning Code (SD84A and SD84B) Water Demand.

5.4 Total City Projected Demands by Population Growth

As required by Water Code Section 10910(c)(3) water demands are projected out 20-years. For consistency with Water Code Section 10631 (Urban Water Management Planning Act) the projected demands are presented in 5-year increments.

Beginning in 2010, Table 5-8 shows citywide demand with the proposed project's contribution included into the total citywide demands in each five-year increment. Base Year demand is 46,809 afy. Projected demand beginning in July 2009 was calculated as part of Metropolitans' WSAP. As stated in Section 4.1, Metropolitan determined each retailer's Base Year demand by averaging demands from 2004, 2005 and 2006. Total demand due to population increases is expected to reach 50,060 afy by 2030, or a growth in demand of 3,251 afy between 2009 and 2030. This WSA uses the higher percentage increase of 0.32 annually to account for population increases due to densification within the city limits. The benefit of utilizing this growth methodology is that it captures and includes all other pending development projects, as well as other yet to be identified development projects. However, as shown in Table 5-8 the Base Year allocation for 2010 exceeds the City's 5-year average demand (Table 5-10) by nearly 3,000 acre-feet and greatly exceeds the City's 2009 demand by over 5,000 acre-feet (Table 5-9). As such, this WSA removes the Base Year demand as a starting point for the further analysis, as it does not reflect water use in the City. Therefore, for both realistic and more conservative water supply planning purposes, the WSA recognizes the water savings the City has recently achieved and analyzes growth in water demand commencing with 41,136 acre-feet (2009 Demand) and using the same annual growth percentage estimates demand in 2030 at 43,993 afy as shown in Table 5-9. In the event pre-WSAP demand conditions return as shown in Table 5-10, this WSA uses the same 0.32 percent annual growth rate

and applies it to the 5-year average demand (43,942 afy) over the 20-year planning horizon to estimate an alternative growth in water demand.

Table 5-8: Base Year Demand Projections without Water Conservation (acre-feet/year)

	2009	2010	2015	2020	2025	2030
Total Demand[a,b]	46,809[c]	46,959	47,716	48,485	49,266	50,060

Notes:
a. CDR at CSF from 2009 Progress Report - population projections calculated at 0.32% annually.
b. Water demand calculated from FY 2008/2009 actual with 0.32% annual growth as determined from population growth between 2010-2030.
c. Base Year demand is 33,323 afy. MWDOC determined each retailer's Base Year demand by averaging demands from 2004, 2005 and 2006.

Table 5-9 shows the projected water demand beginning with 2009 usage and then applies the 0.32 percent growth rate to achieve an estimated demand in 2030. Demand increases at approximately 700 afy under this growth scenario.

Table 5-9: 2009 Demand Projections without Water Conservation (acre-feet/year)

	2009	2010	2015	2020	2025	2030
Total Demand[a]	41,136	41,267	41,933	42,608	43,295	43,993

Notes:
a. Growth in demand as population increases is expected to reach 43,993 afy by 2030. Based on an annual 0.32 percent to account for population increases due to densification within the city limits (see Section 3 for discussion).

Table 5-10 shows the projected water demand beginning with the 5-year average demand and then applies the 0.32 percent growth rate to achieve an estimated demand in 2030. Demand increases at approximately 750 afy under this growth scenario.

Table 5-10: Santa Ana with 5-year Average Demand Projections without Water Conservation (acre-feet/year)

	5-Year Average[b]	2010	2015	2020	2025	2030
Total Demand[a]	43,942	44,083	44,794	45,516	46,249	46,995

Notes:
a. Demand Growth in demand as population increases is expected to reach 46,995 afy by 2030. Based on an annual 0.32 percent to account for population increases due densification within the city limits (See Section 3 for discussion).
b. 5-year Average Demand (2004-2008) from Table 5-3

6.0 Supply-Demand Comparison

6.1 Supply and Demand Comparison at the Metropolitan Level

A presentation of the Metropolitan service area is necessary to evaluate the current and projected disparity between supply and demand. This illustrates the water supply situation at a most regional scale, as this perspective determines if supplies are adequate, and if not, how supplies between member agencies at the basin level and local level will be allocated.

6.1.1 Metropolitan Supply and Demand Comparison

Metropolitan calculates firm demands as total demands (retail municipal and industrial as well as agricultural demands) less conservation and local supplies (groundwater, recycled water, local surface supplies used by member agencies). Demand projections are based on growth forecasted in the 2008 SCAG RTP and the San Diego Association of Governments 2030 forecasts. Metropolitan projected firm demands from 2010 to 2030 are shown in Table 5-1 above.

The WSAP follows the principles and considerations identified in MET's WSDM Plan, which calls upon the allocation of water in a fair and equitable manner to all of Metropolitan's member agencies. To the extent possible, this means developing a plan that minimizes regional hardship during times of shortage. The WSAP seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level.[33]

Under the WSAP imported water supplies retailed to direct members and wholesaled to MWDOC will also be reduced proportionally. Consequently, it will be necessary for each retailer in the region to consider multiple solutions to overcome the potential deficits that are anticipated.

Table 6-1: Supply and Demand Comparison (acre-feet/year)

Year	2009	2010	2011	2012	2013	2014	2015	2020[1]	2025[1]	2030[a]
Supplies	2,007,000	2,007,000	2,007,000	2,007,000	2,007,000	2,007,000	2,007,000	2,007,000	2,007,000	2,007,000
Demand	2,160,000	2,160,000	2,170,200	2,170,200	2,170,200	2,170,200	2,170,492	2,313,613	2,401,926	2,482,325
Difference	-153,000	-153,000	-163,800	-163,800	-163,800	-163,800	-163,492	-306,613	-394,926	-475,325

Note:
a. Total Metropolitan Supplies are projected to increase by approximately 200,000 acre-feet after 2020; based on Model 19 supplies are still short at least 100,000 acre-feet.
Source: Metropolitan Water Surplus and Drought Mgt Plan May 21, 2009 Appendix G Table CY 2009 Projected CRA & SWP Supplies.

Currently, based on Metropolitan system supplies when applying the WSAP formula in years 2010 through 2030, this WSA concluded that existing supplies are insufficient to meet firm demands under current and future scenarios as shown in Table 6-1.

6.1.2 Supply and Demand Comparison within OCWD Service Areas

Within the region considered by this WSA, defined by the OCWD boundary and including all groundwater users of the Orange County Basin, an increase in demand of at least 50,000 acre-feet

33 Metropolitan Water Supply Allocation Plan, Appendix X

annually is anticipated by 2030.[34] In that same time period as shown in Table 6-1, considering the various challenges facing Metropolitan including three years of the statewide drought conditions imported supplies have been decreased.

6.1.3 Supply and Demand Comparison for City of Santa Ana

As stated previously, Santa Ana water demand is not dissimilar from other municipal water providers, insofar as demand occurs as a result of consumptive uses by consumers. However, for Santa Ana, on an annual basis demand equals supply, because of the fact that unaccounted-for system losses are aggregated with distribution deliveries and due to the presence of a large groundwater basin it is not necessary for the City to maintain large above-ground storage reserves for consumptive uses (storage is provided for fire suppression purposes).

This WSA uses the higher percentage increase of 0.32 annually to account for population increases due densification within the city limits. Conversely, for conservative water planning purposes, supplies are held constant according to the prescribed allocation rate. For example, Base Year supplies of 46,809 afy remain the same over the 20-year planning horizon and each WSAP Stage is presented in the same manner. In other words, water supply increases do not match the population rate increases.

6.1.3.1 Base Year Supply and Projected Demand Scenarios

Table 6-2 shows the comparison of anticipated supply and calculated demand over the next 20 years based on the WSAP supply allocation and demand commencing at 41,267 afy. Within the City, an increase in demand of 2,726 afy is anticipated between 2010 and 2030 as shown on the Demand line in Table 6-2. In that same time period, this WSA assumes the challenges facing Metropolitan will prevail and WSAP supplies are held constant at the 46,809 afy. Demands are expected to grown at a 0.32 percent annually culminating at 43,993 afy by 2030. Under this scenario, the City can expect to balance supply and demand each year between 2010 and 2030. As shown in Table 6-2, supply exceeds demand in all years because the City's WSAP allocation is substantially greater than current demand and projected demand. Diminishing surpluses are projected over the same 20-year period.

Table 6-2: Supply and Demand Comparison with Base Year Supply and 2009 Demand (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	46,809	46,809	46,809	46,809	46,809
Water Demand[b]	41,267	41,933	42,608	43,295	43,993
Difference (Surplus/Deficit)	**5,542**	**4,876**	**4,201**	**3,514**	**2,816**

Notes:
a. Tables 4-9 and 4-10 Projected WSAP Base Year Supplies
b. Table 5-9 Demand Projections without Water Conservation
Developed by PBS&J for long-term water supply planning, January 2010.

Table 6-3 shows the comparison of anticipated supply and calculated demand over the next 20 years based on WSAP allocations. The table shows the projected water demand beginning with the 5-year average demand and then applies the 0.32 percent growth rate to achieve an estimated demand in 2030. Within the City, an increase in demand of 2,911 afy is anticipated between 2010

34 Comprehensive Water Demand Discussion, Appendix X.

and 2030 as shown on the Demand line. Demand is expected to grown at a 0.32 percent annually culminating at 46,995 afy by 2030. Under this Base Year supply and 5-Year Average Demand scenario, the City can expect supplies to exceed demand each year between 2010 and 2025 with diminishing surpluses in each 5-year increment. As shown in Table 6-3 demand is projected to outstrip supply in 2030. In this case, the City would need to pump additional groundwater supply above the 62 BPP (Under the current BEA, OCWD allows pumping above the current BPP at cost equal to Metropolitan's imported water rate) or implement more water conservation measures and strategies in order to balance supply and demand. A discussion of Conservation savings is presented later in this section.

Table 6-3: Supply and Demand Comparison with Base Year Supply and 5-year Demand Average (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	46,809	46,809	46,809	46,809	46,809
Water Demand[b]	44,084	44,794	45,516	46,250	46,995
Difference (Surplus/Deficit)	**2,725**	**2,015**	**1,293**	**559**	**-186**

Notes:
a. Tables 4-9 and 4-10 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
Developed by PBS&J for long-term water supply planning, January 2010.

6.1.3.2 WSAP Stage 2 Supply and 2009 Demand Comparison

As shown in the Section 5.1, demand is expected to increase as a result of population growth in the City. Table 6-4 shows the comparison of anticipated supply and calculated demand over the next 20 years. Demand is expected to grow at 0.32 percent annually culminating at 43,993 afy by 2030. Within the City, an increase in demand of 2,726 afy is anticipated between 2010 and 2030 as shown on the Demand line in Table 6-4. In that same time period, beginning in 2009 under the WSAP Stage 2 supply allocations will be reduced to 44,470 afy or 90% of Base Year supplies (Table 4-11). With this understanding, as shown in Table 6-4, supply exceeds demand in all years because the City's WSAP allocation is greater than current demand and projected demand over the 20-year planning horizon. Diminishing surpluses are projected over the same 20-year period.

Table 6-4: Supply and Demand Comparison with WSAP Stage 2 Allocation and 2009 Demand (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	44,470	44,470	44,470	44,470	44,470
Water Demand[b]	41,267	41,933	42,608	43,295	43,993
Difference (Surplus/Deficit)	**3,203**	**2,537**	**1,862**	**1,175**	**477**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
Developed by PBS&J for long-term water supply planning, January 2010.

6.1.3.3 WSAP Stage 2 Supply and 5-year Average Demand Comparison

For water supply planning purposes, based on Table 5-9 demands are expected to increase as a result of population growth in the City. Table 6-5 shows the comparison of anticipated supply and calculated demand over the next 20 years. Within the City, an increase in demand of 2,911 afy is anticipated between 2010 and 2030 as shown on the Demand line in Table 6-5. In that same time period, beginning in 2009 under the WSAP Stage 2 supply allocations will be reduced to 44,470 afy

or 90% of Base Year supplies. Demands are expected to grow at 0.32 percent annually culminating at 46,995 afy by 2030. Demand would outstrip supply as early as 2015. With this understanding, the City can anticipate a supply deficit in each year between 2015 and 2030. As shown in Table 6-5 the supply deficit is the difference of all demands subtracted from the anticipated supplies.

Table 6-5: Supply and Demand Comparison with WSAP Stage 2 Supply and 5-year Demand Average (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	44,470	44,470	44,470	44,470	44,470
Water Demand[b]	44,084	44,794	45,516	46,250	46,995
Difference (Surplus/Deficit)	**386**	**-324**	**-1,046**	**-1,780**	**-2,525**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
Developed by PBS&J for long-term water supply planning, January 2010.

6.1.3.4 WSAP Stage 3 Supply and 2009 Demand Comparison

Additional dry year imported water curtailments could occur as well. As shown in Table 6-6 with WSAP Stage 3 reductions there will be greater supply reductions in all years for current and planned development under these conditions. Assuming Metropolitan could continue to curtail imported water to WSAP Stage 3 or 85% of Base Year Allocation there will be sufficient supply in years 2010 - 2025 for existing customers, current and planned development. Diminishing surpluses are projected over the same 20-year period. However, as shown in Table 6-6 the City can anticipate a supply shortfall of 248 acre-feet in 2030 as a result of reduced imported supplies. In this case, as stated above, the City would need to pump additional groundwater supply above the 62 BPP (Under the current BEA, OCWD allows pumping above the current BPP at cost equal to Metropolitan's imported water rate) or implement more water conservation measures and strategies in order to balance supply and demand. A discussion of Conservation savings is presented later in this section.

Table 6-6: Supply and Demand Comparison with WSAP Stage 3 Allocation and 2009 Demand (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	43,745	43,745	43,745	43,745	43,745
Water Demand[b]	41,267	41,933	42,608	43,295	43,993
Difference (Surplus/Deficit)	**2,478**	**1,812**	**1,137**	**450**	**-248**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
Developed by PBS&J for long-term water supply planning, January 2010.

It should be noted that this assumes the WSAP supplies from Metropolitan remain at or above Stage 3, as stated previously because of the multiple challenges facing Metropolitan further reductions could occur and imported supplies could be less. As of December, DWR has declared that SWP deliveries will be 5 percent of normal for water year 2009/2010. DWR's late fall SWP delivery estimates generally underestimate annual deliveries, in October 2008, DWR stated that SWP deliveries were expected at about 10 to 15 percent of normal year supplies, by late spring 2009 after DWR adjusted the delivery amount to 40 percent of normal. DWR's first snow survey for winter 2010 indicated snow levels at 86 percent of normal years.

6.1.3.4 WSAP Stage 3 Supply and 5-Year Demand Comparison

As shown in Table 6-7, for conservative water planning purposes, if demand in the City returns to pre-WSAP demand conditions (i.e. 43,942 afy), and Metropolitan reduces imported water supplies, the City can expect demand to outstrip supply in all years beginning in 2015 and extending to 2030. As early as 2010, demand exceeds supply by 339 afy, in 2015, demand exceeds supply by 1,049 afy and by 2030 the difference increases to 3,250 afy. As shown in Table 6-7, based on the anticipated shortfall, the City would need to increase its conservation measures and return demand levels shown in Table 6-6 above. It is possible that additional groundwater extractions within the BEA could overcome the supply deficit; however, by 2030, the increasing extraction rates by 3,250 may not be within OCWDs preferred groundwater management plan and consultation with OCWD staff would be necessary. Conservation measures identified later in this section would reduce demand

Table 6-7: Supply and Demand Comparison with WSAP Stage 3 Supply and 5-year Demand Average (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	43,745	43,745	43,745	43,745	43,745
Water Demand[b]	44,084	44,794	45,516	46,250	46,995
Difference (Surplus/Deficit)	**-339**	**-1,049**	**-1,771**	**-2,505**	**-3,250**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-9 Demand Projections without Water Conservation
Developed by PBS&J for long-term water supply planning, January 2010.

6.1.3.5 Supply and Demand Comparison with Supplemental Pumping

In the event Metropolitan changes the WSAP to Stage 3 and curtails import water supplies to its customers. Santa Ana could pump additional supplies from the Orange County Basin under the BEA that allows increased pumping to occur, although the cost of these supplemental supplies come at rates similar to those of Metropolitan supplies. These supplies can be used to offset the supply deficits that could occur in 2030. The City would need to pump an additional 248 afy to meet demand in 2030. Table 6-8 shows a supply and demand balance that can be achieved through additional groundwater pumping.

Table 6-8: Supply and Demand Comparison with WSAP Stage 3 Allocation and 2009 Demand (acre-feet/year)

	2010	2015	2020	2025	2030
Existing Water Supply[a]	43,745	43,745	43,745	43,745	43,745
Supplemental Groundwater Supply[c]	0	0	0	0	248
Supply Total	43,745	43,745	43,745	43,745	43,993
Water Demand[b]	41,267	41,933	42,608	43,295	43,993
Difference (Surplus/Deficit)	**2,478**	**1,812**	**1,137**	**450**	**0**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
c. Table 6-6 Supply and Demand Comparison with WSAP Stage 3 Allocation and 2009 Demand
Developed by PBS&J for long-term water supply planning, January 2010.

As shown in Table 6-9, in the event Metropolitan changes the WSAP to Stage 3 and curtails import water supplies to its customers. The City would need to pump an additional 1,049 afy in 2015, 2,505 afy by 2020 and up to 3,250 afy to meet demand in 2030. Table 6-9 shows a supply and demand balance that can be achieved through additional groundwater pumping.

Table 6-9: Supply and Demand Comparison with WSAP Stage 3 Supply and 5-year Demand Average (acre-feet/year)

	2010	2015	2020	2025	2030
Water Supply[a]	43,745	43,745	43,745	43,745	43,745
Supplemental Groundwater Supply	339	1,049	1,771	2,505	3,250
Supply Total	0	44,794	45,516	46,250	46,995
Water Demand[b]	44,084	44,794	45,516	46,250	46,995
Difference (Surplus/Deficit)	**0**	**0**	**0**	**0**	**0**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
c. Table 6-7 Supply and Demand Comparison with WSAP Stage 3 Allocation and 2009 Demand
Developed by PBS&J for long-term water supply planning, January 2010.

6.2 City Policy, Water Efficiency and Conservation Measures

Water conservation can play a significant role in ensuring that the City will meet its future water demands. Water conservation has been shown to reliably reduce water demands; thereby, extending existing water supplies and reducing the need for new supplies. This conservation is realized through hardware (water efficient fixtures), irrigation and landscape design, and behavioral changes in water use of residents and other customers.

Over the last ten years the citywide demands have decreased as shown in Table 5-3. The average annual demand over the period was 46,576 afy. The average annual demand over the most recent 5-year period was 43,942 afy. Demand in 2009 was 41,136 acre-feet – some of these decreases could be contributed to conservation measures, economic downturn and population slowdowns.

6.2.1 City Policy: Conservation of Public Water Supply

The City has a Conservation of Public Water Supply codified in Municipal Code Chapter 39, Article 6 39.84 - 39.109. Califomia Water Code Section 375 et seq. permit public entities, which supply water at retail to adopt and enforce a water management program to reduce the quantity of water used by the people therein for the purpose of conserving the water supplies of such public entity. The City Council established Conservation of Public Water Supply pursuant to California Water Code Section 375. (Appendix H Water Shortage Contingency Plan from the 2005 UWMP)

Santa Ana's 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.[35]

35 City of Santa Ana, 2005 UWMP p. 7-1 – 7-3.

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 to implement the appropriate phase of the EWCP. 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 City's code.[36] As defined in Chapter 39.105 - 39.108 of the City's Municipal Code, the city council shall make findings of shortage and declare the applicable water conservation phase by resolution. As discussed previously, Metropolitan has enacted its WSAP and is operating under Stage 2 delivery reductions to manage water supplies in its service area. In response, Santa Ana pursuant to Municipal Code Chapter 39, Article 6 – 39.84 – 39.109 is operating under the following permanent water conservation requirements shown in Table 6-10. The table reflects the requirements and prohibitions contained the City's Updated Water Conservation Ordinance. (Appendix J)

On April 20, 2009 the City Council of Santa Ana unanimously adopted the Conservation of Public Water Supply Ordinance NS-2781. (Appendix H Water Conservation Ordinance NS-2781)

Table 6-10: City of Santa Ana Permanent Water Conservation Requirements

No Washing-Down of Hard or Paved Surfaces: except when necessary to alleviate safety or sanitary hazards, and only when using a hand-held hose, equipped with a positive self-closing water shut-off device.	Limits on Watering Hours: lawn and landscape irrigation is prohibited between the hours of 9:00 a.m. and 6:00 p.m., except by using a water shut-off nozzle for a very short period of time.	Limits on Washing Vehicles: using water to wash or clean any automobile, truck, van, motorcycle, boat, or trailer is prohibited, except when using a hand-held hose equipped with a positive self-closing water shut-off device.
No Excessive Water Flow or Runoff: watering or irrigating lawns and landscapes that cause excessive water flow or runoff onto an adjoining sidewalk, driveway, street, alley, or gutter is prohibited.	Commercial Lodging Establishments Must Provide Guest Option to Decline Daily Linen Laundering.	Commercial Car Wash systems: effective January 1, 2012, all commercial conveyor car wash systems must have installed operational re-circulating water systems.
Restaurants are to Use Water Conserving Dish Wash Spray Valves.	Re-circulating Water Required for Water Fountains and Decorative Water Features.	Drinking Water Served Upon Request Only
No Installation of Single Pass Cooling Systems: all single pass cooling systems are prohibited in buildings requesting new water services.	Obligation to Fix Leaks, Breaks: water loss through leaks, breaks, and malfunctions shall be repaired within 72 hours after discovery of such loss.	

Source: City of Santa Ana Updated Water Conservation Ordinance, April 2009. Appendix J

6.2.2 Urban Water Management Planning Act (Water Code Section 10632)

As stated previously, pursuant to the Urban Water Management Planning Act (Water Code Section 10632), water suppliers with an existing dry year shortage contingency plan can implement subsequent stages of demand reduction measures listed in its UWMP as a strategy to balance supply and demand. The EWCP, contained in Section 7 of the 2005 UWMP is the dry year shortage contingency plan that allows the City to reduce water deliveries to customers and implement demand reductions during periods of water shortage. Therefore, to overcome the potential 248-afy supply deficit expected in 2030 under WSAP Stage 3, the City would follow its adopted water shortage contingency plans (EWCP) to implement drought-planning sequences that initiate different levels of water delivery reduction rationing relative to delivery of imported supplies. These delivery reductions within its service area allow the City to balance supply and demand over an extended period.

36 City of Santa Ana, 2005 UWMP p. 7-1 – 7-3.

6.2.3 Water Conservation Measures

As Signatory to the Memorandum of Understanding (MOU) with the California Urban Water Conservation Council (CUWCC), the City has committed to a good faith effort in implementing the 14 cost-effective Best Management Practices (BMPs) or Demand Management Measures (DMM). "Implementation" means achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in each DMM's definition, and to satisfy the commitment by the signatories to use good faith efforts to optimize savings from implementing DMM's as described in the MOU. A DMM as defined in the MOU is a "practice for which sufficient data are available from existing water conservation practices to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water agencies to carry out."

6.2.4 Demand Management Measures

As signatory to the MOU, the City has committed to use good-faith efforts to implement the 14 cost-effective BMPs established by the CUWCC. The 14 BMPs include:

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

The City works cooperatively with Metropolitan and OCWD for technical and financial support needed to facilitate meeting the terms of the MOU.

6.2.5 Necessary Water Conservation

Optimization of the conservation programs or strategies listed above will reduce demands throughout the City's service area. Water efficient fixtures in new developments, landscape and design improvements, and indoor fixture replacements and retrofits at existing connections would reduce indoor demands. In new developments this could be as high as 40 percent. In general, outdoor irrigation demands exceed indoor demands, for this reason, the City should focus its

conservation efforts on reducing outdoor irrigation demands by requiring drought-tolerant landscaping at new developments, such as this project, replacing the existing high water use landscaping throughout the City and encouraging replacement or installation of drought-tolerant landscaping at residential connections. As presented in Table 6-11 additional conservation efforts in the City's EWCP are above and beyond those listed in the DMMs—depending on the BPP—these conservation measures could effectively balance the supply and demand under the projected supply deficit in 2030. The table illustrates the level of water savings that can be achieved with continued conservation and additional modest conservation programs and strategies.

Table 6-11: WSAP Stage 3 Supplies and 2009 Demand with Conservation Achieved (acre-feet/year)

	2010	2015	2020	2025	2030
Conservation Needed	**0%**	**0%**	**0%**	**0%**	**0.6%**
Existing Water Supply[a]	43,745	43,745	43,745	43,745	43,745
Water Demand with Conservation	41,267	41,933	42,608	43,295	43,745
Difference (Surplus/Deficit)	**Surplus**	**Surplus**	**Surplus**	**Surplus**	**0**

Notes:
a. Table 4-11 Projected WSAP Base Year Supplies
b. Table 5-10 Demand Projections without Water Conservation
c. Table 6-6 Supply and Demand Comparison with WSAP Stage 3 Allocation and 2009 Demand
Developed by PBS&J for long-term water supply planning, January 2010.

If the City chooses to boost its conservation programs, consumption reductions would have a long-term benefit to the Orange County Basin.

Upon implementation of various conservation measures, the City can balance supply and demands. Empirical evidence reported by other jurisdictions indicates that upon request for conservation, consumers in these service areas have responded positively and these jurisdictions have achieved 20 to 25 percent water savings.[37] Notably, if demands return to pre-2009 levels a higher level of conservation would be necessary.

37 City of South San Francisco, 2005 Urban Water Management Plan, p. 41.

7.0 Summary of Analysis

On a regional level, over the 20-year period ending in 2030, an increase in demand by at least 50,000 afy[38] is anticipated for the entire Orange County Basin and service area. Dry year demands on the groundwater basin may increase as part of conjunctive use programs when surface water diversions are curtailed, but average groundwater demands are expected to remain below the sustainable yield of the basin. Current projections based on the most reasonably available data from Metropolitan indicates the regional supplies (import water) in all hydrologic years are insufficient to meet projected demands within the South Coast Hydrologic Region as a whole.

This is primarily, due to SWP cutbacks related to the protection of the threatened Delta smelt and other salmonid species and year three of the statewide drought. If dry years prevail, further import water reductions could be necessary, at this point Metropolitan would adjust its supply allocations to WSAP Stage 3. However, a solution to compensate for reduction in imported supply can be achieved by pumping within the BEA restriction, currently set at two (2) percent above BPP, at a cost essentially the same as the water rate purchased through Metropolitan. This additional pumping can provide sufficient water for anticipated growth in Santa Ana. In addition, conservation measures listed in the City's EWCP can reduce citywide demand and balance supply in years with potential supply shortfalls.

Notably, the statewide water supply situation is subject to change annually and could return to normal or above-normal year precipitation in the near-term and then extend over many years. This assumes that water year history will repeat itself and these cyclical wet hydrologic periods return. In addition, forthcoming case law or new pumping strategies could lift the SWP pumping restrictions; thereby, returning the system to firm delivery capacity.

The proposed TZC project is estimated to require a net increase of 1,125 afy at build-out. Within the context of the City's projected demands through 2030, this represents 2.6 percent of total anticipated demands in the City. Further, the net increase of 131 afy accounts for 4.3 percent of anticipated growth in water demand between 2010 and 2030 (131 afy/3,000 afy). The proposed TZC project's demands will be served through supplies from the Orange County groundwater basin managed by OCWD and imported water available from Metropolitan. As stated above, under the current supply situation, due to cutbacks in the SWP and reduced groundwater pumping - in all hydrologic years including single and multiple dry years, supplies will be sufficient now and over next 20 years as shown in Section 6. It should be noted as shown in Table 6-6 in Section 6, if Metropolitan changes the WSAP to Stage 3, this WSA assumed that supplies would be further reduced and the City could anticipate a supply shortfall in 2030.

As discussed in Section 6, if WSAP Stage 3 is implemented, the City could utilize the 2 percent BEA and pump additional supplies to meet demand in 2030. This would reduce reliance on imported supplies, and eliminate the City's contribution to Metropolitan's regional demand, which has benefits for the City, as it reduces reliance on SWP supplies via Metropolitan, it lessens impacts to Delta smelt and other salmonid species. Santa Ana could also implement subsequent phases on its ECWP to reduce demand and overcome the potential supply shortfall.

This WSA concludes that the City has adequate supplies based on water supplies delivered through Metropolitan and pumped from wells in the Orange County Basin to meet demand in all years with the exception of a potential shortfall occurring in 2030 under a multiple dry-year event if imported supplies are further reduced under Metropolitan's WSAP Stage 3. In the event of a supply shortfall,

38 Comprehensive Water Demand Discussion, Appendix X.

the City, through its EWCP can impose water saving conservation measures and subsequent stages of demand reductions to balance demand against reduced supplies.

7.1 WSA Findings

Regarding the availability of water supplies to serve the proposed project, beginning in 2010 the City finds as follows:

- In years of normal and above-normal precipitation the City has adequate supplies to serve 100 percent of normal, single dry and multiple dry year demand up to 2030.
- In dry-year events commencing in 2030, if Metropolitan imposes WSAP Stage 3 reductions, the City has in place the EWCP to balance supply and demand.
- With the EWCP in place, the City finds it has sufficient water supplies available to serve its customers including the demand of the proposed project, and existing and planned future uses.

8.0 References

1. Billings, Bruce R. and C. Vaughn Jones. 1996. *Forecasting Urban Water Demand*. American Water Works Association.
2. California Department of Water Resources. October 2003. *Guidebook for Implementation of SB 610 and SB 221 of 2001*, 2003.
3. California Department of Water Resources, Bay-Delta office. 2005. The State Water Project Delivery Reliability Report.
4. California Department of Water Resources. 2003. California's Groundwater: Bulletin 118 – Update 2003.
5. California Department of Water Resources. Accessed September 2007. Background: Droughts in California. http://watersupplyconditions.water.ca.gov/background.cfm.
6. City of Santa Ana. 1982. *General Plan*.
7. City of Santa Ana. November 2005. *Urban Water Management Plan*.
8. City of Santa Ana. 2007. *Santa Ana Transit Zoning Code (SD84A and SD84B)*.
9. County of Orange. 2004. *General Plan*.
10. EIP Associates. January 2006. *Draft Program Environmental Impact Report for Orange County Water District Long-Term Facilities Plan and Annexations.*
11. Irvine health Foundation. Accessed September 2007. About Orange County. http://www.ihf.org/about/aboutoc.htm.
12. Izbicki, John A. et al. 2001. Stormflow Chemistry in the Santa Ana River below Prado Dam and at the Diversion Downstream from Imperial Highway, Southern California, 1995-98. United States Geologic Survey. Water Resources Investigation Report 00-4127.
13. Lebow, Ruth. Accessed September 2007. Southern California Climate. http://www.lalc.k12.ca.us/target/fragile_habitats/climate.html.
14. Metropolitan Water District of Southern California. November 2005. *The Regional Urban Water Management Plan.*
15. Metropolitan Water District of Southern California. August 31, 2007. News Release.
16. Metropolitan Water District of Southern California. November 20, 2007. Board of Directors: Water Planning and Stewardship Committee. Board Meeting on Draft Shortage Allocation Plan.
17. Municipal Water District of Orange County. December 2005. *Urban Water Management Plan*.
18. Orange County Water District. Revised January 2003. *Orange County Water District Act.*
19. Orange County Water District. March 2004. *Groundwater Management Plan.*
20. Orange County Water District. September 2005. *Long-Term Facilities Plan.*
21. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2007-2008.
22. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2005-2006.

23. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2004-2005.
24. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2003-2004.
25. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2002-2003.
26. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2001-2002.
27. Orange County Water District. Engineer's Report on the groundwater conditions, water supply and basin utilization in the Orange County Water District 2000-2001.
28. Orange County Watersheds. Accessed September 2007. Introduction to Santa Ana River Watershed. http://www.ocwatersheds.com/watersheds/santaanariver.asp
29. Santiago Creek Watershed Preservation & Restoration Project. Accessed September 2007. Home page. http://www.santiagocreek.org.
30. United States Geological Survey. Accessed September 2007. Santa Ana Basin, National Water Quality Assessment Program. http://ca.water.usgs.gov/sana_nawqa/.