Appendix F Water Supply Assessment

Draft

City of Huntington Beach

Water Supply Assessment

for the proposed

Beach-Edinger Corridors Specific Plan

August 2009

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1.0 Introduction

This document, prepared for the City of Huntington Beach (City or Huntington Beach) regarding the proposed Beach-Edinger Corridors Specific Plan project (proposed project or BECSP), is a Water Supply Assessment (WSA) intended to satisfy the requirements of Senate Bill (SB) 610. 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 BECSP project site is located in the City of Huntington Beach in Orange County, California. The project site, which is the area described in the specific plan, extends along Beach Boulevard, from the Coastal Zone boundary in the south to Edinger Avenue, and along Edinger Avenue from Beach Boulevard westward to Goldenwest Street. The total acreage of the specific plan is approximately 459 acres.

Beach Boulevard runs roughly through the center of the City and is one of four arterial corridors in the City providing a continuous north-south connection between Pacific Coast Highway and Interstate 405 (I-405). Edinger Avenue runs due east-west and is one of only four City arterials that cross I-405. The portion of Edinger Avenue within the project site runs along the southern edge of Golden West College and the Bella Terra shopping mall and intersects with Beach Boulevard immediately south of the I-405 interchange. The regional and local contexts of the proposed project are shown in Figure 1-1.

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 Huntington Beach), and finally project-level analysis for the proposed BECSP. The report organization is as follows:

1) Introduction
2) General information on Water Supply Planning under SB 610
3) Regional and local land-use planning setting
4) Water supply – historical and projected
5) Water demands – historical and projected
6) Comparison of Supply and Demand with and without Conservation
7) Conclusion of Analysis
8) Plans for Obtaining Sufficient Supply – Local and Regional programs
9) Recommendations

The final WSA for this project must be approved by the City Council, and its conclusions incorporated into other environmental documents as necessary, including but not limited to the Environmental Impact Report (EIR), 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.

Source: Microsoft Streets and Trips, 2006.

FIGURE **1-1**

Project Vicinity and Regional Location Map

100000407 Beach-Edinger Corridors Specific Plan WSA

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1.1 City of Huntington Beach

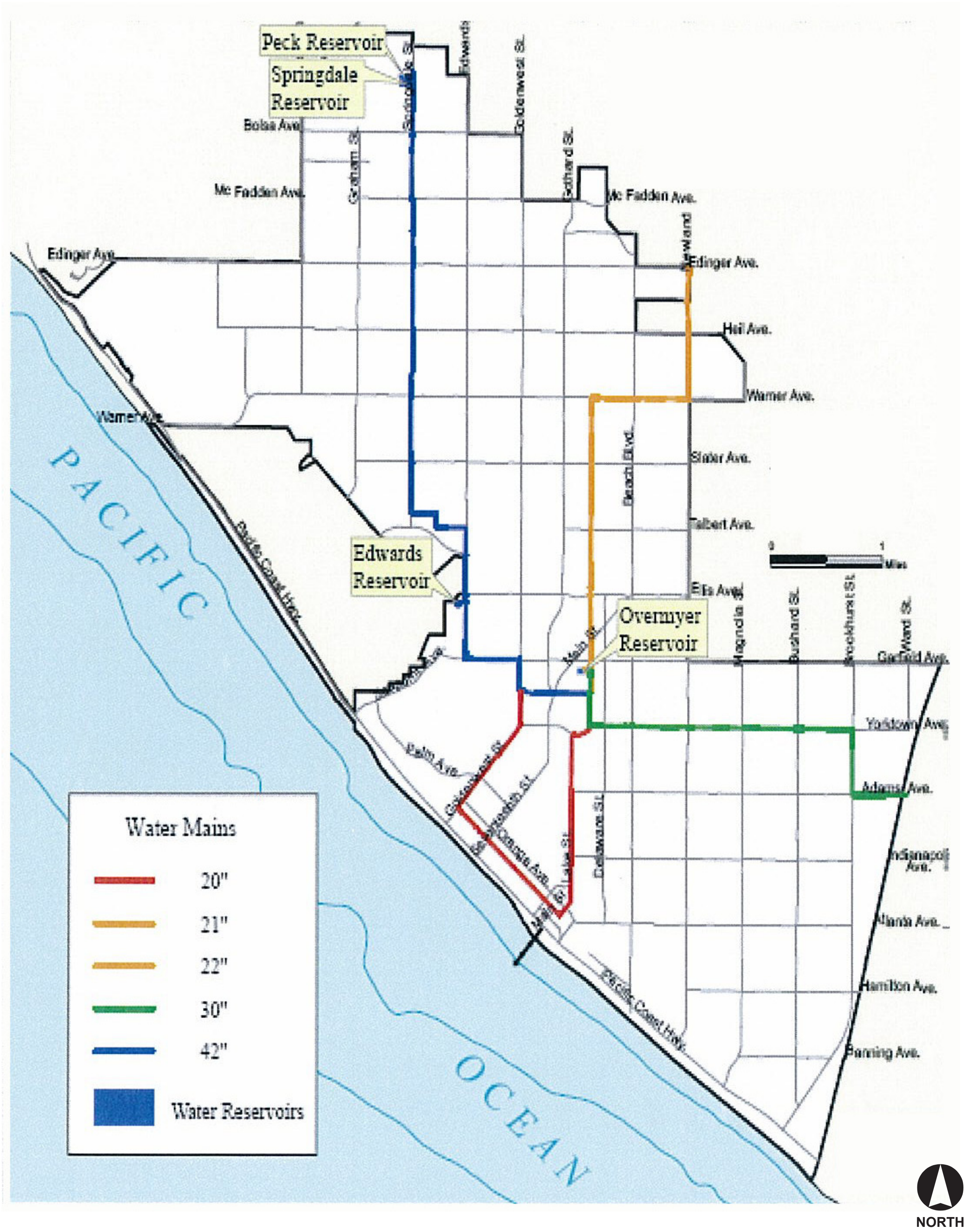
The City of Huntington Beach is the principal water retailer within the City boundaries and the Sunset Beach area of unincorporated Orange County. The water service area is consistent with the City's boundary (see Figure 1-2) and includes the Beach-Edinger Corridors Specific Plan area. Public Works Department (Public Works) is responsible for operating and maintaining wells, reservoirs, imported water connections, distribution pipelines, fire hydrants, water meters, and related infrastructure. In addition, Public Works also conducts comprehensive water quality testing and monitoring programs and develops long-range operational and engineering plans designed to prepare for future needs and contingencies.

The City of Huntington Beach utilizes imported water and groundwater to meet demands within its service area. The City is a retail provider of Metropolitan Water District of Southern California's (Metropolitan) imported water, which is wholesaled through the Municipal Water District of Orange County (MWDOC). Typically over one-third of the City's water supply comes from imported water wholesaled by Metropolitan through MWDOC. Imported water is treated by Metropolitan at its Robert B. Diemer Filtration Plant in northern Orange County and Joseph Jensen Filtration Plant in Granada Hills before the water is delivered to the City.

The City is also a member of 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. 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). 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. The BEA can be increased as needed to discourage production above the BPP. 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 is essentially the same rate as the import water rate purchased through MWDOC.

The City of Huntington Beach is 56.1 percent owner and acts as General Manager/Engineer for the West Orange County Water Board. The West Orange County Water Board is a joint powers agreement between the cities of Huntington Beach, Garden Grove, Westminster and Seal Beach for the ownership and operation of two large capacity turnouts (OC-9 and OC-35).

The City operates a water supply system currently consisting of ten wells, three imported water connections, four storage and distribution reservoirs, and a variety of transmission and conveyance facilities. Wells vary in depth from 306 feet to 996 feet and range in production from 500 gallons per minute (gpm) to 3,400 gpm. The total system capacity of the City's groundwater wells is 25,050 gpm. The City also maintains three imported water connections to the Metropolitan system.



***Source*:** City of Huntington Beach, 2005, *Urban Water Manangement Plan*.

FIGURE **1-2**

City of Huntington Beach Service Area

The City also operates four storage and distribution reservoirs with a combined capacity of 55 million gallons (MG). The storage system is supported with four booster stations located at the reservoir sites. The booster pumps have a total capacity of 58,690 gpm, which is adequate to keep the system pressurized under peak flow conditions.[1]

1.2 Beach-Edinger Corridors Specific Plan Project Description

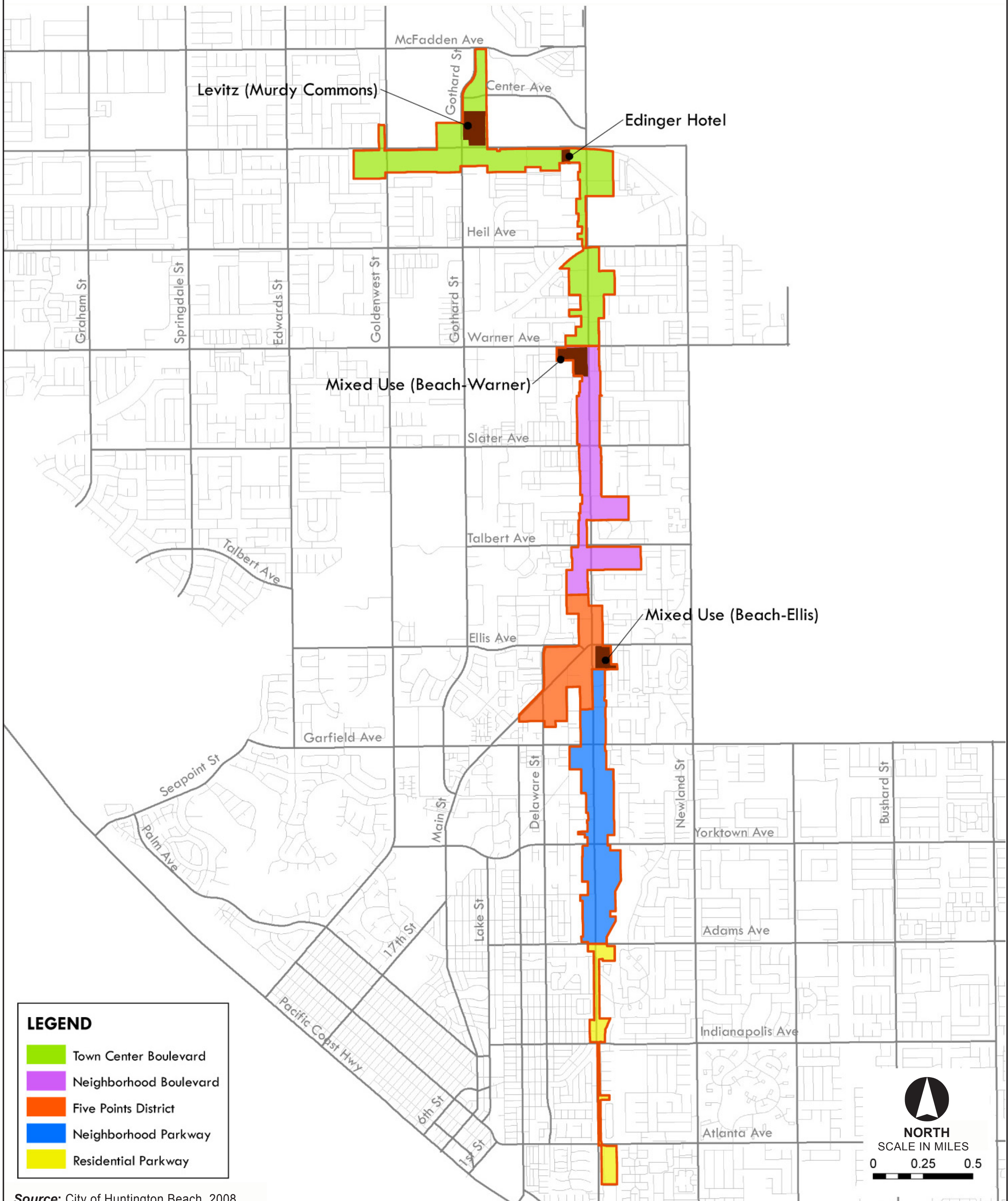
The overall vision for the Specific Plan area is to develop primarily residential and neighborhood retail uses in the southern portion of Beach Boulevard, transitioning to commercial and retail uses in the middle segment of Beach Boulevard, then to a more dense "town center" adjacent to and at the intersection of Beach Boulevard and Edinger Avenue. To the west along Edinger Avenue, mixed uses would be developed. Geographically, the intention is to intensify land uses as one travels north along Beach Boulevard from the southern boundary of the Study area, developing a town center concept at the major intersection of Beach Boulevard and Edinger Avenue. Individual development projects in the specific plan comprise the following projects: Edinger Hotel, Murdy Commons, Beach-Warner Mixed Use, and Beach-Ellis Mixed Use. Figure 1-3 shows the Beach-Edinger Corridors Specific Plan Map.

The Beach and Edinger Corridors are composed of 550 individual privately held properties, and six and a half miles of public rights-of-way owned by the City of Huntington Beach (in the case of Edinger Avenue) and the State of California (in the case of Beach Boulevard). The proposed land use changes and increase in development intensity would allow for additional growth within the corridors. The following information summarizes these geographic transition areas (also referred to as segments).

1.2.1 Beach Boulevard Corridor

1) **Residential Parkway** (*Beach Boulevard, between Adams south to the Specific Plan boundary*): Existing residential uses in this area would be preserved. Any infill and replacement development would primarily replicate and very subtly improve upon the existing pattern of uses.
2) **Neighborhood Parkway** (*Beach Boulevard, between Five Points Center and Adams Avenue*): The existing aging commercial strip development would gradually be replaced by primarily residential development oriented away from Beach Boulevard and toward perpendicular side streets. In addition to residential development, office, lodging, and neighborhood-serving retail would also be permitted.
3) **Five Points District** This development area occupies the half-way point between the beachfront and I-405, and is organized around the confluence of Beach Boulevard and Main Street/Ellis Avenue. The planning approach to this area is two-fold: 1) retain the Five Points community retail center and support its eventual intensification and mix; and 2) encourage the restructuring and revitalization of surrounding areas to enhance market focus and district appeal. The "Beach-Ellis Mixed Use" development project is located within this segment.

1 City of Huntington Beach. Urban Water Management Plan. 2005.



Source: City of Huntington Beach, 2008.

FIGURE **1-3**

Beach-Edinger Corridor Specific Plan Map

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4) **Neighborhood Boulevard** (*Beach Boulevard, between Warner Avenue and Five Points Center with Beach-Warner Mixed Use development*): The planning approach to this area is to facilitate long-term transition from strip retail to uses more focused on nearby populations. Neighborhood-serving and hospital-serving retail and services, corner/crossroads located retail, and office and office-medical would be encouraged. Infill residential uses would also be permitted throughout this segment. The "Beach-Warner Mixed Use" development project is located within this segment.

5) **Town Center Boulevard** (*Beach Boulevard between Warner Avenue and Edinger Avenue with Murdy Commons and Edinger Hotel*): A wide range of City-oriented retail and service uses would be supported to encourage gradual transition to a more pedestrian-oriented development pattern. While auto dealerships would be encouraged to remain and expand, future development adjacent to dealerships would promote the addition of housing and supporting retail and services to create a more walkable environment. Entitlements would be provided for mixed-use development to encourage a gradual increase in land use efficiency. The "Edinger Hotel and Murdy Commons" development projects are located within this segment.

1.2.2 Edinger Avenue Corridor

The Edinger Avenue Corridor generally encompasses the area between Beach Boulevard and Goldenwest Street and also includes development along Gothard Street to the north to McFadden Avenue. Development along this segment would be similar to the overall vision of the Town Center Boulevard segment described for the Beach Boulevard Corridor. An increasing number of buildings would feature multiple levels, as the area is intended to become a central City district. Overall, the entirety of the Edinger Avenue Corridor (including those areas that are not included within the Specific Plan boundaries) would be compact and clustered with a variety of land uses including retail, entertainment, civic, residential, office, and lodging. The majority of the Edinger Avenue Corridor is characterized as Town Center Boulevard; however, the parcels lining the eastern side of Gothard Street up to McFadden Avenue have different designations. All of the proposed Specific Plan designations along Edinger Avenue are described below.

1) **Town Center Boulevard** The Town Center Boulevard segment generally covers the properties located along Edinger Avenue itself (excepting the Town Center Neighborhood and Core Edge parcels described below). New development would be configured in a pattern that would make walking a viable option and would also accommodate a wider range of uses. New development on properties lining Edinger Avenue would typically feature a mixture of ground-level shops and services, with upper-level homes, offices, or hotel rooms. Each block of new development would feature a unique protected parking access lane with slow moving traffic and amenities that buffer the sidewalk from the central fast-moving center of Edinger Avenue. One of the specific development projects to be analyzed within the EIR is located in this segment (Edinger Hotel).

2) **Town Center Neighborhood** Within the Specific Plan boundaries, the Town Center Neighborhood designation include the parcels north of the Town Center Core Edge along Edinger Avenue, between Gothard Street and the Union Pacific Railroad right-of-way up to McFadden Avenue. This new neighborhood would feature the City's widest range of contemporary housing types and possibly a wide mixture of uses, all concentrated within walking distance of the Town Center's Core (i.e., Bella Terra, which is not within the Specific

Plan boundaries). A majority of one of the specific development projects is located within this area (Murdy Commons).

3) **Town Center Core Edge** The Town Center Core Edge includes the linear portion at the edge of the Town Center Neighborhood along Edinger Avenue between Gothard Street and the Union Pacific Railroad right-of-way (ROW). New development would feature ground-level retail, restaurant, and entertainment uses contiguous with those planned for the adjacent Village at Bella Terra. This Town Center Core Edge refers to a small portion of the specific development project called Murdy Commons.

1.2.3 BECSP Development Summary

The proposed land use changes and increases in development intensity would result in additional growth focused within each of the above-mentioned areas. The development standards and regulations that are contained in the Specific Plan would apply to new developments and additions of 15 percent or more that are proposed within the project site. The proposed land use changes and increase in development intensity would result in a substantial amount of growth focused within each of the above-mentioned areas. Existing uses would be allowed to remain and expand, regardless of the vision of the proposed project.

Overall, build-out of the Specific Plan (estimated at 2030) could result in the addition of up to 6,400 new dwelling units (DU), 738,400 sf of retail uses, 350 hotel rooms, and 112,000 sf of office uses. However, not all of this development would be considered net growth. In many cases, existing structures would be replaced or redeveloped with the new uses. In order to accommodate the proposed development, it is estimated that approximately 1,400,000 sf of existing commercial development within the Specific Plan (or approximately 32 percent of existing development) would be demolished and renovated. Table 1-1 outlines the projected development scenario over the short- and long-term.

Table 1-1: BECSP Development Summary

Street/Street Segment	Short Term			Long Term				Total			
	DUs	Retail SF	Hotel Rms	DUs	Retail SF	Hotel Rms	Office SF	DUs	Retail SF	Hotel Rms	Office SF
Edinger Ave.	1,660	60,000	150	1,040	146,000	—	—	2,700	206,000	150	—
Beach Boulevard											
Town Center Blvd.	—	—	—	800	114,400	—	—	800	114,400	—	—
Neighborhood Blvd.	300	11,000	—	150	87,000	—	112,000	450	98,000	—	112,000
Five Points District	400	75,000	—	1,100	42,500	—	—	1,500	117,500	—	—
Neighborhood Parkway	100	25,000	—	650	162,500	—	—	750	187,500	—	—
Residential Parkway	—	—	—	200	15,000	200	—	200	15,000	200	—
Beach Subtotal	800	111,000	—	2,900	421,000	200	112,000	3,700	532,400	200	112,000
Total	***2,460***	***171,000***	***150***	***3,940***	***567,400***	***200***	***112,000***	***6,400***	***738,400***	***350***	***112,000***

Source: City of Huntington Beach, Written communication via email with Mary Beth Broeren. February 11, 2009.

2.0 Water Supply Planning

California has many different processes through which to plan for development or maintenance of water supplies on a 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 some degree of regional planning of water supply and demand.

To complement these large-scale planning processes, the California State Senate passed SB 610 and SB 221 in 2002, which emphasize the incorporation of water supply and demand analysis at the earliest possible stage in the planning process for projects. These legislations primarily apply to the planning of water supplies and sources for individual subdivision projects and are completed at the time the project is being proposed and permitted. 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. SB 221, which requires completion of a Water Supply Verification (WSV), amended Section 65867.5 and added Sections 66455.3 and 66473.7 to the Government Code.[2]

2.1 Water Supply Planning Under SB 610 and SB 221

As the public water system that will supply water both existing and future customers with the City boundaries and the Sunset Beach area of unincorporated Orange County, the City of Huntington Beach is required to adopt WSAs and WSVs under the requirements of SB 610 and SB 221 and the Government Code (Sections 65867.5, 66455.3 and 66473.7). There are four primary areas to be addressed in a WSA:

1) All relevant water supply entitlements, water rights, and water contracts;
2) A description of the available water supplies and the infrastructure, either existing or proposed, to deliver the water;
3) An analysis of the demand placed on those supplies, by the project, and relevant existing and planned future uses in the area; and
4) If supplies are found to be insufficient, the WSA must include plans to obtain sufficient supplies to serve the project, and relevant existing and planned future uses within the service area. In addition to these items, WSVs incorporate more detailed confirmation that the appropriate infrastructure planning and funding is in place to fully commit water supplies to a project.

Senate Bill 610, which is applicable to 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 an 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. Not all water providers who must prepare a WSA under SB 610 are required to prepare an UWMP.

2 Department of Water Resources, Guidebook for Implementation of SB 610 and SB 221 of 2001, 2003.

Pertinent to this WSA for the proposed project, including all other projects to be served by the City of Huntington Beach, are the provisions under SB 610 that involve documentation of supply if groundwater is to be used as a source. In general, approximately two-thirds of the City's water supply comes from groundwater wells accessing the Orange County Basin. supplies from groundwater. Regional documents, including the OCWD's GMP, OCWD's Long-Term Facilities Plan (LTFP), 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. Appendix A contains the comprehensive discussion of surface and groundwater supplies.

The SB 610 WSA process involves responding to 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 of Huntington Beach has determined that the project is subject to CEQA. However, since projected water use analysis based on projected population increase by 2030 far exceeds the amount of projected water use by BECSP, or the sum of various pre-evaluated projects (refer to Appendix B), including demands from the Downtown Specific Plan Update project, various pending development projects, and yet to be identified development projects, the conclusions and recommendations from this WSA are applicable to other projects beyond the BECSP. The information contained in this assessment will be used to inform and support the EIR for the BECSP 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 (sf) of floor space;
3) A commercial building employing more than 1,000 persons or having more than 250,000 sf 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 sf 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 BECSP project (see Table 5-5) proposes a net residential growth of 6,400 DU, exceeding the residential threshold of 500 DU, as well as a net commercial growth of 850,400 sf,[3] which exceeds the commercial threshold of 250,000 sf; for these reasons, the proposed project is subject to SB 610.

2.1.3 "Is there a water supplier with jurisdiction over the subdivision?"

The third step in the SB 610 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 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 of Huntington Beach is a public water supplier with over 52,000 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 project.

2.1.4 "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 BECSP project. 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. Appendix A contains the comprehensive discussion of groundwater supplies.

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.

3 Does not include 473,497 sf of landscaping and right-of-ways. Total commercial combined is approximately 1.32 million sf.

- 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.

2.1.5 "Are there sufficient supplies to serve the project over the next twenty Years?"

The fourth step in the SB 610 process is to prepare the actual 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 projected to build-out in 2030. The supply and demand comparisons are included in Section 6.0.

2.1.6 "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:

1) The estimated total costs, and the proposed method of financing the costs, associated with acquiring the additional water supplies.
2) 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.
3) 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, population changes and housing considerations for the City of Huntington Beach.

3.1 City of Huntington Beach

3.1.1 2008 Land Use Element

The 2008 Land Use Element Update of the City's General Plan 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 Plan.

Ninety-eight percent of the City is developed; consequently, the goals and policies of the Land Use Element largely focus on the conservation, maintenance, and rehabilitation of existing property. In general, any new development will necessarily consist of redevelopment and infill development on the remaining vacant and/or underutilized parcels.

3.2 Beach-Edinger Corridors Specific Plan

The BECSP presents a plan for the long-term redevelopment of the Beach and Edinger Corridors, which have been divided into five informal districts. Geographically, the intention is to intensify land uses as one travels north along Beach Boulevard from the southern boundary of the Study area, developing a town center concept at the major intersection of Beach Boulevard and Edinger Avenue. As discussed previously, the overall vision for the Specific Plan is to develop primarily residential and neighborhood retail uses in the southern portion of Beach Boulevard, transitioning to commercial and retail uses in the middle segment of Beach Boulevard, then to a more dense "town center" adjacent to and at the intersection of Beach Boulevard and Edinger Avenue. To the west along Edinger Avenue, higher intensity mixed uses would be developed.

The Specific Plan will require a General Plan Amendment (GPA), Zoning Text Amendment (ZTA), and Zoning Map Amendment (ZMA) and result in changes to land use and development intensity and standards related to site layout, building design, and landscaping.

3.3 Relationship to the General Plan

The proposed BECSP implements the broad policies established in the City of Huntington Beach General Plan to guide growth and change along the Beach Boulevard and Edinger Avenue Corridors. The Development Code contained within the BECSP would replace previous land use and development regulations contained within the Huntington Beach Zoning and Subdivision Ordinance for these portions of the City.

The proposed Specific Plan would ultimately allow mixed-use and stand-alone residential development in an area of the City that was not previously designated to permit such uses. As stated previously, Huntington Beach is almost fully developed. Through implementation of the proposed project, it is the City's intent to effectively redistribute the overall residential growth that was originally identified in the General Plan to other areas of the City. However, the City is not undertaking associated efforts to preclude or reduce the amount of residential growth that is currently allowed elsewhere in the City.

The City's increase in residential growth since 1990 is well below the 18,500 units that were identified as the buildout limit (General Plan Policy LU 2.1.4). According to the General Plan EIR (Table PD-1) the City's 1990 level of housing was 74,179 units. For comparison purposes, the California Department of Finance (DOF) identified the City's 1990 level of housing at 72,736 units[4]—a difference of 1,443 units. The EIR, that this WSA supports, relies on the 1990 data provided in the General Plan EIR because the document provides build-out scenarios (based on the 74,179 units) utilizing the 18,500 units as directed in the General Plan.

Between 1990 and 2008, approximately 5,000 units were constructed in the City. However, accounting for demolitions, the net increase in residential growth within this timeframe is closer to 3,828 units,[5] which is far from the build-out capacity of 18,500 units identified in the General Plan. Additionally, past residential projects have not reached the full size allowed under the General Plan for those sites. In fact, many of the residential projects have only been developed to 70 percent of the total allowable size, and based on this information; it does not appear that the City would reach its growth potential within the time frame previously anticipated. Full build-out of the 6,400 DU included in the proposed BECSP would capture less than half of the remaining anticipated residential growth in the City. Consequently, while the City does not anticipate subsequent re-zoning of other areas to reflect the redistribution intent, the project would not necessarily represent an increase in housing above what was projected in the General Plan build-out scenario. Moreover, the City's General Plan land use policy would prevent that from occurring.

3.4 Population Evaluation and Housing Considerations

Data from the United States Bureau of the Census (U.S. Census) (American Community Survey), the DOF, the Southern California Association of Governments (SCAG), and the City of Huntington Beach 2008–2014 Housing Element of the General Plan (Housing Element) were used to prepare this discussion as it relates to population and housing within Huntington Beach and 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.

4 California Department of Finance (DOF). 2007. E-8 Historical Population and Housing Estimates for Cities, Counties and the State, 1990-2000. Sacramento, California. August.

5 Existing 2008 housing stock of 78,007 (DOF, E-5 Population and Housing Estimates) minus 1990 housing stock of 74,179 is equal to 3,828 units.

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 2008 DOF estimated population of 201,993[6] represents a 0.3 percent increase over the 2007 population of approximately 201,315. Table 3-1 shows the population growth in the City since 2000, using data derived from the DOF reflecting U.S. Census sources and population estimates. As identified, the City's average annual growth has steadily declined since 2000, with increases between 2007 and 2008 representing only a fraction of what occurred between 2000 and 2001.

Table 3-1: Population Growth: City of Huntington Beach (2000–2008)

Year	Population	Average Annual Growth (persons/year)
2000	189,627	—
2001	192,412	2,785
2002	194,781	2,369
2003	197,087	2,306
2004	198,831	1,744
2005	199,896	1,065
2006	200,608	712
2007	201,315	707
2008	201,993	678

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.

The 2004 SCAG Regional Transportation Plan (RTP) Update shows future population projections for Huntington Beach, 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).[7] (Appendix C)

Table 3-2: SCAG Population and Households Forecast for the City of Huntington Beach

	2005	2010	2015	2020	2025	2030
Population	200,349	212,957	217,822	220,892	222,569	224,788
Households	75,601	77,237	77,720	77,968	78,315	78,839

Source: SCAG 2008, Growth Forecast.

3.4.2 Households

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

6 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.

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

households and dwelling units also reflects population segments living in-group quarters such as board and care facilities, and those who are homeless.

Table 3-3 compares the number of households in the City of Huntington Beach for 2000 and 2008. The average household size in the City of Huntington Beach increased from 2.57 persons per household (pph) in 2000 to 2.66 pph in 2008, essentially a densification of pph.

Table 3-3: Households in Huntington Beach (2000–2008)

	2000	2008	2030 [c]
Households			
Huntington Beach	73,674	75,940	78,839
Average Household Size (pph)			
Huntington Beach	2.57[a]	2.66[b]	2.85 [c]

Notes: Household figures represent occupied housing units.
a. Calculated as a population of 189,627 in 2000 divided by 73,674 households.
b. Calculated as a population of 201,993 in 2008 divided by 75,940 households.
c. Calculated as a projected population of 224,788 in 2030 divided by 78,839 households in 2030 from Table 3-2 SCAG (Population and Households Forecast for the City of Huntington Beach).
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.

The average household size of 2.66 represents all occupied housing units in the City, including owner- and renter-occupied units. Implementation of the proposed BECSP 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. Accordingly, the average renter-occupied household size in the City of Huntington Beach was 2.50 pph in 2007.[8] Using the projected households and population data in Table 3-2, the household size in 2030 is estimated at 2.85 pph - more densification per household. However, these projections did not include households associated with the proposed project. Upon implementation of the proposed project the pph returns to 2.66 levels.

3.4.3 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 224,788, an increase of 22,795 over 2008 population numbers. This equates to an increase of approximately 0.0048 annually.

In terms of dwelling units, using DOF numbers, dwelling units in 2008 were 78,007. Going forward, SCAG projects 78,839 total housing units by 2030 but this did not include all 6,400 DU associated with the BECSP project. With the additional dwelling units proposed in the BECSP, housing units total approximately 84,407 (78,007 existing plus 6,400 units from BECSP).[9] Under this dwelling unit

8 American Community Survey. 2007. City of Huntington Beach Selected Housing Characteristics: 2005-2007.
9 A vacancy rate of 2.5 percent exists with the City, but for this analysis this information was removed from the data.

growth scenario, the City would increase its projected dwelling units by approximately 6,400 DU, which is full build-out of the project. This equates to a dwelling unit increase of approximately 0.0038 annually.

Although, the General Plan projected dwelling unit increases of 18,500 DU by 2030 (see Table 3-4) new development projects have reached only 70 percent of the dwelling units per project. As discussed above, since the 1990, the City has captured only 3,828 new DU because of the 5,000 constructed 1,172 were demolished or converted. This is the difference between 78,007 and 74,179 as shown in Table 3-4.

Table 3-4: Anticipated Housing Growth in Huntington Beach

1990 Housing Stock[a]	Existing (2008) Housing Stock[b]	Permitted General Plan Increase	Net # of DU built since 1990	Remaining allowable growth	Proposed build-out of Specific Plan	Exceedance
74,179	78,007	18,500	3,828	14,672	6,400	No

Notes:
a. Huntington Beach General Plan EIR. 1995. Table PD-1 Huntington Beach Draft General Plan Buildout.
b. 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.

As stated above, based on this information and patterns of development, it seems reasonable to assume that Huntington Beach would not reach the 18,500 DU projected in the General Plan. For the reasons presented here, this WSA uses the annual population increases culminating at 224,788 persons by 2030 as the more reasonable projection of growth in the City. The added benefit of utilizing this growth methodology is that it captures and includes all previously evaluated projects (refer to Appendix B), pending projects like the Downtown Specific Plan Update, various other 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 0.0048 annually to account for population increases due to densification within the city limits. Conversely, for conservative planning purposes, supplies are held constant according to the prescribed allocation rate. For example, Base Year supplies of 33,323 acre-feet per (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 are not proportional to population rate increases.

4.0 Water Supply

This section provides a water supply analysis on a regional scale including the service areas of Metropolitan and those agencies that make up the MWDOC. In Orange County, the groundwater basin is a shared resource, managed by OCWD; therefore, the District boundary defines the regional context for the following water supply analysis. See Appendix A for a Comprehensive Surface and Groundwater Discussion.

4.1 Imported Water Supply to the City

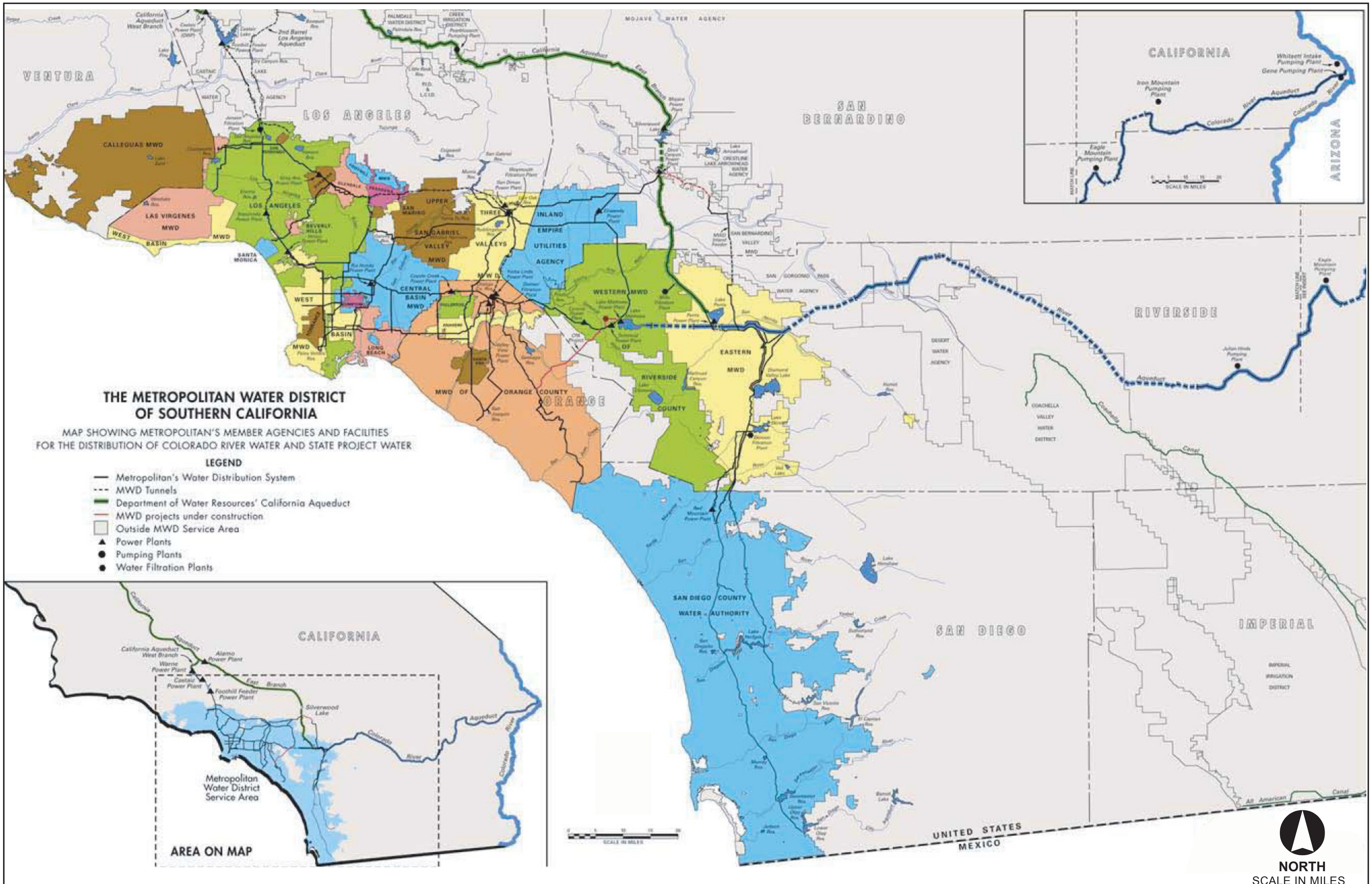
The City obtains imported water from Metropolitan via MWDOC. These agencies treat water received from the Colorado River via the Colorado River Aqueduct (CRA) and from the State Water Project (SWP) via the California Aqueduct. The amount of water delivered to the City by MWDOC currently accounts for about third of the total water used in the City.

4.1.1 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. He 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.

Recent court decisions have forced the Department of Water Resources (DWR) to restrict pumping in the Delta to protect the threatened delta smelt; thereby, reducing the amount of water available to Metropolitan and other SWP contractors. The reliability of the SWP water is defined in DWR SWP Delivery Reliability Report, which has been published in 2002, 2005 and 2007. 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 changes in hydrology due to potential climate change for the future and restrictions on SWP and Central Valley Project pumping in accordance with the interim operating rules imposed by the December 2007 Federal Court order. The 2007 Final SWP Delivery Reliability Report addressed these recent hydrologic conditions.

Due to drought conditions and uncertainty regarding future pumping operations from the SWP, Metropolitan has worked with member agencies to put together a Water Supply Allocation Plan (WSAP). The plan allocates water to members based on the Regional Shortage Level experienced in Metropolitan's service area; higher regional shortages result in larger supply cutbacks. Metropolitan's service area is shown in Figure 4-1.



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

FIGURE **4-1**

Metropolitan Water District of Southern California Water Service Area

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4.1.1 Supply Considerations

According to DWR, eleven droughts have occurred in California since 1850. The year 1977 is recognized by DWR as the driest single year of California's measured hydrologic record.[10] The most recent multi-year statewide drought took place between 1987 and 1992.[11] Conversely, in the years following these drought periods the Central Valley was drenched with record rainfall that caused flooding. This extreme climatic variability is common throughout California.

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 SWP water to meet customer demands.

The 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.[12] 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 pumping technology could lift the SWP pumping restrictions; thereby, returning the system to firm delivery capacity. Therefore, for comparison purposes normal “Base Year” supply, “WSAP Year” supply, and various demand scenario comparisons will be presented in this analysis.

4.1.2 Metropolitan Water District of Southern California Water Supply Planning

For future years in which Metropolitan’s supplies are insufficient to meet firm demands, imported supplies to MWDOC will be managed in accordance to Metropolitan’s (Met) WSAP. (Because the City is not a direct Metropolitan member, Section 4.1.3.1 presents the effects of the Met WSAP on MWDOC and its subsequent supply actions as it relates to member agencies.) 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 Delta, Metropolitan is faced with the possibility that it may not have access to the supplies necessary to meet firm demands now and in the future and may allocate supply shortages to the member agencies. In preparing for this possibility, Metropolitan has worked with member agencies to put together the Met WSAP. The plan includes sample calculations for determining a particular member agency’s allocation, as well as

10 Department of Water Resources. Accessed September 2007. Background: Droughts in California. http://watersupplyconditions.water.ca.gov/background.cfm.

11 Department of Water Resources. Accessed September 2007. Background: Droughts in California. http://watersupplyconditions.water.ca.gov/background.cfm.

12 Department of Water Resources. California Drought An Update. April 2008. Accessed January 2009. http://www.water.ca.gov/drought/docs/DroughtReport2008.pdf.

estimated retail and wholesale reliability for member agencies based on a given percent reduction in total supply (refer to Appendix E).

For the last three years, Metropolitan has pulled water out of storage to meet regional demands as a result of the below average rainfall and the water supply from the Delta in Northern California being restricted. These restrictions, referred to as a regulatory drought, can cut water to 25 million Californians in southern California by as much as 30-50%. As a result, mandatory conservation is now being required.[13]

On February 12, 2008 the Metropolitan Board of Directors officially adopted the Met WSAP. The Met 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 plan, cover 5 percent increments from 5 to 50 percent. Under each shortage level, there are specific wholesale minimum allocations for each member agency. The Met 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), and Level 4 Regional Shortage (20 percent), and in a Level 6 Regional Shortage (40 percent). These values for MWDOC from Metropolitan are shown in Table 4-1.

Table 4-1: Wholesale Reliability for Imported Supplies within the Basin (AFY)

Shortage Percentage (Regional Shortage)	Level 2 Regional Shortage 10%	Level 4 Regional Shortage 20%	Level 6 Regional Shortage 40%
MWDOC (in basin)	94.9%	89.2%	78.3%

Source: Metropolitan Water District of Southern California. Board of Directors, Water Planning and Stewardship Committee. February 12, 2009 Board Meeting. *Attachment 2. Values shown are for the proposed formula*.

4.1.2.1. Recent Activity

The Metropolitan Board of Directors approved the implementation of Met's WSAP at a Level 2 on April 14, 2009. This action was taken in order to manage demands through the period of July 1, 2009 through June 30, 2010 given the limited supplies available in the current calendar year, including limiting withdrawals of storage in order to maintain reasonable reserve levels. As a result of Met's WSAP action, Section 4.1.4.1 presents MWDOC's subsequent response and creation of its Draft Water Supply Allocation Plan (WSAP). The Draft WSAP affects each MWDOC member agency.

Metropolitan's monthly report provides updates for regional water supply and demand conditions and potential actions under the Water Surplus and Drought Management Plan (WSDM Plan). The WSDM Plan provides the overall strategy for managing Metropolitan's resources to meet the range of estimated demands for the current calendar year. This report considers conditions as of May 21, 2009.[14] The May 2009 WSDM Report can be found in Appendix D.

13 MWDOC Press Release April 15, 2009. MWDOC Implements Water Supply Allocation Plan.
14 Water Surplus and Drought Management Plan on water supply and demand as of May 21, 2009.

The WSDM Plan calculates reliable supply capacity for the current and next calendar year, which includes the supplies in Metropolitan's Five Year Supply Plan Resource Option. Based on these estimates, Metropolitan determines its supplies in the region that are currently available to meet customer demands. This WSA, based on the Delta pumping limitations and year three of a statewide drought, it appears that the water supply situation is somewhat uncertain at this time. 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. With this understanding, for conservative water supply planning purposes, supplies are held constant per allocation over this same period. Table 4-2 shows the supplies available to Metropolitan beginning 2010 and extending annually to 2015 and out to 2030.

Table 4-2: New Metropolitan Supply & Allocation CY 2009 with Five Year Supply Plan Resource Option (MAF)

Year	2009	2010	2011	2012	2013	2014	2015	2020	2025	2030
CRA[1]	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
SWP[2]	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Total	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**

Notes: Due to round off errors Total does not sum correctly.
MAF = million acre-feet; CY = calendar year
1. Metropolitan Water Surplus and Drought Mgt Plan May 21,2009 Attachment 1 Table CY 2009 Projected CRA & SWP Supplies, Appendix D
2. Metropolitan Water Surplus and Drought Mgt Plan May 21,2009 Attachment 1 Table CY 2009 Projected CRA & SWP Supplies, Appendix D

4.1.3 Municipal Water District of Orange County

The MWDOC was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911. MWDOC was formed for the purpose of contracting with Metropolitan to acquire supplemental imported water supplies from northern California and the Colorado River for use within Orange County. MWDOC is Metropolitan's third largest member agency; it represents 30 member agencies, it provides and manages the imported water supplies used within its service area. MWDOC is a regional water wholesaler and resource planning agency, managing all of Orange County's imported water supply with the exception of water imported to the cities of Anaheim, Fullerton, and Santa Ana. MWDOC serves more than 2.3 million residents in a 600-square mile service area. Its service area and member agencies are shown in Figure 4-2. It is through MWDOC that the City of Huntington Beach purchases imported water from Metropolitan.

Direct-use water (water directly piped from treatment facilities or wells to homes and commercial and institutional buildings, as opposed to indirect use, which is water needed to replenish groundwater storage and to serve as a barrier against saltwater intrusion) in MWDOC's service area comes from both local and imported supplies. Local supplies developed by individual member agencies, primarily groundwater, presently account for about 50 percent of MWDOC's direct water use. Other local supplies include recycled wastewater and surface water. The remaining 50 percent of direct water use demand is met by imported water from Metropolitan.

Source: MWDOC, 2005, *Urban Management Plan*, November 2005.

FIGURE **4-2**

Service Area and Member Agencies of MWDOC

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4.1.3.1. Recent Activity and WSAP

For the past year, MWDOC staff has been working on the development of its WSAP. (See Appendix E) Through the Board's recommended policy principles, Client Agency technical workshops, and MWDOC Committee meetings, staff developed a plan to allocate imported water in a fair and equitable manner to all of its 28 Client Agencies within its service area.[15]

In preparation of the WSAP, the MWDOC Board of Directors adopted the following policy principles to help guide staff:

- Seek best allocation available from MET
- Develop the MWDOC Plan in collaboration with its Client Agencies
- When reasonable, use similar method/approach as MET
- When MET method would produce significant unintended consequence, use an alternative approach
- Develop accurate data on local supply, conservation, recycling, rate structures, growth and other relevant adjustment factors
- Seek opportunities within MWDOC service area to provide mutually beneficial shortage mitigation

As of spring 2009, MWDOC Board of Directors voted unanimously for implementation of MWDOC's WSAP. In conjunction with the WSAP, the MWDOC Board officially declared a regional water shortage. The WSAP is being implemented at Stage 2 - a ten percent reduction in available imported water supply – and will be effective July 1, 2009, through June 30, 2010. MWDOC's Board took action as a result of Metropolitan's Board of Directors calling for a Stage 2, or ten percent reduction, on Tuesday, April 14, 2009.[16] The WSAP uses the water supply data provided via imported supplies from Metropolitan conveyed to MWDOC and groundwater supplies managed by OCWD. MWDOC determined the supplies that will be available to each retailer in its service area. The WSAP consists of five steps listed below:[17]

Step 1 – Determine an Agency's Baseline

Step 2 – Establish Allocation Year Information

Step 3 – Calculate Initial Minimum Allocation based on Declared Shortage Level

Step 4 – Assign Allocation Adjustments and Conservation Credits

Step 5 – Sum Total Allocations and Calculate Retail Reliability

15 Resolution Adopting MWDOC Supply Allocation Plan, February 6, 2009, page 2.
16 MWDOC Press Release April 15, 2009. MWDOC Implements Water Supply Allocation Plan.
17 Resolution Adopting MWDOC Supply Allocation Plan, February 6, 2009, page 3.

Although these steps are similar to MET's allocation process; there were situations where an alternative approach was needed for MWDOC's service area such as the Growth Adjustment, Retail Impact Adjustment, Conservation Credits, and the assessment of allocation penalties.[18]

4.1.4 Orange County Water District

Orange County Water District (OCWD or District) was formed in 1933 by a special act of the California Legislature to protect the groundwater basin. The District is neither a wholesale nor a retail 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. Because OCWD is the manager of the Basin and not an urban water supplier, it is not required to develop an UWMP; however, in 2004, OCWD adopted a GMP in its capacity to ensure sufficient water supplies for present and future beneficial uses within Orange County. An update to the OCWD GMP was released in May 2009. 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.

There are 23 major producers extracting water from the Orange County groundwater basin, which is managed by OCWD in collaboration with the other water and wastewater agencies. The area managed by OCWD is shown in Figure 4-3.

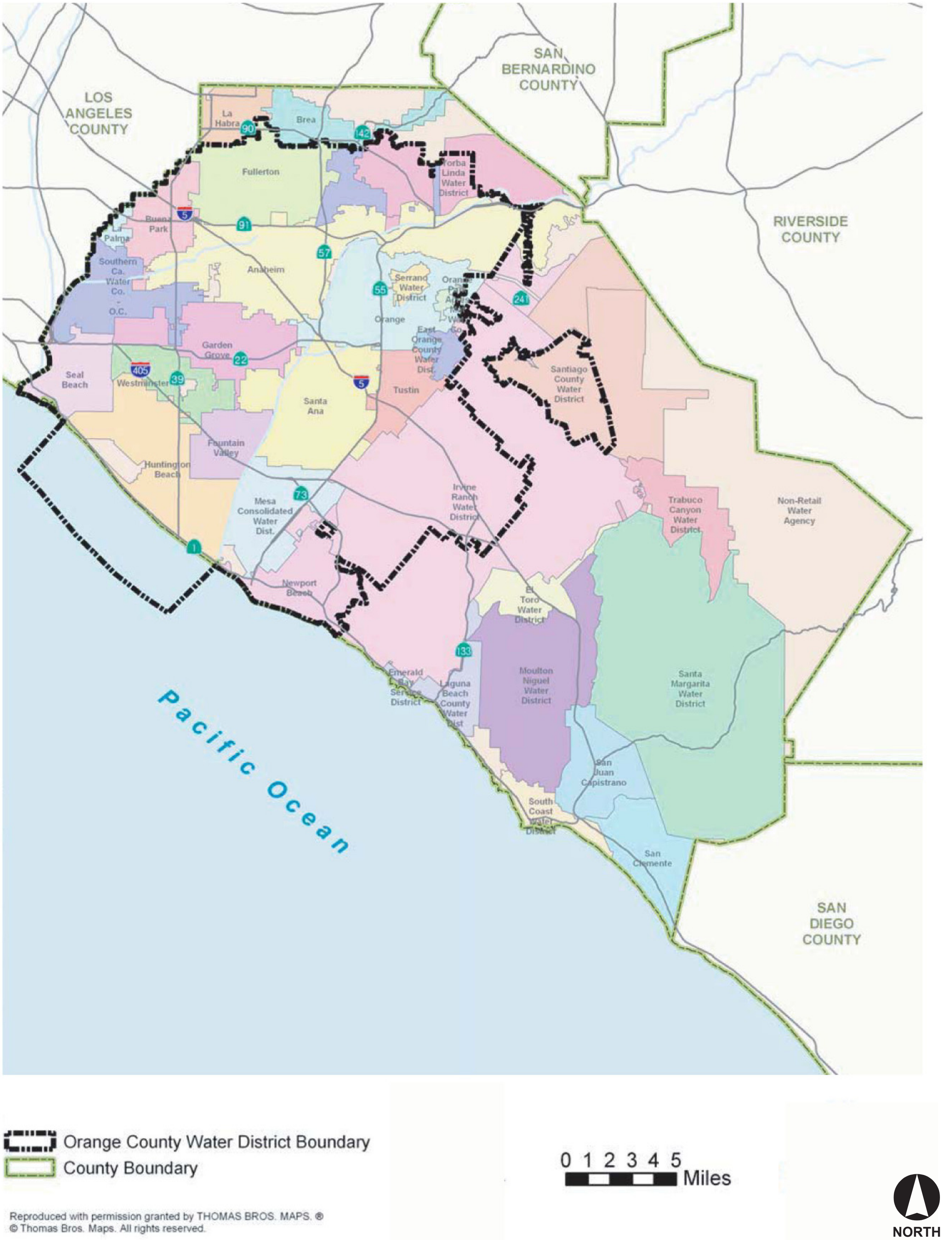
OCWD's allowable BPP establishes the annual pumping percentage per OCWD member and may vary annually. The BPP is set uniformly and is a portion of each member's water supply that comes from groundwater pumped from the basin. OCWD members pay an RA fee for water pumped from the basin. Groundwater production at or below the BPP is assessed the RA. Any production above the BPP is charged the RA plus the BEA. 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. The BEA can be increased as needed to discourage production above the BPP. Currently, the BPP is set at 62 percent, and groundwater pumped between 62 percent to a maximum restriction of 64 percent.[19] will be charged the sum of the RA and BEA, which is essentially the same rate as the import water rate purchased through MWDOC.

4.2 Supplies within the City of Huntington Beach

Total potable supplies within the City are primarily composed of local groundwater and imported water is also an important source of supply. The MWDOC 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. For conservative planning purposes, supplies are held constant according to the prescribed

18 Resolution Adopting MWDOC Supply Allocation Plan, February 6, 2009, page 3.

19 Groundwater pumping is managed by OCWD and groundwater reserves are limited by the annual BPP. Although in the past OCWD has allowed pumping above the BPP as this allowed additional recharge (replenishment water to be added to the groundwater system).



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

FIGURE **4-3**

Orange County Water District Boundary

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allocation rate. For example, Base Year supplies of 33,323 AFY remain the same over the 20-year planning horizon and each WSAP Stage is presented in the same manner.

Table 4-3 shows the supplies available to the City under MWDOC's WSAP Base Period model (no reductions), hereinafter "Base Year" under this supply scenario commencing in July 2009 through 2010, the City could expect to receive 33,323 AFY. However, as previously discussed, due to reduced statewide water supplies under WSAP Stage 2, the City can expect to receive less than the Base Year water supply allocation.

Table 4-3: MWDOC's WSAP Base Year Supplies (AFY)

Years	2009	2010	2015	2020	2025	2030
Imported Water	12,663	12,663	12,663	12,663	12,663	12,663
Groundwater	20,660	20,660	20,660	20,660	20,660	20,660
Total[1]	33,323	33,323	33,323	33,323	33,323	33,323

Notes:
1. MWDOC WSAP Base Year Water Supply Allocation. Assumes 38% Imported Water from MWDOC and 62% BPP of Groundwater from OCWD.

As shown in Table 4-5, one short-term solution to compensate for reduction in import supply can be achieved by pumping within the BEA restriction, currently set at two (2) percent above BPP, at a rate essentially the same as the purchasing rate through MWDOC. For example, under WSAP Stage 2, additional groundwater pumping within BEA restriction could increase annual supplies by 1,776 acre-feet, and under WSAP Stage 3, that could increase by 1,688 acre-feet. A discussion of the supply allocation under the WSAP Stage 2 follows below.

Table 4-4: MWDOC's WSAP Stage 2 Allocation with 2% BEA Pumping Allowance (AFY)

Years	2009	2010	2015	2020	2025	2030
Imported Water	12,146	12,146	12,146	12,146	12,146	12,146
Groundwater	21,593	21,593	21,593	21,593	21,593	21,593
Total[1]	33,739	33,739	33,739	33,739	33,739	33,739

Notes:
1. MWDOC WSAP Base Year Water Supply Allocation. Assumes 38% Imported Water from MWDOC and 62% BPP of Groundwater from OCWD and 2% BEA Pumping Allowance. Supply is 101 percent of Base Year supplies.

Table 4-5 shows the supplies that the City could expect to receive under various WSAP allocations. For consistency with Metropolitan's WSDM and Five Year Supply Plan Resource Option allocations and recent implementation of Stage 2 MWDOC reductions; although, not official, this WSA takes a conservative approach and assumes that under WSAP Stage 2 beginning July 1, 2009, the City can expect to receive 31,963 AFY in total supplies. Under WSAP Stage 2, the City's allocation reduction equates to a loss of 517 AFY or 12,146 acre-feet of imported supplies. Under WSAP Stage 3, the City's allocation reduction equates to a loss of 1,120 AFY or 11,543 acre-feet of imported supplies.[20]

20 Assume 38% imported water from MWDOC and 62% BPP of groundwater from OCWD.

Table 4-5: MWDOC Water Supply Allocation Plan Schedule[1]					
Allocation Schedule of Shortages[4]	**Import Allocation (AFY) [2]**	**Allocation Reduction Less Base Year Supply**	**Actual Percentage Reduction from Base Year Demand**	**Percent of Supply**	**Supply Total[3]**
10% (Stage 2)	**12,146**	**517**	**4.08**	**95.92%**	**31,963**
15% (Stage 3)	**11,543**	**1,120**	**8.84**	**91.16%**	**30,376**
20%	10,732	1,931	15.25	84.75%	28,242
25%	9,920	2,743	21.66	78.34%	26,105
30%	9,108	3,555	28.07	71.93%	23,968
35%	8,296	4,367	34.48	65.52%	21,832
40%	7,484	5,179	40.90	59.10%	19,695
45%	6,672	5,991	47.31	52.69%	17,558
50%	5,861	6,802	53.71	46.29%	15,424

Notes:
1. MWDOC Draft WSAP 2009 from City of Huntington Beach staff August 5, 2009
2. Import Allocation based on Base Year allocation of 12,663 AFY.
3. Supply total Base Year Allocation of 33,323 AFY. Assumes 38% Imported Water from MWDOC and 62% BPP of Groundwater from OCWD.
4. Allocation Schedule of Shortages: Stage 2 = 10% and Stage 3 = 15%.

As previously stated, 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.[21] 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 pumping technology could lift the SWP pumping restrictions thereby, returning the system to firm delivery capacity.

4.2.1.1. Additional Dry Years

Projected supplies are shown in Table 4-6. 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 4-4, if next year is another dry year, MWDOC 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 1,120 acre-feet, reduced to 11,543 acre-feet, which is 30,376 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.

21 Department of Water Resources. California Drought: An Update. April 2008. Accessed January 2009. http://www.water.ca.gov/drought/docs/DroughtReport2008.pdf.

Table 4-6: City of Huntington Beach Supplies: WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030)

Supply Allocation	Base Year Supply Allocation[1]		WSAP Stage 2 Allocation Single Dry Year[2]		Multiple Dry Year Event[2]					
					WSAP Stage 2 Allocation Dry Year 1[3]		WSAP Stage 3 Allocation Dry Year 2[4]		WSAP Stage 3 Allocation Dry Year 3	
	AFY	%	AFY	%	AFY	%	AFY	%	AFY	%
Huntington Beach Allocation	33,323	100	31,963	90	31,963	90	30,376	85	30,376	85

Note:

1. MWDOC Draft WSAP 2009 from City of Huntington Beach staff August 5, 2009. Assumes 38% imported water from MWDOC and 62% BPP of groundwater from OCWD.
2. PBS&J developed additional dry year planning projections based on Stage 2 and Stage 3 Allocations.
3. Stage 2 Allocation in effect beginning in Dry Year 1 – Same as Single Dry Year.
4. 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.

Projected supplies with 64 percent groundwater with a BEA of 2 percent pumping allowance in effect are shown in Table 4-7. 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 4-7, if next year is another dry year, MWDOC 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 1,120 acre-feet, reduced to 11,543 acre-feet, which is 32,064 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 4-7: City of Huntington Beach Supplies: WSAP Stage 2 and 3 Allocations with 2% BEA Pumping Allowance - Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030)

Supply Allocation	Base Year Supply Allocation[1]		WSAP Stage 2 Allocation Single Dry Year[2]		Multiple Dry Year Event[2]					
					WSAP Stage 2 Allocation Dry Year 1[3]		WSAP Stage 3 Allocation Dry Year 2[4]		WSAP Stage 3 Allocation Dry Year 3	
	AFY	%	AFY	%	AFY	%	AFY	%	AFY	%
Huntington Beach Allocation	33,323	100	33,739	90	33,739	90	32,064	85	32,064	85

Note:

1. MWDOC Draft WSAP 2009 from City of Huntington Beach staff August 5, 2009.
2. PBS&J developed additional dry year planning projections based on Stage 2 and Stage 3 Allocations. Assumes 38% imported water from MWDOC and 64% BPP of groundwater from OCWD with the 2009 2% BEA Allowance. Supply is 101% of Base Year supplies due to 2% BEA Pumping Allowance.
3. Stage 2 Allocation in effect beginning in Dry Year 1 – Same as Single Dry Year plus 2% BEA pumping.
4. Stage 3 Allocation in effect with BEA of 2% after Dry Year1 and due to the WSAP model WSAP Stage remains in effect over the next year.

Developed by PBS&J for Water Supply and Demand Planning Purposes.

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 of Huntington Beach and the project-specific analysis demand calculations are based on demand factors from similar development facilities in the City of Huntington Beach, Southern California and other parts of the state. See Appendix F for a comprehensive demand discussion on a larger scale. See Appendix B of other future water use projections for all other previously evaluated projects, pending projects like the Downtown Specific Plan Update, and various other pending projects.

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 (AFY)

	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 MWDOC Water Demands

Regional projected demand in OCWD's service area, shown in Table 5-2, is based upon demand estimated by the individual producers and submitted to the MWDOC as part of its Annual Survey in spring 2008. Demands of member 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 demands are assumed not to increase. In fact, in dry years demands 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 per Section 3. A discussion of the Conservation efforts and achievements is presented in Section 7.

Table 5-2: Total Projected Demand within the Basin in an Normal Year (AFY)					
	2010	**2015**	**2020**	**2025**	**2030**
MWDOC (in basin)	342,841	362,646	369,814	373,880	375,928
Total Demand[1]	**500,961**	**527,828**	**543,464**	**550,830**	**552,797**

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

5.2.1 City of Huntington Beach Demands

In the City of Huntington Beach, water demand is not dissimilar from other municipal water providers, insofar as demand occurs as a result of consumptive uses by consumers. However, for Huntington Beach, 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 31,691 acre-feet. Demand decreases could be contributed to conservation efforts, economic downturn and annual population decreases. In fact, the City has observed an annual population decrease between 2000 and 2007.[22] The average annual demand over this period was 33,532 AFY and the last 3-year average (2005-2008) was 32,099 acre-feet.

Table 5-3: Historical Demands (1999 - 2008)	
Year	**Water Demand (AFY)**
1999	34,427
2000	35,738
2001	33,893
2002	35,083
2003	33,256
2004	34,061
2005	32,561
2006	31,960
2007	32,645
2008	**31,691**
Last 3 Year Average	32,099
10 Year Average	33,532
Base Year Demand (Per MWDOC for WSAP)	**33,323**

Source: MWDOC WSAP from Request for City Council Action April 6, 2009, page 4.

22 Population and Housing Section, Draft EIR Beach and Edinger Corridor Specific Plan, July 2009.

5.3 Beach – Edinger Specific Plan Project Demands

5.3.1 Existing Project-Site Demands

The BECSP 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 used in other WSAs that the City previously approved, as well as published materials and/or similar facilities in Southern California as cited in Table 5-4 and Table 5-5. As it currently exists, the total existing water demand for the proposed project areas is approximately 397 AFY – this is the sum of the demands from the “Commercial Uses” and “Residential, Hospitality, Medical Service” facilities. Implementation of the proposed project will result in a net change in water demands. Of the existing 397 AFY of existing demands – the demands of 207 acre-feet associated with residential, hotel and hospital will remain in use.

5.3.1 Beach – Edinger Specific Plan 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 conservatively estimated to be 1,371 AFY, which assumes full build-out of the entire Specific Plan area with all 6,400 DU implemented. This is a net increase in water demand of approximately 1,180 AFY above existing uses. It should be noted that installation of water efficient fixtures in new developments along with drought-tolerant landscaping could reduce demands as much as 40 percent.[23] The changes in water demand are shown in Table 5-6.

Table 5-4: Existing Water Demand for the Beach-Edinger Specific Plan Area

Land Use /Connection Designation	Area	Unit	Demand Factor	Total Demand (AFY)
Commercial Uses[a] (Foregone demands with Project Implementation)				
Retail, restaurant; office (4,862,174 sf)	110 acres	~	1,480 gpd/acre	185
Landscaping/ROW[b]	473,497 sf	~	0.01 gpd/sf	5
Subtotal				190
Residential – Hospitality - Medical Service (Demands with Project Implementation)				
Hotel[c]	~	303 rooms	130 gpd/room	44
Hospital[d]	~	264 beds	177 gpd/bed	52
Residential		493 DU	200 gpd/DU	110
Subtotal				207

Notes:
DU = dwelling unit
gpd = gallons per day
a. Commercial water demands estimated at 1,480 gallons per day per acre based on the City's 2005 Water Master Plan and used in the 2005 UWMP.
b. Estimated sf of landscape areas.
c. Seattle Public Utilities Resource Conservation Section, Hotel Water Conservation, A Seattle Demonstration, July 2002, prepared by O'Neill & Siegelbaum and The RICE Group.
d. Calculated demand based on PSOMAS Water and Sewer Analysis for Pomona Valley Hospital Medical Center 2008.

23 City of Menlo Park, Draft Water Supply Assessment, June 2009 (KEMA Memorandum).

Table 5-5: Beach-Edinger Specific Plan Water Demands

Land Use/Connection Designation	Area (sf)	Unit	Demand Factor	Total Demand (AFY)
Commercial Uses				
Office	112,000		0.15 gpd/sf	19
Retail [a]	627,640		0.15 gpd/sf	105
Restaurant [b]	110,760		1.5 gpd/sf	186
Landscaping/ROW [c]	473,497		0.01 gpd/sf	5
Subtotal	***1,323,897***			***315***
Residential [d]		6,400 DU	140 gpd/DU	1,004
Hotel [e]		350 rooms	130 gpd/room	51
Subtotal				***1,055***
Total				**1,370**

Notes:
DU = dwelling unit
a. City of Huntington Beach, Bella Terra II Water Supply Assessment May 2008 (0.15 gpd/sf for restaurant).
b. City of Huntington Beach, Bella Terra II Water Supply Assessment May 2008 (1.5 gpd/sf for restaurant).
c. Estimated sf of landscape areas. Need actual or best guess from SP.
d. Two persons per DU as used in the Bella Terra II Water Supply Assessment, May 2008.
e. Seattle Public Utilities Resource Conservation Section, Hotel Water Conservation, A Seattle Demonstration, July 2002, prepared by O'Neill & Siegelbaum and The RICE Group.

Table 5-6 shows the net change in demand at build-out of the BECSP. The existing demands of 190 AFY replaced by a new demands associated with the proposed project. Upon build-out of the BECSP the City can expect new demands of 1,180 AFY along the corridor.

Table 5-6: Net Change in Demands from Existing to Proposed Project Demands (AFY)

Land Use/Connection Designation	Total Demand
Existing Water Demands [1]	190
Specific Plan Water Demands [2]	1,370
Net Change in Water Demand [3]	**1,180**

Notes:
1. Table 5-4. Existing Water Demand. Assumes existing water demands in the project area were accounted for in the 2005 UWMP.
2. Table 5-5: Beach-Edinger Specific Plan Water Demands.
3. The net change in demands is added to the demand not accounted for in the 2005 UWMP and will be added to demand projections beginning in 2010 and extending through 2030.

5.3.2 Projected BECSP Demands in Normal, Single Dry and Multiple Dry Years

In dry years for consistency purposes, the proposed BECSP project demand is not anticipated to change, as shown in Table 5-7. It should be noted that conservation efforts achieved along the corridor 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. Demands shown below are for full build-out in 2030.

Table 5-7: Normal, Single Dry and Multiple Dry Year Demands (AFY)					
	Normal Year Demand	Single Dry Year Demand	Multiple Dry Year Demand		
			Year 1	Year 2	Year 3
Net Demand	1,180	1,180	1,180	1,180	1,180
Source: Total demand at build-out calculated from Table 5-5: Beach-Edinger Specific Plan Water Demands.					

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.

City demands, beginning in 2009/2010 are shown in Table 5-8. Base Year demand is 33,323 AFY. Projected demands beginning in July 2009 were calculated as part of MWDOC's WSAP. As stated in Section 4.1, MWDOC 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 36,894 AFY by 2030, or by 3,571 AFY between 2009 and 2030. Recall, that this WSA uses the higher percentage increase of 0.0048 annually to account for population increases due to densification within the city limits. The added benefit of utilizing this growth methodology is that it captures and includes all previously evaluated projects (refer to Appendix B), pending projects like the Downtown Specific Plan Update, other pending development projects, as well as other yet to be identified development projects.

Table 5-8: City of Huntington Beach Base Year Demands Projections without Water Conservation (AFY)						
Years	(2009)	2010	2015	2020	2025	2030
Total Demands	(33,323)[1]	33,485[2]	34,306[2]	35,148[2]	36,010[2]	36,894[2]

Notes:
1. Base Year demand is 33,323 AFY. MWDOC determined each retailer's Base Year demand by averaging demands from 2004, 2005 and 2006.
2. Growth in demand as population increases is expected to reach 36,894 AFY by 2030. Based on an annual 0.0048 percent to account for population increases due densification within the city limits (See Section 3 for discussion).

In normal years, Table 5-8 shows citywide demands with the proposed project's contribution included into the total citywide demands in each five-year increment.

City demands, beginning in 2009/2010 are shown in Table 5-9. 2008 Demand is 31,691 AFY. Projected demands beginning in July 2009 were calculated as part of MWDOC's WSAP. Total demand due to population increases is expected to reach 35,087 AFY by 2030, or by 3,396 AFY between 2009 and 2030. Recall, that this WSA uses the higher percentage increase of 0.0048 annually to account for population increases due densification within the city limits. The added benefit of utilizing this growth methodology is that it captures and includes all previously evaluated projects (refer to Appendix B), pending development projects like the Downtown Specific Plan Update, other pending development projects, as well as other yet to be identified development projects.

Table 5-9: City of Huntington Beach 2008 Demands Projections without Water Conservation (AFY)

Years	(2009)	2010	2015	2020	2025	2030
Total Demands[1]	(31,691)	31,845	32,626	33,427	34,247	35,087

Notes:
1. 2008 Demand were 31,691 AFY. Growth in demand as population increases is expected to reach 35,087 AFY by 2030. Based on an annual 0.0048 percent to account for population increases due to densification within the city limits (see Section 3 for discussion).

Beginning with 2008 Demands, Table 5-9 shows citywide demands with the proposed project's contribution included into the total citywide demands in each five-year increment.

As stated previously, this WSA uses the annual population increases culminating at 224,788 persons by 2030 as the more reasonable projection of growth in the City. The added benefit of utilizing this growth methodology is that it captures and includes all previously evaluated projects including pending projects (the Downtown Specific Plan Update), various other pending developments, as well as other yet to be identified future projects. City staff evaluated the water demands of those aforementioned development projects that are in the entitlement stage or planning phases; the results of the water supply needs of those projects are shown in Table 5-10. For comparative purposes the demands of BECSP project are shown in this table as well.

Table 5-10: Demand Comparison from Growth in Population Projection versus Pre-Evaluated Future Projects (AFY)

Total Demand Increase by 2030 Per Population Projection	Base Year Demand 3,572 AFY	2008 Year Demand 3,396 AFY
BECSP (Net Increase)	1,180	1,180
Pre-Evaluated Projects[1]	835	835
Downtown Specific Plan Update (Net Increase) - Pending	371	371
Difference	**1,186**	**1,010**

Notes:
1. City of Huntington Beach Tentative List of Pre-Evaluated & Pending Development Projects. Appendix B

It should be noted that nearly 3,000 AFY of the current demands in the City are used for municipal/ irrigation purposes,[24] this WSA suggests that by modifying the landscaping plants or designs, and exchanging natural turf for artificial turf or using reclaimed water for irrigation purposes, a sizable supply of potable water could be saved.

Therefore, based on the MWDOC's WSAP calculations for water supply planning purposes, demands grow in response to population increases but are not adversely affected by changes in annual hydrologic conditions over the 20-year planning period. In other words, demands do not increase as a result of dry year conditions. Demands in the second and third years could remain unchanged or could be potentially less than the first dry year demands as conservation measures begin to take effect. Empirical evidence has shown that voluntary or mandated conservation measures in jurisdictions throughout California achieved 20 to 25 percent demand reductions under multiple dry year conditions; therefore, it is reasonable to assume that as the City begins to realize

24 City of Huntington Beach Urban Water Management Plan 2005, Table 5.3-2, page 5-3.

conservation savings, citywide demands would stabilize and/or decrease.[25] A discussion of potential water savings appears in Section 6.

25 City of South San Francisco, 2005 Urban Water Management Plan, page 41.

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 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 above.

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.

Table 6-1: Supply and Demand Comparison (AFY)

Year	2009	2010	2011	2012	2013	2014	2015	2020[3]	2025[3]	2030[3]
Supplies[1]	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]	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

Sources:

1. Metropolitan Water Surplus and Drought Mgt Plan May 21, 2009 Attachment 1 Table CY 2009 Projected CRA & SWP Supplies, page 2.
2. Metropolitan Water Surplus and Drought Mgt Plan May 21, 2009 Attachment 1 Table CY 2009 Projected CRA & SWP Supplies.
3. 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.

6.1.2 Supply and Demand Comparison within MWDOC and 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 annually is anticipated by 2030.[26] In that same time period, under the restrictions on SWP pumping in accordance with the interim operation rules imposed by the December 2007 Federal Court order along with years three of the statewide drought conditions supplies have been decreased.

The Met 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

26 Comprehensive Water Demand Discussion, Appendix F.

agencies. To the extent possible, this means developing a plan that minimizes regional hardship during times of shortage. The Metropolitan WSAP seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level.[27]

Under Metropolitan's WSAP imported water supplies 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.

6.1.3 Supply and Demand Comparison for City of Huntington Beach

In the City of Huntington Beach, water demand is not dissimilar from other municipal water providers, insofar as demand occurs as a result of consumptive uses by consumers. However, for Huntington Beach, 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).

Again, this WSA uses the higher percentage increase of 0.0048 annually to account for population increases due densification within the city limits. Conversely, for conservative planning purposes, supplies are held constant according to the prescribed allocation rate. For example, Base Year supplies of 33,323 AFY remain the same over the 20-year planning horizon and each WSAP Stage is presented in the same manner. With the exception of the discussion in Section 6.1.3.1 water supply increases do not match the population rate increases.

6.1.3.1. Base Year Supply and Demand Comparison

Table 6-2 shows the comparison of anticipated supply and calculated demand over the next 20 plus years based on MWDOC's Draft WSAP from April 2009. Within the City, an increase in demand of 3,572 AFY is anticipated between 2009 and 2030 as shown on the Demand line in Table 6-2. In that same time period, under MWDOC WSAP supplies are anticipated to grow proportionally with population increases. Demands are expected to grown at a 0.0048 percent annually culminating at 36,911 AFY by 2030. Under this Base Period scenario, the City can expect to balance supply and demand each year between 2010 and 2030. As shown in Table 6-2, supplies and demands are in balance because the City only delivers what is necessary to meet daily demands.

Table 6-3 shows the comparison of anticipated supply and calculated demand over the next 20 plus years based on MWDOC's Draft WSAP from April 2009. Within the City, an increase in demand of 3,396 AFY is anticipated between 2009 and 2030 as shown on the Demand line in Table 6-3. In that same time period, under MWDOC WSAP supplies are anticipated to grow proportionally with population increases. Demands are expected to grown at a 0.0048 percent annually culminating at 35,087 AFY by 2030. Under this Base Year supply and 2008 Demand scenario, the City can expect supplies to exceed demand each year between 2010 and 2030. As shown in Table 6-2, supply will

27 MWDOC Supply Allocation Plan, February 6, 2009, page 4.

exceed demand; in this case, the City has successfully met consumer demands while achieving water savings over the 20-year planning horizon.

Table 6-2: Supply and Demand Comparison
Base Year Supplies and Base Year Demands with Annual Growth (AFY)[2]

	Years					
	2009	2010	2015	2020	2025	2030
Supplies[1]	33,323	33,485	34,306	35,148	36,010	36,894
Demand[2]	33,323	33,485	34,306	35,148	36,010	36,894
Difference[3]	**0**	**0**	**0**	**0**	**0**	**0**

Notes:
1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8 City of Huntington Beach Base Year Demands without Conservation.
3. On an annual basis demand equals supply. No storage reserves for consumptive uses (storage is provided for fire suppression and unaccounted-for system losses are aggregated with distribution deliveries).

Developed by PBS&J for long-term water supply planning.

Table 6-3: Supply and Demand Comparison
Base Year Supplies and 2008 Demands with Annual Growth (AFY)

	Years					
	2009/2010	2010	2015	2020	2025	2030
Supplies[1]	33,323	33,485	34,306	35,148	36,010	36,894
Demand[2]	31,691	31,845	32,626	33,427	34,247	35,087
Difference	**1,632**	**1,640**	**1,680**	**1,721**	**1,764**	**1,807**

Notes:
1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9 City of Huntington Beach 2008 Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

6.1.3.2. WSAP Stage 2 Supply and Base Year Demand Comparison

For water supply planning purposes, based on Table 5-4 demands are expected to increase as a result of population growth in the City as projected by SCAG. Table 6-4 shows the comparison of anticipated supply and calculated demand over the next 20 years. Within the City, an increase in demand of 3,571 AFY is anticipated between 2009 and 2030 as shown on the Demand line in Table 6-3. In that same time period, beginning in 2009 under MWDOC's WSAP Stage 2 supply allocations will be reduced to 90 percent of Base Year demands. Demands are expected to grow at 0.0048 percent annually culminating at 36,894 AFY by 2030. With this understanding, the City can anticipate a supply deficit in each year between 2010 and 2030. As shown in Table 6-4 the supply deficit is the difference of all demands subtracted from the anticipated supplies.

Table 6-4: Supply and Demand Comparison WSAP Stage 2 Supplies and Base Year Demands (AFY)					
	Years				
	2009/2010	**2015**	**2020**	**2025**	**2030**
Supplies[1]	31,963	31,963	31,963	31,963	31,963
Demand[2]	33,485	34,306	35,148	36,010	36,894
Difference	**-1,522**	**-2,343**	**-3,185**	**-4,047**	**-4,931**

Notes:
1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8, City of Huntington Beach Base Year Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

As shown in Table 6-5, based on the WSA model available supplies are adequate to meet demands in the near-term; however, as shown in the table supplies are insufficient to meet demands beginning in 2015 as a 567 acre-feet deficit would occur and by 2030, the City can anticipate a deficit of 3,155 acre-feet. Demands increase as result of annual population increases, not as a result of below-normal precipitation. It is anticipated, based on conservation achievements in similar jurisdictions that upwards of 20 percent reductions in water demands could be achieved.[28] A discussion of Conservation savings is presented later in this section.

Table 6-5: Supply and Demand Comparison WSAP Stage 2 Supplies with 2% BEA Pumping Allowance and Base Year Demands (AFY)					
	Years				
	2009/2010	**2015**	**2020**	**2025**	**2030**
Supplies[1]	33,739	33,739	33,739	33,739	33,739
Demand[2]	33,485	34,306	35,148	36,010	36,894
Difference	**254**	**-567**	**-1,409**	**-2,271**	**-3,155**

Notes:
1. Table 4-7, City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations with 2% BEA Pumping Allowance - Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8, City of Huntington Beach Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

6.1.3.3. WSAP Stage 2 Supply and 2008 Demand Comparison

As shown in Table 5-4 from MWDOC's WSAP, demands are expected to increase as a result of population growth in the City, which is consistent with SCAG projections. Table 6-6 shows the comparison of anticipated supply and calculated demand over the next 20 years. Demands are expected to grow at 0.0048 percent annually culminating at 35,087 AFY by 2030. Within the City, an increase in demand of 3,242 AFY is anticipated between 2009 and 2030 as shown on the Demand line in Table 6-6. In that same time period, beginning in 2009 under MWDOC's WSAP Stage 2 supply allocations will be reduced to 85% of Base Year supplies. With this understanding, the City can anticipate a supply deficit in each year between 2010 and 2030. As shown in Table 6-4 the supply deficit is the difference of all demands subtracted from the anticipated supplies.

28 City of South San Francisco, 2005 Urban Water Management Plan, page 41.

Table 6-6: Supply and Demand Comparison
WSAP Stage 2 Supplies and 2008 Demands (AFY)

	Years				
	2009/2010	2015	2020	2025	2030
Supplies[1]	31,963	31,963	31,963	31,963	31,963
Demand[2]	31,845	32,626	33,427	34,247	35,087
Difference	**118**	**-663**	**-1,464**	**-2,284**	**-3,124**

Notes:
1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9 City of Huntington Beach 2008 Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

As shown in Table 6-6, based on the WSA model available supplies are insufficient to meet demands; beginning in 2015, a 663 acre-feet deficit would occur and by 2030, the City can anticipate a deficit of 3,124 acre-feet. It is anticipated, based on conservation achievements in similar jurisdictions that upwards of 20 percent reductions in water demands could be achieved.[29] A discussion of Conservation savings is presented later in this section.

As shown in Table 6-7, based on the WSA model available supplies are adequate to meet demands over the next 15 years; however, as shown in the table supplies are insufficient to meet demands; beginning in 2025 a 508 acre-feet deficit would occur and by 2030, the City can anticipate a deficit of 1,348 acre-feet. Demands increase as result of annual population increases, not as a result of below-normal precipitation. It is anticipated, based on conservation achievements in similar jurisdictions that upwards of 20 percent reductions in water demands could be achieved.[30] A discussion of Conservation savings is presented later in this section.

Table 6-7: Supply and Demand Comparison
WSAP Stage 2 Supplies with 2% BEA Pumping Allowance and 2008 Demands (AFY)

	Years				
	2009/2010	2015	2020	2025	2030
Supplies[1]	33,739	33,739	33,739	33,739	33,739
Demand[2]	31,845	32,626	33,427	34,247	35,087
Difference	**1,894**	**1,113**	**312**	**-508**	**-1,348**

Notes:
1. Table 4-7 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations with 2% BEA Pumping Allowance - Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9 City of Huntington Beach Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

6.1.3.4. WSAP Stage 3 Supply and 2008 Demand Comparison

Additional dry year curtailments could occur as well. As shown in Table 6-8 with WSAP Stage 3 reductions there will be greater supply deficiencies in all years for current and planned development under these conditions. Assuming MWDOC could continue to curtail imported water to WSAP Stage

29 City of South San Francisco, 2005 Urban Water Management Plan, page 41.
30 City of South San Francisco, 2005 Urban Water Management Plan, page 41.

3 or 85% of Base Year Allocation,[31] multiple dry year shortages are anticipated as well; there will be insufficient supply in all years for existing customers, current and planned development during multiple dry years. It should be noted that this assumes the WSAP supplies from MWDOC remain at or above Stage 3, as stated previously due to uncertainties in the SWP supply allocations conveyed to the City via MWDOC could be less. As of April 2009, DWR has declared that SWP deliveries will be 60 percent less than normal for this calendar year.

Table 6-8: Supply and Demand Comparison
WSAP Stage 3 Supplies and 2008 Demands (AFY)

	Years				
	2010	2015	2020	2025	2030
Supplies[1]	30,376	30,376	30,376	30,376	30,376
Demand[2]	31,845	32,626	33,427	34,247	35,087
Difference	**-1,469**	**-2,250**	**-3,051**	**-3,871**	**-4,711**

Notes:
1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9 City of Huntington Beach 2008 Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-8 shows the comparison of anticipated supply and calculated demand over the next 20 years. Demands are expected to grow at 0.0048 percent annually culminating at 35,087 AFY by 2030. Within the City, an increase in demand of 3,242 AFY is anticipated between 2010 and 2030 as shown on the Demand line in Table 6-8. In that same time period, beginning in 2009 under MWDOC's WSAP Stage 3 supply allocations will be reduced to 80% of Base Year supplies, a loss of 1,120 acre-feet. With this understanding, the City can anticipate a supply deficit in each year between 2010 and 2030.

As shown in Table 6-8, based on the WSA model available supplies are insufficient to meet demands in all years beginning in 2010 as a 1,469 acre-feet deficit would occur and by 2030 the City can anticipate a deficit of 4,711 acre-feet.

As shown in Table 6-9, based on the WSA model available supplies are adequate to demands in the near-term. However, supplies will be insufficient to meet demands beginning in 2015, in fact, a 562 acre-feet deficit would occur and by 2030 the City can anticipate a deficit of 3,023 acre-feet.

6.1.3.5. Supply and Demand Comparison with Supplemental Purchases

The City of Huntington Beach could purchase additional supplies from MWDOC although surcharges will likely apply. These supplies can be used to offset the supply deficits that could occur in all years. Tables 6-10 through 6-13 show a supply and demand balance that can be achieved through additional purchases from MWDOC.

31 Request for City Council Action, April 2009 - MWDOC WSAP 20% limitation of curtailments, page 4.

Table 6-9: Supply and Demand Comparison
WSAP Stage 3 Supplies with 2% BEA Pumping Allowance and 2008 Demands (AFY)

	Years				
	2010	2015	2020	2025	2030
Supplies[1]	32,064	32,064	32,064	32,064	32,064
Demand[2]	31,845	32,626	33,427	34,247	35,087
Difference	**219**	**-562**	**-1,363**	**-2,183**	**-3,023**

Notes:

1. Table 4-7 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9, City of Huntington Beach Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-10 shows the supply and demand comparison using these additional supply purchase strategies with Base Year demands and WSAP Stage 2 supply allocations. In this case, beginning in 2010 the City would need to purchase 1,522 acre-feet to meet demands, and by 2030, the City would need to purchase 4,931 acre-feet.

Table 6-11 shows the supply and demand comparison using these additional supply purchase strategies with 2008 Demands and WSAP Stage 2 supply allocations. In this case, beginning in 2010 the City would need to purchase 567 acre-feet to meet demands, and by 2030, the City would need to purchase 3,155 acre-feet.

Table 6-10: WSAP Stage 2 Supplies and Base Year Demand Comparison with Supplementary MWDOC Purchases (AFY)

	Years				
	2010	2015	2020	2025	2030
Supplies	31,963	31,963	31,963	31,963	31,963
Supplementary MWDOC Purchases	*1,522*	*2,343*	*3,185*	*4,047*	*4,931*
Total Supplies with Purchases	33,485	34,306	35,148	36,010	36,894
Demand	33,485	34,306	35,148	36,010	36,894
Difference	**0**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-6, City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8, City of Huntington Beach Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-12 shows the supply and demand comparison using these additional supply purchase strategies with Base Year demands and WSAP Stage 2 supply allocations. In this case, beginning in 2010 the City would need to purchase 663 acre-feet to meet demands, based on this model by 2030 the City would need to purchase 3,124 acre-feet.

Table 6-11: WSAP Stage 2 Supplies with 2% BEA Allowance and Base Year Demand Comparison with Supplementary MWDOC Purchases (AFY)

	Years				
	2010	**2015**	**2020**	**2025**	**2030**
Supplies	33,739	33,739	33,739	33,739	33,739
Supplementary MWDOC Purchases		*567*	*1,409*	*2,271*	*3,155*
Total Supplies with Purchases	33,485	34,306	35,148	36,010	36,894
Demand	33,485	34,306	35,148	36,010	36,894
Difference	**No purchase**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-5 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8 City of Huntington Beach Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-12: WSAP Stage 2 Supplies and 2008 Demand Comparison with Supplementary MWDOC Purchases (AFY)

	Years				
	2010	**2015**	**2020**	**2025**	**2030**
Supplies	31,963	31,963	31,963	31,963	31,963
Supplementary MWDOC Purchases	*0*	*663*	*1,464*	*2,284*	*3,124*
Total Supplies with Purchases	31,845	32,626	33,427	34,247	35,087
Demand	31,845	32,626	33,427	34,247	35,087
Difference	**No purchase**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9: City of Huntington Beach 2008 Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-13 shows the supply and demand comparison using these additional supply purchase strategies with 2008 Demands and WSAP Stage 2 supply allocations. In this case, beginning in 2025 the City would need to purchase 508 acre-feet to meet demands, and by 2030, the City would need to purchase 1,348 acre-feet.

This is neither a favorable nor an advantageous situation for the City as well as for the other MWDOC members. The drawbacks of using additional purchases to relieve the supply shortfall are three fold: 1) rates per unit of water would be significantly higher than normal; 2) the WSAP is structured to encourage conservation; consequently, delivery purchases above the City's Drought Allocation quantity could exceed MWDOC's overall allocation; and, 3) the City would be viewed negatively by other jurisdictions that did not exceed their allocation amount. Therefore, this WSA does not recommend this strategy as a means to relieve the supply deficit.

Table 6-13: WSAP Stage 2 Supplies with 2% BEA Pumping Allowance and 2008 Demand Comparison with Supplementary MWDOC Purchases AFY)

	Years				
	2010	**2015**	**2020**	**2025**	**2030**
Supplies	33,739	33,739	33,739	33,739	33,739
Supplementary MWDOC Purchases	*0*	*0*	*0*	*508*	*1,348*
Total Supplies with Purchases	31,845	32,626	33,427	34,247	35,087
Demand	31,845	32,626	33,427	34,247	35,087
Difference	**No purchase**	**No purchase**	**No purchase**	**0**	**0**

Notes:

1. Table 4-7 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations with 2% BEA Pumping Allowance – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9: City of Huntington Beach 2008 Demands without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

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. Demand in 2008 was 31,691 acre-feet – some of these decreases could be contributed to conservation measures, economic downturn and population decreases. The average annual demand over this period was 33,532 AFY.

6.2.1 City Policy: Water Efficient Landscape

Huntington Beach has a Water Efficient Landscape ordinance (Municipal Code 14.52.00) to reduce the new demands at the development. The ordinance guides new develop projects through the process of designing, installing and maintaining water efficient landscaping. The purpose and intent of Municipal Code 14.52.00 is outlined below.

(a) Promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;

(b) Establish a structure of designing, installing, and maintaining water efficient landscapes in new projects;

(c) Establish provisions for water management practices and water waste prevention for established landscapes;

(d) Establish a long range goal of water efficiency through proper planning and design, the use of technologically current equipment with proper installation, continued maintenance and monitoring of water use through the designed systems;

(e) When used in conjunction with the "Arboricultural and Landscape Standards and Specifications" Resolution Number 4545, to give the Landscape Architect and/or owner the tools to provide an individualized landscape improvement to suit the needs of the owner and the requirements of the city; and,

(f) To provide standards for a finished landscape that is physically attractive, conserves water and is easy to maintain.

6.2.2 City Policy: Water Management Program

Huntington Beach has a Water Management Program codified in Municipal Code 14.82.00. California 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 a Water Management Program pursuant to California Water Code Section 375.

The Director of Public Works determines the extent of conservation or water use efficiency required through the implementation and/or termination of particular conservation stages in order for the City to prudently plan for and supply water to its customers.

As defined in Chapter 14.18 of the City's Municipal Water Code, a water shortage is declared based on one or more of the following conditions:

(a) A general water supply shortage due to increased demand or limited supplies.

(b) A major failure of the supply, storage and distribution facilities of the Metropolitan Water District of Southern California, or of the City occurs.

(c) A local or regional disaster, which limits the water supply.

On April 9, 2009, the City Council of Huntington Beach unanimously approved the Stage 1 Voluntary Conservation program of the City's Water Management Program.

6.2.3 City Policy: Water Use and Efficiency Master Plan

According to City staff, City efforts have begun preparation of a Water Use Efficiency Master Plan (WUEMP). In general, this proposed WUEMP is a key to creating reliable water for current and future water supply through more aggressive water conservation. This document will be comprised of methodologies, implementation strategies, plumbing fixture requirements and policies that will help the City efficiently use water and effectively reduce demands over the next 20 years. It is believed that the Master Plan will provide more creative and aggressive methodologies to help reduce overall outdoor water use throughout the City, to help the City customers to achieve the 20 percent per capita reduction in water use by 2020.

6.2.4 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 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."

6.2.5 Demand Management Measures

As signatory to the MOU, the City has committed to use good-faith efforts to implement the 14 cost-effective DMMs established by the CUWCC. The 14 DMMs 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 MWDOC for technical and financial support needed to facilitate meeting the terms of the MOU. MWDOC's current Water Use Efficiency Program includes regional programs, detailed in their 2005 Regional UWMP, implemented on behalf of its member agencies following three basic goals:

1) Provide on-going water use efficiency program support for member agencies.
2) Assume the position of lead agency to implement water use efficiency programs that are more cost-effectively implemented on a regional basis rather than a local basis.
3) Secure outside funding from Metropolitan's Conservation Credits Program, United States Bureau of Reclamation, and other sources.

6.2.6 Necessary Water Conservation

Optimization of the conservation programs or strategies listed above along with implementation of the WUEMP 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. Notably, as previously stated in Section 5 upwards of 3,000 AFY is used for municipal/irrigation purposes the City should look to replace the current landscaped areas with drought-tolerant plant species, artificial turf, or use recycled/reclaimed water on these sites for irrigation purposes.

As presented in Tables 6-14 – 6-19 below, conservation efforts employed during different supply scenarios—depending on the BPP—could effectively balance the supply and demand situations that may exist under the projected supply deficits. The tables illustrate the level of water savings that can be achieved with both modest and aggressive conservation programs and strategies.

Table 6-14: WSAP Stage 2 Supplies and Base Year Demands with Conservation Measures Incorporated (AFY)

Conservation Efforts Achieved	**5.0%**	**7.0%**	**9.0%**	**11.0%**	**13.5%**
Years	**2010**	**2015**	**2020**	**2025**	**2030**
Supply[1]	31,963	31,963	31,963	31,963	31,963
Demand[2]	33,485	34,306	35,148	36,010	36,894
Conservation Savings	*1,522*	*2,343*	*3,185*	*4,047*	*4,931*
Reduced Demand with Conservation	31,963	31,963	31,963	31,963	31,963
Difference	**0**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-7, City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8, City of Huntington Beach Base Year Demands Projections without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-15: WSAP Stage 2 Supplies with 2% BEA Pumping Allowance and Base Year Demands with Conservation Measures Incorporated (AFY)

Conservation Efforts Achieved		**2.0%**	**4.0%**	**6.0%**	**8.5%**
Years	**2010**	**2015**	**2020**	**2025**	**2030**
Supply[1]	33,739	33,739	33,739	33,739	33,739
Demand[2]	33,485	34,306	35,148	36,010	36,894
Conservation Savings	*Supply Surplus*	*567*	*1,409*	*2,271*	*3,155*
Reduced Demand with Conservation	33,739	33,739	33,739	33,739	33,739
Difference	**0**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-6, City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-8, City of Huntington Beach Base Year Demands Projections (AFY).

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-16: WSAP Stage 2 and 2008 Demands with Conservation Measures Incorporated (AFY)

Conservation Efforts Achieved	0.5%	2.0%	4.5%	7.0%	9.0%
Years	**2009-2010**	**2015**	**2020**	**2025**	**2030**
Supply[1]	31,963	31,963	31,963	31,963	31,963
Demand[2]	31,845	32,626	33,427	34,247	35,087
Conservation Savings	*118*	*663*	*1,464*	*2,284*	*3,124*
Reduced Demand with Conservation	31,963	31,963	31,963	31,963	31,963
Difference	**0**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9: City of Huntington Beach 2008 Demands Projections without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-17: WSAP Stage 2 Supplies with 2% BEA Pumping Allowance and 2008 Demands with Conservation Measures Incorporated (AFY)

Conservation Efforts Achieved	~	~	~	1.5%	4.0%
Years	**2009-2010**	**2015**	**2020**	**2025**	**2030**
Supply[1]	33,739	33,739	**33,739**	33,739	33,739
Demand[2]	31,845	32,626	33,427	34,247	35,087
Conservation Savings	*Supply Surplus*	*Supply Surplus*	*Supply Surplus*	*508*	*1,348*
Reduced Demand with Conservation	33,739	33,739	33,739	33,739	33,739
Difference	**0**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-7, City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations with 2% BEA Pumping Allowance – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9: City of Huntington Beach 2008 Demands Projections without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-18: WSAP Stage 3 and 2008 Demands with Conservation Measures Incorporated (AFY)

Conservation Efforts Achieved	5.0%	7.0%	9.0%	11.0%	13.4%
Years	**2009-2010**	**2015**	**2020**	**2025**	**2030**
Supply[1]	30,376	30,376	30,376	30,376	30,376
Demand[2]	31,845	32,626	33,427	34,247	35,087
Conservation Savings	*1,469*	*2,250*	*3,051*	*3,871*	*4,711*
Reduced Demand with Conservation	30,376	30,376	30,376	30,376	30,376
Difference	**0**	**0**	**0**	**0**	**0**

Notes:

1. Table 4-6 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9 City of Huntington Beach 2008 Demands Projections without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

Table 6-19: WSAP Stage 3 Supplies with 2% BEA Pumping Allowance and 2008 Demands with Conservation Measures Incorporated (AFY)

Conservation Efforts Achieved	~	1.8%	4.1%	6.4%	8.6%
Years	**2009-2010**	**2015**	**2020**	**2025**	**2030**
Supply[1]	32,064	32,064	32,064	32,064	32,064
Demand[2]	31,845	32,626	33,427	34,247	35,087
Conservation Savings	*Supply Surplus*	*562*	*1,363*	*2,183*	*3,023*
Reduced Demand with Conservation	32,064	32,064	32,064	32,064	32,064
Difference	**0**	**0**	**0**	**0**	**0**

Notes:
1. Table 4-7 City of Huntington Beach Supply Allocations with WSAP Stage 2 and 3 Allocations – Normal, Single Dry Year and Multiple Dry Years (2009/2010 – 2030).
2. Table 5-9 City of Huntington Beach 2008 Demands Projections without Conservation.

Developed by PBS&J for long-term water supply planning, August 2009.

If the City chooses to boost its conservation programs, consumption reductions would have a long-term benefit to the local groundwater basin. In addition, these conservation efforts could eliminate the need to purchase additional supplies through MWDOC as discussed in Section 6.0. Future participation in other conservation programs may be funded as an option to offset additional water demands.

Upon implementation of various aggressive 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.[32] However, under certain hydrologic conditions, or more specifically, due to further curtailments in the SWP only very aggressive conservation measures could overcome the supply deficit. Assuming WSAP Stage 3 comes to fruition (curtailment of up to 1,120 acre-feet), water supplies to the City would be further strained and as shown in Table 6-19 and additional conservation would be necessary in 2010. As shown in Table 6-20, under WSAP Stage 3 more conservation, as much as 9.0% by 2020 would be necessary as demands increase due to annual population increases. This also assumes conservation efforts start from 2008 Demand levels. Similarly, as shown in Table 6-19 under WSAP Stage 3, if the City can utilize its 2 percent BEA Pumping Allowance then only 9.0% conservation in 2030 would be necessary. Notably, if demands return to pre-2008 levels a higher level of conservation would be necessary.

32 City of South San Francisco, 2005 Urban Water Management Plan, page 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[33] is anticipated for the entire Orange County groundwater basin. 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 indicate the regional supplies (import water and groundwater) in all hydrologic years are insufficient to meet projected demands within the Orange County groundwater basin as a whole. This is primarily, due to SWP cutbacks related to the protection of the threatened Delta smelt and year three of the statewide drought. If dry years prevail, further import water reductions could be necessary, at this point MWDOC would adjust its supply allocations to WSAP Stage 3. However, one short-term solution to compensate for reduction in import supply can be achieved by pumping within the BEA restriction, currently set at two (2) percent above BPP, at a rate essentially the same as the water rate purchased through MWDOC. This additional pumping can provide sufficient water for pre-approved development projects and provide supplies for some additional development as depicted in Table 6-7. As shown in Table 6-5, if additional supply reductions are necessary the City of Huntington Beach can anticipate deeper supply deficiency gaps.

Notably, the statewide 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 technology could lift the SWP pumping restrictions; thereby, returning the system to firm delivery capacity.

The BECSP project is estimated to require a net increase of 1,180 AFY at build-out. Within the context of the City of Huntington Beach's projected demands through 2030, this represents 3.1 percent of total anticipated demands in the City. Further, the net increase of 1,180 AFY accounts for 33 percent of anticipated growth in water Base Year demands between 2010 and 2030 (1,180/3,572). The proposed BECSP project's demands will be served through supplies from the Orange County groundwater basin managed by OCWD and imported water available from Metropolitan via MWDOC. As stated above, under the current supply situation, due to cutbacks in the SWP and reduced groundwater pumping - in all hydrologic years (Base Year, single and multiple dry years), supplies will be insufficient now and over next 20 years as shown in Section 6. This WSA assumed that supplies allocated in the WSAP considered Base Year demands, and supply reductions through WSAP Stages 2 and 3.

As discussed in Section 6, the City of Huntington Beach could utilize its 2 percent BEA to reduce reliance on imported supplies without additional surcharges. Further in Section 6, utilization of the City's 2 percent BEA will relax some of the necessary conservation measures that the City will need to employ to balance supply and demand. As shown in Tables 6-15, 6-17 and 6-19, depending on the level of demand at the time, the difference in conservation ranges from as little as 1.5 percent in 2025 (Table 6-19) to 9.0 percent in 2030 even under a WSAP Stage 3.

33 Comprehensive Water Demand Discussion, Appendix F.

At the present time, regardless of the programs, plans and strategies that Metropolitan, MWDOC or OCWD are engaged in, due to the supply deficiency in future multiple dry years as modeled in this WSA, it will be necessary for the City of Huntington Beach to use effective conservation measures including installation of water savings fixtures and drought-tolerant landscaping to alleviate the current and projected supply and demand situation. The following section discusses the programs or plan(s) for obtaining sufficient supply.

7.1 Plan for Obtaining Sufficient Supply

SB 610 as stated in Water Code Section 10911(a) requires that if a WSA concludes there is insufficient supply or infrastructure to serve the project, that the plan to obtain sufficient supplies be presented in the WSA. See Appendix G for a discussion of Supplies under Development currently be developed by Metropolitan.

As a part of the development process the project proponents, and possibly the City of Huntington Beach will be installing the necessary infrastructure to supply the proposed project with water. Engineering design and specifications illustrate the infrastructure improvements that will be installed during implementation. Once completed, these plans should be available for review at the City.

Further in Water Code Section 10911(a), those plans may include, but are not limited to, information concerning all of the following:

(1) The estimated total costs, and the proposed method of financing the costs, associated with acquiring the additional water supplies.

(2) 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.

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

7.1.1 Seawater Desalination Plant

Desalination is a viable water supply for Huntington Beach at this time the City has approved a desalination facility, to be located on the AES property that will produce up to 50 MG per day of potable water. Conditions of approval for the project give the City the option of purchasing up to 3,360 AFY (3.2 MG per day) on a firm basis and up to 8.4 MG per day of additional water in a declared water emergency for up to seven consecutive days, with additional water on an as-available basis.

Poseidon Resources Corporation (Poseidon) is the project applicant/proponent for a desalination facility in Huntington Beach and the City has entered into an agreement with Poseidon. The City Council certified the Recirculated EIR for the project in September 2005 and approved the Conditional Use Permit and Coastal Development Permit in February 2006. Poseidon is in the process of obtaining a Coastal Development Permit from the California Coastal Commission. The project has also received several key permits, and construction could begin within the next five years.

7.1.2 Reclaimed Urban Runoff for Non-Potable Irrigation

When there is an opportunity to capture urban runoff, treated captured water can be distributed for non-potable irrigation purposes. For example, the City of Santa Monica captures 500,000 gpd (560 AFY) of urban runoff at its Santa Monica Urban Runoff Recycling Facility. After treatment the reclaimed runoff is distributed for irrigation purposes throughout Santa Monica.

7.1.3 OCWD Long Term Facilities Plan

In response to the requirements in Water Code Section 10911(a), OCWD through implementation of projects identified in the LTFP has taken the necessary steps to address multiple dry year deficiencies as well to provide continued reliable water service through the year 2030. Appendix H contains the LTFP.

The LTFP provides a list of proposed projects that could be implemented to (1) increase the Basin's annual sustainable yield, and therefore accommodate additional pumping, and (2) protect water quality in the Basin. The various projects considered in the LTFP are grouped within the following five categories:

- Recharge Facilities
- New Water Supply Facilities
- Basin Management Facilities
- Water Quality Management Facilities
- Operational Improvement Facilities

LTFP project excerpts Executive Summary of the LTFP are listed herein:

> The LTFP as shown in Table 7-1 considers 29 potential projects among the five [water supply] portfolios that could produce as much as 125,000 AFY of new water and corresponding similar increase in groundwater pumping over the next 20 years. Additionally these projects result in basin management, water quality, and operational improvements.
>
> Sixteen of the 29 projects within the LTFP create new water, subject to the availability of sufficient recharge water. The capital cost of these projects is $311 million. They have a total annual cost of $60 million, which includes O&M and debt service. Their estimated unit cost is $480/acre-feet. These estimated costs, which are based on year 2005 costs, do not include any grant funding, which, if received, would lower the cost.
>
> Thirteen of the 29 projects are within the seawater intrusion control, water quality management, and operational improvement categories. Calculation of a simple unit cost per acre-foot is not possible for these projects.

If all 29 projects were constructed, capital costs for all projects would total $432 million with related O&M costs at about $64 million per year. Total annual costs are estimated at $89 million per year as presented in Table 7-1.[34]

Table 7-1: Summary of Recommended Portfolios

Portfolio	Number of Projects	Maximum			
		Capacity (AFY)	Capital Cost ($M)	O&M Cost ($M/year)	Annual Cost ($M/year)
Recharge	7[a]	93,000[b]	124	14.3	21.5
New Water Supply	6[a]	22,000[c]	150	24.7	33.4
Basin Management – West Orange County	3	10,000[d]	37	3	5.1
Subtotal - New Water	16	125,000	311	42	60
Basin Management - Seawater Intrusion	3	~	90	18.1	23.3
Water Quality	4	~	22.5	2.8	4.1
Operational Improvements	6	~	8.8	1.3	1.9
Totals	29	125,000	432	64	89

Notes:

$M = million dollars

a. Mid-basin Injection included in New Water Supply Portfolio

b. Equivalent to 128 cfs additional percolation. Includes: Santiago Creek Recharge, Four New Recharge Basins, Desalting Facility, Vadose Recharge - Fletcher Basin, 5 Basin Cleaning Vehicles - Deep Basins, and Future Basins.

c. 23,600 AFY of GWR System Phase 1 flows for Mid-Basin Injection and Radial Recharge - Ball Basin, not included. Subsurface Recharge

d. Includes: Shallow Aquifer Development, Colored Water Development.

Source: OCWD Draft Long-Term Facilities Plan 2005.

7.2 Summary of Plan for Obtaining Sufficient Supply

Water Code Section 10911 is specific in its legal descriptions in paragraphs (1), (2), and (3) for obtaining sufficient supply. The entire southern region of California is grappling with insufficient water supplies, and each water wholesaler and retailer has a responsibility to supply adequate supplies to its customers or member agencies. To that end, Metropolitan is working to bolster its regional supplies through a number of programs, plans, contracts, and new or expanded facilities. In order to help reduce regional demands, MWDOC as a member of Metropolitan enacted its WSAP; however, the results of the rationing and savings on a regional level are not fully known.

OCWD as the groundwater basin manager prepared a GMP and established its LTFP to bolster and sustain the Orange County groundwater basin. As discussed above the LTFP has water supply goals, programs for increasing water supplies and financial accountability to obtain those goals and increase groundwater supplies.

Huntington Beach as the water provider to the project area has put forth adequate due diligence evaluations that show good faith efforts in both short and long-term water supply planning. Environmental review was completed for a desalination facility and the City has entered into agreements with Poseidon, the desalination proponent. The City has also granted its approval of the desalination facility.

34 Orange County Water District. Draft Long-Term Facilities Plan. September 2005.

The City will be also expanding and enhancing its conservation efforts through its WUEMP. This effort will reduce the City's regional demands and help to stabilize local groundwater supplies in the Orange County groundwater basin. Furthermore, when there is an opportunity to capture urban runoff, treated captured water can be distributed for non-potable irrigation purposes; thereby, firming up the reliability of potable water within the City boundaries.

8.0 Recommendations for the City of Huntington Beach

This WSA recommends the following measures as means to help balance the regional supply and demand situations over the next 20 years.

- Implement City-wide conservation programs as discussed in Section 6.2 for the proposed Specific Plan as a means to reduce its contribution on regional and local demands. These conservation measures are described in the City's UWMP and in Section 6 of this WSA. In addition, the CUWCC has developed more water conservation measures and if feasible, water suppliers are strongly encouraged to begin to implement these new programs.
- Develop a Cap-and-Trade Program - this program has two water-use offset options listed below.
  a) No Net Gain Program 1: New developments will use water efficient measures and fixtures to nullify its contribution to the citywide demands. If this cannot be achieved, the developer would pay a flat fee into a City buy-in program so that water efficient fixtures can be purchased and installed at sites from a list of "interested parties" in need of plumbing upgrades. Water reductions at the institutional site would offset the added contribution at the new development.
  b) No Net Gain Program 2: Similar to Program 1 except this program allows new developments to exceed existing demands by certain predetermined percentages as shown in Table 8-1. The percentages establish the program buy-in amounts assessed on facility connection charges. The developer would buy into the City's program (based on assessed percentage) so that water efficient fixtures can be purchased and installed at sites from a list of "interested parties" in need of plumbing upgrades. Water reductions at the institutional site would offset the added contribution at the new development.

Table 8-1: No Net Gain Program 2: Sample Percentages for Fees

Exceedance of Existing Water Use	Development Type			
	Residential	Commercial	Municipal	Institutional
5.0%	plus 5% assessed on FCC			
10.0%	plus 10% assessed on FCC			
15.0%	plus 15% assessed on FCC			
20.0%	plus 20% assessed on FCC			
25.0%	plus 25% assessed on FCC			

Notes:
FCC = facility connection charge
Developed by PBS&J, August 2009.

- Water Efficiency and Conservation Commitment. The City will develop water efficiencies and conservation commitment plan. This plan would include project-level conservation measures and in-person meeting to review the conservation requirements and then the developer signs the Conservation Commitment Memorandum. In this manner, the developer has formally committed to conservation and water efficiencies at the project site and would be legally bound to this commitment.
- Implement a Water Use Efficiency Plan Master Plan.

- Investigate the use of reclaimed urban water runoff and complete a feasibility study that fully evaluates using reclaimed urban runoff as a viable non-potable supply.
- Prepare will-serve letter sunset clause. As a water provider the City can condition the building permit with "will-serve letter sunset clause." This allows the City to rescind the will-serve letter at some specific time in the future. In this manner, the developer has a responsibility to move the project forward and the water allocated for the new development is not committed indefinitely.

9.0 References

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APPENDICES

A	Comprehensive Surface and Groundwater Discussion
B	City of Huntington Beach Tentative List of Pre-Evaluated & Pending Development Projects
C	Population Characteristics, Center for Demographic Research, California State University Fullerton, City of Huntington Beach
D	May 2009 Report for the Water Surplus and Drought Management Plan
E	MWDOC Draft Water Supply Allocation Plan (WSAP) with Metropolitan WSAP
F	Comprehensive Demand Discussion
G	Discussion of Supplies under Development
H	OCWD Long-Term Facilities Plan

APPENDIX A

Comprehensive Surface and Groundwater Discussion

1.0 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.

1.1 Regional Climate, Hydrology, and Water Quality

1.1.1 Climate

The regional climate in Southern California reflects a combination of maritime and Mediterranean climates. In the inland valley areas, 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.[1]

The more localized climate in Huntington Beach 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 63.3°F in January to 73.5°F in August. Average minimum temperatures range from 47.0°F in January to 63.5°F in August. Average annual precipitation is 11.2 inches. Nearly 93 percent of the average annual rainfall falls between November and April; nearly 60 percent falls between January and March. A summary of temperature and rainfall data for the City of Huntington Beach is included in Table 4-1.

According to DWR, eleven droughts have occurred in California since 1850. The year 1977 is recognized as the driest single year of California's measured hydrologic record.[2] The most recent multi-year statewide drought took place between 1987 and 1992.[3] Water year 2007, was a dry year throughout California, with parts of Southern California setting new records for minimum annual precipitation.[4]

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

2 Department of Water Resources. Accessed September 2007. Background: Droughts in California. http://watersupplyconditions.water.ca.gov/background.cfm.

3 Department of Water Resources. Accessed September 2007. Background: Droughts in California. http://watersupplyconditions.water.ca.gov/background.cfm.

4 Department of Water Resources. California Drought An Update. April 2008. Accessed January 2009. http://www.water.ca.gov/drought/docs/DroughtReport2008.pdf.

Table 1-1: City of Huntington Beach Climate Summary

	Maximum Average Temperature (°F)[a]	Minimum Average Temperature (°F)[a]	Average Monthly Rainfall (inches)[a]	ETo (inches)[b]	Irrigation (inches)[c]
January	63.3	47.0	2.2	2.18	0.0
February	63.5	48.3	2.4	2.49	0.1
March	63.8	50.0	1.9	3.67	2.3
April	65.2	52.6	0.9	4.71	4.8
May	67.0	56.2	0.2	5.18	6.4
June	69.1	59.3	0.1	5.87	7.4
July	72.2	62.4	0.0	6.29	8.0
August	73.5	63.5	0.1	6.17	7.8
September	73.2	61.8	0.2	4.57	5.5
October	71.0	57.6	0.3	3.66	4.3
November	67.7	51.6	1.2	2.59	1.8
December	64.4	47.6	1.7	2.25	0.7
Annual Average	**67.8**	**54.8**	**11.2**	**49.63**	**49.2**

Notes:
a. Source: Western Regional Climate Center – Newport Beach Harbour, Ca. Data from 11/1/1934 to 6/30/2007.
b. Source: CIMIS Station 75: Monthly Average ETo.
c. Irrigation requirement assumes 15% leaching fraction and 90% irrigation efficiency.

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 SWP water to meet customer demands.

1.1.2 Surface Water Hydrology and Water Quality

There are 13 watersheds in Orange County; portions of Huntington Beach are contained in three of these watersheds: the Talbert Watershed, the Westminster Watershed, and the Santa Ana River Watershed.

The Talbert Watershed covers 21.4 square miles straddling the mouth of the Santa Ana River. It includes portions of the cities of Costa Mesa, Fountain Valley, Huntington Beach, Newport Beach, and Santa Ana. Two main tributaries drain this watershed. On the western side, the Talbert and Huntington Beach Channels drain through the Talbert Marsh before emptying into the Pacific Ocean. On the eastern side, the Greenville-Banning Channel empties into the Santa Ana River.[5]

The Westminster Watershed covers 74.1 square miles in the southwestern corner of Orange County. It includes portions of the cities of Anaheim, Cypress, Fountain Valley, Garden Grove, Huntington Beach, Los Alamitos, Santa Ana, Seal Beach, Stanton, and Westminster. Three main tributaries drain this watershed. The Los Alamitos Channel drains into the San Gabriel River. The

5 Orange County Watersheds. Accessed September 2007. *Introduction to Talbert Watershed.* http://www.ocwatersheds.com/watersheds/talbert.asp.

Bolsa Chica Channel empties into the Anaheim Bay-Huntington Harbour complex. The East Garden Grove-Wintersburg Channel drains through Bolsa Bay into Huntington Harbour.[6]

The Santa Ana River Watershed is the largest in Orange County, covering 153.2 square miles[7] and draining approximately 2,670 square miles.[8] The river begins almost 75 miles away in the San Bernardino Mountains, crossing central Orange County before emptying into the Pacific Ocean. The Orange County portion of the watershed includes portions of the cities of Anaheim, Brea, Huntington Beach, Orange, Placentia, Santa Ana, Villa Park, and Yorba Linda. The river serves as the main tributary to the watershed with Santiago Creek being the largest tributary within Orange County.[9]

The Santa Ana River is not used directly for water supply purposes, but instead, is used to recharge the local groundwater basin. Almost all the flow in the river, over 200,000 acre-feet annually, is diverted into recharge facilities as part of the groundwater basin management plan. The recharge facilities are discussed in more detail in Section 4.2.1.

According to the Orange County Water District's Groundwater Management Plan, average annual captured river flows approximate 155,000 acre-feet annually for baseflow and 60,000 acre-feet annually for stormflow. Because Santa Ana River baseflow is composed primarily of treated wastewater, baseflow is anticipated to increase steadily over time as population in the watershed increases. However, reclamation programs, water conservation, and changes in regulatory requirements could affect the amount of wastewater discharged to the Santa Ana River in the future. Stormflows in the Santa Ana River vary considerably through time depending upon such factors as precipitation intensity, duration, distribution, and the amount of impervious area in the watershed. From 1963 to 2003, annual stormflow volumes have ranged from 16,000 acre-feet to 117,000 acre-feet; OCWD estimates, on average, 60,000 acre-feet of stormwater is captured and recharged annually.

In general, the quality of water in the Santa Ana River becomes progressively poorer as water moves downstream. The highest quality water is typically associated with tributaries flowing from surrounding mountains. Water quality is altered by a number of factors including consumptive use, importation of water high in dissolved solids, runoff from urban and agricultural areas, and the

6 Orange County Watersheds. Accessed September 2007. *Introduction to Westminster Watershed.* http://www.ocwatersheds.com/watersheds/santaanariver.asp.
7 Orange County Watersheds. Accessed September 2007. *Introduction to Santa Ana River Watershed.* http://www.ocwatersheds.com/watersheds/westminster.asp.
8 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.
9 Orange County Watersheds. Accessed September 2007. *Introduction to Santa Ana River Watershed.* http://www.ocwatersheds.com/watersheds/westminster.asp.

recycling of water within the watershed.[10] OCWD is committed to implementing routine monitoring of the Santa Ana River and major creeks and surface water bodies in the upper watershed that are tributary to the river. This is particularly important because Santa Ana River flows are the primary source of recharge water to the groundwater basin.

1.1.3 Groundwater Hydrology and Water Quality

The City of Huntington Beach 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 Department of Water Resources' 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. In fact, some degree of overdraft is desirable to OCWD; this will be discussed in Section 4.2.1.

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

10 United States Geological Survey. Accessed September 2007. Santa Ana Basin, National Water Quality Assessment Program. http://ca.water.usgs.gov/sana_nawqa/.

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 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).

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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 AF (DWR 1967). As of 1998, storage of fresh water within the basin amounted to 37,700,000 AF (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 af 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 af 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 af and an outflow of 342,823 af for the 1998-1999 water year. The inflow includes natural recharge (29,434 af), artificial recharge (222,755 af), and return of applied water (6,224 af). The outflow includes non-irrigation extraction (334,136 af) and irrigation extraction (8,687 af).

Water within the basin is primarily sodium-calcium bicarbonate (DWR 1967). Total dissolved solids range from 232 - 661 mg/L and average 475 mg/L (OCWD 2000). The average TDS content of 240 public supply wells is 507 mg/l with a range of 196 –

1,470 mg/L. Impairments to groundwater quality include the following: sea water intrusion near the coast (DWR 1967; OCWD 1999b), colored water, from natural organic materials in the lower aquifer system (OCWD 1999b), and increasing salinity, high nitrates and MTBE (OCWD 1999b).

OCWD is committed to administering a comprehensive water quality monitoring program in the Basin. Seawater intrusion has been monitored since the early 1900s and includes measured parameters such as chloride, total dissolved solids, electrical conductivity, and bromide. Volatile organic compounds have been monitored since 1986. OCWD's groundwater quality management has also focused on nitrates and colored groundwater, and OCWD recognizes a new class of emerging chemicals of concern: pharmaceuticals, personal care products, and endocrine disruptors. The District intends to prioritize tracking of these chemicals with regulatory agencies. Monitoring activities will be designed with guidance from the Department of Health Services. Management of the groundwater quality is a priority for OCWD; multiple projects are currently being implemented that are designed primarily to enhance regional groundwater quality in the Basin.

1.2 Regional Water Supplies

Regional water supplies are composed of groundwater managed by OCWD and imported water managed by Metropolitan (wholesaled to the City by MWDOC). The City is fully dependent upon Metropolitan, MWDOC, 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 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)). The basin boundary represents all potential users of the groundwater basin because the OCWD Act[11] does not allow a city or water district to take groundwater produced in the basin and pump it outside the basin.

11 Orange County Water District Act. Revised January 2003.

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.

1.2.1 Orange County Water District

Orange County Water District (OCWD or 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.

There are 23 major producers extracting water from the Orange County groundwater basin, which is managed by OCWD in collaboration with the other water and wastewater agencies. 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. Because OCWD is the manager of the Basin and not an urban water supplier, it is not required to develop a UWMP; however, 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.

1.2.1.1. 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 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, the District 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 Basin Pumping Percentage (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."[12] Therefore, OCWD sets the BPP each year based on groundwater conditions, availability of imported water supplies, and basin management objectives. Established BPPs for 2000 through 2005 are shown below in Table 4-2.

Table 1-2: Historical Basin Pumping Percentages

	2001	2002	2003	2004	2005	2006
Annual BPP	75	75	75	66	66	64

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

While the BPP has been as high as 75 percent in recent years, the BPP was set at 66 percent for 2004-2005 and 64 percent for the water year 2005-2006. Although some members of OCWD maintained pumping within the BPP, other members did not. The City of Huntington Beach 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 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 Replenishment Assessment (RA), which designates a cost per acre-foot of groundwater pumped; pumping over the BPP is assigned a Basin Equity Assessment (BEA) for every acre-foot pumped over the BPP in addition to the RA. The BEA comes 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.

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

OCWD's Groundwater Management Plan 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 AF, the basin is considered 99.5 percent full with 40 million acre-feet of groundwater in storage. 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.

1.2.1.2. 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 that 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. OCWD also imports 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.[13]

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 that inject recycled water, imported water, and groundwater into the basin. These facilities are primarily used to prevent seawater intrusion, but in

13 Orange County Water District. 2004. *Groundwater Management Plan*, p. 2-7.

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 injected water 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. Due to variation in climatic conditions and the availability of imported water, the amount of water available for recharge will vary from year to year.

In 2005, the District produced a 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 District's customers will become more reliant upon imported water supplies.

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, MWDOC, and Metropolitan, which allows some Agencies to pump above the BPP without penalty of the BEA. The In-Lieu program is simple, it promotes use of imported water supplies to reduce pumping in the basin, which effectively acts as a form of indirect recharge to the basin.

1.2.1.3. 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 1-3: 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.

Current recharge associated with the Talbert Barrier is 12,000 acre-feet annually, supplied by imported water from Metropolitan. However, OCWD implemented a Groundwater Replenishment System (GWR), which will use purified reclaimed water to artificially recharge the basin. The 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. In January 2008, OCWD completed Phase 1 of the GWR System, which, according to the LTFP, recharges upwards of 72,000 acre-feet annually through the barrier, resulting in a net growth in recharge capacity of 60,000 acre-feet annually. Phase 1 of the GWR System is 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, resulting in a total sustainable yield of the basin of 540,500 acre-feet annually. However, because these projects have not been approved or environmental analysis has not yet been completed, they are not considered firm supplies for the purposes of this report.

1.2.1.4. Dry Year Sustainable Basin Yield

Groundwater production is likely to increase in dry years as imported supplies are reduced. While this isn't quantified in OCWD's Groundwater Management Plan, 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. While producers can obtain 100 percent of their supplies from the groundwater basin, this is typically not cost-effective and so is not the preferred choice.

However, the lack of pumping restrictions has significant benefits for water supply reliability for the local producers. Supplies for the City of Huntington Beach, and, in fact, all other water districts within the OCWD boundary, are 100 percent reliable in dry years due to the lack of pumping restrictions and the ability to maintain a basin deficit over multiple years. That said, if a drought lasts long enough, or if the basin is significantly overdrafted when a drought begins, the basin groundwater pumping levels will drop. Some wells will not have pump bowl submergence and would be inoperable. Obviously, this is an extreme condition, but it is technically possible.

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, the District 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.

1.2.2 Municipal Water District of Orange County

The MWDOC was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911. MWDOC was formed for the purpose of contracting with Metropolitan to acquire supplemental imported water supplies from northern California and the Colorado River for use within Orange County. MWDOC is Metropolitan's third largest member agency; it represents 30 member agencies and provides and manages the imported water supplies used within its service area. MWDOC is a regional water wholesaler and resource planning agency, managing all of Orange County's imported water supply with the exception of water imported to the cities of Anaheim, Fullerton, and Santa Ana. MWDOC serves more than 2.3 million residents in a 600-square mile service area. It is through MWDOC that the City of Huntington Beach purchases imported water from Metropolitan.

Direct-use water (water directly piped from treatment facilities or wells to homes and commercial and institutional buildings, as opposed to indirect use, which is water needed to replenish groundwater storage and to serve as a barrier against saltwater intrusion) in MWDOC's service area comes from

both local and imported supplies. Local supplies developed by individual member agencies, primarily groundwater, presently account for about 50 percent of MWDOC's direct water use. Other local supplies include recycled wastewater and surface water. The remaining 50 percent of direct water use demand is met by imported water from Metropolitan.

1.2.3 Metropolitan Water District of Southern California

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.[14] As a wholesaler, Metropolitan has no retail customers, and distributes treated and untreated water directly to its 26 member agencies. Some member agencies provide retail water service, while others provide water to the local area as wholesalers; some member agencies provide a combination of both. Most Metropolitan water purveyors, including the City of Huntington Beach, utilize both surface water and groundwater to meet customer demands; however some depend exclusively on Metropolitan's imported supplies.

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 associated populations. Metropolitan has provided 45 to 60 percent of all municipal, industrial, and agricultural water used in its service area.

Although most cities in Orange County, including Huntington Beach, receive Metropolitan's imported water through the MWDOC, the cities of Santa Ana, Anaheim and Fullerton receive imported water directly from Metropolitan. For this reason, imported supplies to the basin are equal to the sum of imported water received by members of MWDOC within the OCWD boundary, which include the cities of Santa Ana, Anaheim, and Fullerton.

The majority of water acquired by Metropolitan is imported and originates from Northern California via the SWP and the Colorado River watershed via the CRA. 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). MWDOC and the City of Huntington Beach receive only imported water from Metropolitan. Metropolitan is a water wholesaler, not an urban water supplier, and is, therefore, not required to develop a UWMP.

14 Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan, p. I-3.

However, due to competing demands on the SWP and Colorado River water and concerns related to regional water operations, Metropolitan has prepared a Regional Urban Water Management Plan (RUWMP). This document summarizes the major planning initiatives undertaken by Metropolitan, including the Integrated Resources Plan (IRP), the IRP Update, the Water Surplus and Drought Management Plan, and the Strategic Plan along with its 2001 Rate Restructure. The 1996 IRP established a goal of 100 percent reliability for full-service demands 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. The RUWMP provides a policy framework, guidelines, and resource targets that define the future of Metropolitan.

The RUWMP provides information on the SWP and CRA; historical, current, and projected water supplies and demands for customers in its service area; future water supply reliability, and; information related to conservation, recycling, water storage and transfer agreements, and water quality. It should be noted, however, that recent court decisions have forced the Department of Water Resources to curtail pumping in the Delta to protect the threatened Delta smelt, thereby reducing the amount of water available to Metropolitan and other SWP contractors. Consequently, projected supplies and supply reliability established in the RUWMP are questionable. This will be discussed in more detail later in this section.

The following information related to Metropolitan's imported water supplies is taken from Metropolitan's 2005 RUWMP.

1.2.3.1. 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.

Over the years, a number of factors have affected the levels of Colorado River water available to Metropolitan. First, Metropolitan's dependable supply of Colorado River water was further defined in the 1964 U.S. Supreme Court decree in *Arizona v. California* and was limited to 550,000 acre-feet annually. 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 in 1985. Second, in 1979, the Present Perfected Rights (PPRs) of certain Indian reservations, cities, and individuals along the Colorado River were quantified, further limiting Metropolitan's Colorado River supply. These PPRs predate the Seven-Party Agreement, but the rights holders were not included in the Seven Party Agreement prioritizing California's use and storage of Colorado River water. Since 1985, these PPR holders have used less than 20,000 acre-feet annually; however, because over 5,362,000 acre-feet of Colorado River water were already allocated, it was not clear which rights would be affected by the use of these PPRs. As a result, over time the amount of Colorado River water available to Metropolitan will be reduced slightly. By 2030, the basic apportionment expected to be received by Metropolitan is expected to be 503,000 acre-feet annually.

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 (IID), 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. This water is typically only available in average or above-average rainfall years. While this can add to the ultimate supply available to Metropolitan, it is not a dependable source of supply in all years. In 2030, 19,000 acre-feet annually is expected to be available to Metropolitan in average and above-average years.

Additional Colorado River water is made available to Metropolitan through conservation and land management programs entered into with participating agencies. A minimum of 80,000 acre-feet annually is received through a conservation program entered into with IID. Under a 1988 agreement, Metropolitan funded water efficiency improvements within IID's service area in return for the right to divert the water conserved by those investments. Under this program, IID implemented a number of structural and nonstructural measures, including the lining of existing earthen canals with concrete, constructing local reservoirs and spillinterceptor canals, installing non-leak gates, and automating the distribution system. Through this program, Metropolitan initially obtained an additional 109,000 acre-feet per year. Execution of the Quantification Settlement Agreement (QSA) and amendments to the 1988 and 1989 agreements resulted in changes in the availability of water under the program, extending the term to 2078 and guaranteeing Metropolitan at least 80,000 acre-feet per year. In 2030, 85,000 acre-feet annually is expected to be received through the conservation program with IID. The remainder of the conserved water is available to CVWD.

In 2003, the QSA was authorized by representatives from Metropolitan, IID, Coachella Valley Water 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 May 2004, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with the Palo Verde Irrigation District (PVID). Under the program, participating farmers in PVID will be paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of lands within PVID can be fallowed in any given year. Under the terms of the QSA, water savings within the PVID service area will be made available to Metropolitan. Partial implementation of the program began in January 2005, with deliveries in that year of 85,000 acre-feet. When fully implemented, the program is estimated to provide up to 111,000 acre-feet per year. The agreement also states that when fully implemented the program will supply a minimum of 26,000 acre-feet per year. 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.

Metropolitan has also formed agreements to transfer some of its Colorado River supplies to other agencies. Metropolitan formed an agreement and Exchange Program with the Desert Water Agency (DWA) and CVWD in 1967 for interagency transfers of water supplies. DWA and CVWD also known as DWCV 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. DWA has a SWP Table A[15]

[15] Table A water is the maximum contractual amount that SWP Contractors can request each year.

contract right of 38,100 acre-feet per year and CVWD has a SWP Table A contract right of 23,100 acre-feet per year, for a total of 61,200 acre-feet per year. In addition, Metropolitan has been delivering water in advance (via the Advance Delivery Agreement) 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 demands. The amount of DWA and CVWD SWP Table A water available to Metropolitan depends on total SWP deliveries and varies from year-to-year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff, and actual deliveries of water. Approximately 35,000 acre-feet of water is expected to be transferred to CVWD and DWA on an annual basis based on projected SWP deliveries.

The Metropolitan, DWA and CVWD Exchange Program is currently in operation. The Advance Delivery Agreement has been in place since 1967 and was modified in 1984. Since 1967 Metropolitan has been taking delivery of these agencies' SWP Table A water and providing equivalent water to those agencies from Metropolitan's supplies on the CRA. Metropolitan has also been delivering water in advance of the amount needed under the Exchange Program agreement. This water can be called on by Metropolitan during dry years. By the end of 2005, Metropolitan expects to have 325,000 acre-feet in the Advance Delivery account.

Metropolitan's expected Colorado River supplies in 2030 under all hydrologic conditions, based on the discussion above, are presented in Table 4-4.

Table 1-4: Colorado River Aqueduct Supplies, 2030 (acre-feet/year)

Current Programs	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
Base Apportionment – Priority 4[a]	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	19,000	0	0
PVID Land Mgmt. Program	70,000	111,000	111,000
Less DWCV SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Total Current Supplies	**642,000**	**664,000**	**664,000**

Notes:

The Department will revise the allocation as hydrologic and water supply conditions develop and provide for additional deliveries.

a. Basic Apportionment less Present Perfected Rights.
Source: Metropolitan Water District of Southern California. *Regional Urban Water Management Plan.* 2005. p. A.3-38.

1.2.3.2. State Water Project

The SWP, owned by the state and operated by the Department of Water Resources (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 demands 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, demands 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 demands. The amount of Table A deliveries approved by DWR vary annually based on contractor demands, 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.

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.

In 2005, the Department of Water Resources published The State Water Project Reliability Report. 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. A discussion of the analysis tool (the CalSim II computer simulation model) can be found in the above-mentioned report. 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.

The results of five computer simulations are included 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 demands, 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. 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 (shown in Table 4-5).

Table 1-5: California Aqueduct Supplies, 2030 (acre-feet/year)

Current Programs	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
SWP Deliveries	1,472,000	175,000	509,000
San Luis Carryover	280,000	280,000	93,000
SWP Call-back of DWCV Table A Transfer	0	5,000	26,000
Central Valley Storage and Transfers			
Semitropic Program	0	107,000	107,000
Arvin Edison Program	0	90,000	90,000
San Bernardino Valley MWD Program	20,000	70,000	37,000
Kern Delta Program	0	50,000	50,000
Current Supplies	**1,772,000**	**777,000**	**912,000**

Source: Metropolitan Water District of Southern California. 2005. *Regional Urban Water Management Plan.* p. A.3-43.

In addition to Metropolitan's SWP Table A water, additional SWP water is received through the transfer agreement with DWCV (see Section 4.3.2.1). Under this program, Metropolitan delivers Colorado River water to the DWCV in exchange for their SWP Contract Table A allocations. Metropolitan can make advance deliveries of Colorado River water under the terms of the agreement with these agencies. By making advance deliveries, Metropolitan is able take DWCV SWP Table A allocation in dry years without having to deliver an equivalent amount of Colorado River water so long as there is enough advance delivery water to cover Metropolitan's exchange obligation. This program allows Metropolitan to maximize delivery of SWP and Colorado River water in dry years. The advance delivery provision increases SWP Table A deliveries to Metropolitan by about 6,000 acre-feet in a single dry year like 1977 and by about 18,000 acre-feet in multiple dry years similar to the period 1990-1992. These increases in dry year Table A deliveries are incorporated into the estimate of SWP Deliveries under Current Programs shown in Table 4-5.

The Monterey Amendment, executed by DWR and the SWP contractors in 1995 and 1996, addressed the allocation of SWP water in times of shortage. The 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 by 93,000 acre-feet to 285,000 acre-feet, depending on supply conditions. These amounts of carryover water include DWCV carryover water acquired through the transfer agreement mentioned above, which is stored in average and above-average rainfall years.

There are also transfer and exchange programs that increase Metropolitan's SWP supplies. Metropolitan has entered into one such agreement with the Desert Water Agency and Coachella Valley Water District (DWCV). Under the transfer agreement, Metropolitan transferred 100,000 acre-feet of its SWP Table A amount to DWCV. Under the terms of the agreement, DWCV pays all SWP charges for this water, including capital costs associated with capacity in the California Aqueduct to transport this water and variable costs to deliver this water to Perris Reservoir. The amount of water actually delivered in any given year depends on that year's SWP allocation. Water is delivered through the existing exchange agreements between Metropolitan and DWCV. While Metropolitan transferred 100,000 acre-feet of its Table A amount, it retained other rights, including interruptible water service; its full carryover amounts in San Luis Reservoir; its full use of flexible storage in Castaic and Perris Reservoirs; and any rate management credits associated with the 100,000 acre-feet. In addition, Metropolitan is able to recall the SWP transfer water in years in which Metropolitan determines it needs the water to meet its water management goals. The main benefit of the agreement is to reduce Metropolitan's SWP fixed costs in wetter years when there are more than sufficient supplies to meet Metropolitan's water management goals, while at the same time preserving its dry year SWP supply. In a single critically dry year like 1977, the call-

back provision of the transfer can provide Metropolitan about 5,000 acre-feet of SWP supply. In multiple dry years like 1990-1992 it can provide Metropolitan about 26,000 acre-feet of SWP supply.

Metropolitan has also entered into several Central Valley storage and transfer programs, which are discussed below. These storage programs consist of partnerships with Central Valley agricultural districts and 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 (Semitropic). 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 withdrawal ranges from a minimum of 31,000 acre-feet per year (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 (Arvin-Edison). 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 withdrawal 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 is also 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 Valley MWD). The purchased SWP supply is provided to Metropolitan through either direct deliveries of SWP water or recaptured SWP water stored by San Bernardino Valley MWD 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. This program can deliver between 20,000 acre-feet and 80,000 acre-feet, depending on hydrologic conditions. The expected delivery for a single dry year similar to 1977 is 70,000 acre-feet. The expected delivery for a multiple dry year period similar to 1990-1992 is 37,000 acre-feet. The agreement with San Bernardino Valley MWD also allows Metropolitan to store up to 50,000 acre-feet of transfer water for use in dry years. In wet years the program can produce up to 130,000 acre-feet of water supply.

Metropolitan has also entered into Principles of Agreement with Kern Delta Water District (Kern Delta) for development of a dry year supply program. When available, water is stored in Kern Delta'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. Metropolitan's expected SWP supplies in 2030 under all hydrologic conditions are presented in Table 4-5 above.

1.2.3.3. Sacramento-San Joaquin Delta Supply Reductions

Recent court decisions have forced the Department of Water Resources to curtail pumping in the Delta to protect the threatened Delta smelt, thereby reducing the amount of water available to Metropolitan and other SWP contractors. Consequently, projected supplies and supply reliability established in the RUWMP are questionable.

On May 25, 2007, a U.S. Judge found that the 2005 U.S. Fish and Wildlife Service Biological Opinion for delta smelt was not consistent with the requirements of the Federal Endangered Species Act and must be rewritten. On August 31, 2007 the same judge established interim operating rules to protect delta smelt until USFWS rewrites the biological opinion. The interim operating rules set in-Delta flow targets in Old and Middle Rivers from late December through June that will restrict CVP and SWP pumping in 2008 and until the delta smelt biological opinion is rewritten.[18]

Since the 2005 SWP Delivery Reliability Report, DWR has updated its estimate of current (2007) and future (2027) SWP delivery reliability (Table 4-6) and has expanded the conditions under which reliability is quantified. The additional conditions are changes in hydrology due to potential climate change for the future and restrictions on SWP and CVP pumping in accordance with the interim operation rules imposed by the December 2007

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

Federal Court order. 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.

Table 1-6: Projected SWP Table A Deliveries from the Delta (in Percent of Maximum Table A Amount)

Study	Long-Term Average	Single Dry Year (1977)	2-Year Drought (1976-1977)	4-Year Drought (1931-1934)	6-Year Drought (1987-1992)	6-Year Drought (1929-1934)
2005 Report, Current (2005)	68%	4%	41%	32%	42%	37%
2005 Report, Future (2025)	77%	5%	40%	33%	42%	38%
2007 Report, Current (2007)	63%	6%	34%	35%	35%	34%
2007 Report, Future (2027)	66-69%	7%	26-27%	32-37%	33-35%	33-36%

Source: Department of Water Resources. The State Water Project Delivery Reliability Report 2007. Draft. p. 46.

In its current UWMP, Metropolitan projected multiple dry year periods based on the three years of shortest supplies (1990-1992 hydrology). Although this is not a drought sequence contained in the above table from DWR's SWP Delivery Reliability Report, there is an analysis of the 1990-1992 drought sequence contained in the Report.[20] To be consistent with Metropolitan's UWMP, this WSA considers 1990-1992 as the multiple dry year scenario. Supplies were much lower during the 1990-1992 period compared to all of the dry year periods analyzed in the above table. Further, in its current UWMP, Metropolitan projected multiple dry year periods for years ending in "0" or "5". Its planning for multiple dry years is based on an average of three years with this extreme hydrology. Thus, the results presented for 2010 can be considered representative of results for 2008, 2009, and 2010. To be consistent, this WSA also averages the three year drought scenario to project supplies in years ending in “0” or “5”.

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. 54-55.

Based on communications with Metropolitan staff, SWP cutbacks occurring due to pumping restrictions imposed for protection of the Delta smelt would affect Table A Allocation deliveries and Table A Call-back[21] water, but not carryover water[22] or storage and transfer agreements. The expected California Aqueduct supplies, under the interim operating rules imposed by the Federal Court, are shown in Table 4-7.

Table 1-7: California Aqueduct Supplies with Interim Delta Operating Rules, 2030 (acre-feet/year)

Current Programs	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
SWP Deliveries	1,289,925	138,054	357,494
San Luis Carryover	280,000	280,000	93,000
SWP Call-back of DWCV Table A Transfer	0	7,000	18,127
Central Valley Storage and Transfers			
Semitropic Program	0	107,000	107,000
Arvin Edison Program	0	90,000	90,000
San Bernardino Valley MWD Program	20,000	70,000	37,000
Kern Delta Program	0	50,000	50,000
Current Supplies	**1,589,925**	**742,054**	**752,621**

Source: Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan. p. A.3-43.

1.2.3.4. In-Basin Storage

Metropolitan has also identified a number of in-basin storage programs to enhance emergency, drought, and seasonal reliability. Surface storage is a major component of Metropolitan's in-basin storage strategy, providing a means of storing water during normal and wet years for future use during dry years, when imported supplies are reduced. Metropolitan and the Department of Water Resources have constructed several surface water reservoirs to enhance water supply reliability, including Pyramid Lake, Castaic Lake, Elderberry Forebay, Silverwood Lake, Lake Perris, Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir, and Diamond Valley Lake. Some of these reservoirs are used solely for regulatory purposes, but most provide water supply reliability to the region.

Metropolitan operates Diamond Valley Lake, Lake Skinner, and Lake Mathews. Diamond Valley stores water imported during years of ample supply. Of its 800,000 acre-foot

21 Call-back water is SWP water transferred to other water agencies and then "called back" to meet customer demands. In fact, Metropolitan called back 100,000 acre-feet from DWCV in 2005 but did not call back water in 2006 and 2007.

22 Carryover water is water remaining in storage from one year to the next, which adds to current supplies and can be used to meet demands.

capacity, approximately one-third is dedicated to emergency storage, and the remainder is available to augment supplies during dry years and for seasonal storage. In contrast, Lake Skinner and Lake Mathews are largely used for system operations rather than seasonal storage. The total available storage capacity for all Metropolitan-controlled surface reservoirs (Metropolitan-owned and DWR terminal reservoirs) is 1,625,700 acre-feet. After accounting for emergency storage, the surface storage available in Metropolitan-owned reservoirs to meet dry-year/seasonal requirements in 2030 ranges from 601,000 acre-feet in a single dry year similar to 1977 and 200,000 acre-feet in a multiple dry year period similar to 1990-1992.

There is also flexible storage available in Castaic Lake and Lake Perris. In return for participating in repayment of the capital costs of constructing there reservoirs, Metropolitan has the contract right to withdrawal SWP water from these reservoirs, in addition to their allocated supply in any year on an as-needed basis. This effectively provides Metropolitan with dry year supply. As part of the flexible storage program, any water taken from these reservoirs must be replaced within five years of the first withdrawal. Metropolitan has contractual rights to 65,000 acre-feet of flexible storage at Lake Perris (East Branch terminal reservoir) and 153,940 acre-feet of flexible storage at Castaic Lake (West Branch terminal reservoir). This storage provides Metropolitan with additional options for managing SWP deliveries to maximize yield from the project. Over multiple dry years it can provide Metropolitan with 73,000 acre-feet of additional supply. In a single dry year like 1977 it can provide up to 219,000 acre-feet of additional supply to Southern California.

There are also a number of groundwater storage and conjunctive use programs that enhance Metropolitan's supply reliability. These include long-term replenishment and cyclic storage programs, North Las Posas storage, and Proposition 13 storage projects, discussed in detail below.

Metropolitan has developed a number of local programs to work with its member agencies to increase storage in groundwater basins. In the past, Metropolitan encouraged storage through its cyclic and seasonal storage programs. Metropolitan can currently draw on 20,000 acre-feet per year of dry-year supply from cyclic storage accounts with several member agencies. Long-term replenishment provides the remainder; together these programs provide 86,000 acre-feet of dry year supplies for Metropolitan.

In 1995, Metropolitan entered into an agreement with Calleguas Municipal Water District to develop facilities for storage and extraction in the North Las Posas Basin in Ventura County.

The agreement gives Metropolitan the right to store up to 210,000 acre-feet of water in the North Las Posas Groundwater Basin. As of 2009 18 aquifer storage recovery (ASR) wells were installed and now online, a final phase of this groundwater storage program will install another 12 wells. At this time, the 18 wells in ASR well field can produce 66 cubic feet per second (cfs) or up to a maximum capacity 42.36 mgd. Upon completion of the final phase, the ASR well field is expected to produce 100 cfs or a maximum capacity of 64.5 mgd.. These well fields are expected to be fully operational in 2007 after the completion of the Moorpark pipeline pump station by the Calleguas MWD. At that stage, the project will be able to pump 47,000 acre-feet per year from the basin.

Proposition 13 provided $45 million to support groundwater conjunctive use projects within Metropolitan's service area. These agreements have facilitated projects in Los Angeles County, Orange County, and San Bernardino County. Some projects are in the design-phase, some are under construction, and some have been completed. These projects together provide for 64,000 acre-feet of dry year supplies. Over $40 million was spent by June 2005 on these conjunctive use programs. The remainder will be used to fund projects under development, discussed in Section 7.1.3.

Metropolitan's expected in-basin storage supplies in 2030 under all hydrologic conditions, based on the discussion above, are presented in Table 4-8. Note that in-basin storage supplies are not utilized in average years, but, instead, are conserved for use in dry years.

Table 1-8: In-Basin Storage Supplies, 2030 (acre-feet/year)

Current Programs	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
Metropolitan Surface Storage (Diamond Valley Lake, Lake Mathews, Lake Skinner)	0	601,000	200,000
Flexible Storage in Castaic Lake and Lake Perris	0	219,000	73,000
Groundwater Conjunctive Use Programs			
Long-term Replenishment and Cyclic Storage	0	86,000	86,000
North Las Posas Storage	0	47,000	47,000
Proposition 13 Storage	0	64,000	64,000
Current Supplies	**0**	**1,017,000**	**470,000**

Source: Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan, p. A.3-48.

1.2.3.5. Total Metropolitan Imported Supplies

As discussed in detail in the previous sections, total projected imported water supplies for Metropolitan's service area come from the CRA, SWP (California Aqueduct), and in-basin storage; with supply amounts from each of these sources shown below in Table 4-9. Supplies conveyed by the California Aqueduct include SWP deliveries related to Metropolitan's Table A Allocation, San Luis Carryover water, and water purchased through the San Bernardino Valley Municipal Water District program. Supplies listed under CRA include Metropolitan's Base Apportionment Fourth Priority water, a limited amount of Fifth Priority water (available in years of surplus water), and water provided through the Conservation Program with IID and Land Management Program with PVID. No in-basin storage would be utilized during normal years. 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 1-9: Projected Metropolitan Imported Supplies in an Average Year with Interim Delta Operating Rules (acre-ft/year)

	2010	2015	2020	2025	2030
In-Basin Storage[a]	0	0	0	0	0
California Aqueduct[b]	1,514,679	1,536,178	1,557,677	1,579,176	1,589,925
Colorado River Aqueduct[c]	711,000	643,000	642,000	642,000	642,000
Total Imported Supply	**2,225,679**	**2,179,178**	**2,199,677**	**2,221,176**	**2,231,925**

a. From Table 4-8: In-Basin Storage Supplies, 2030 (acre-feet/year).
b. From Table 4-7: California Aqueduct Supplies with Interim Delta Operating Rules, 2030 (acre-feet/year).
c. From Table 4-4: Colorado River Aqueduct Supplies, 2030 (acre-feet/year).

Metropolitan's single dry year supply, shown in Table 4-10, is estimated based on 1977 hydrology and the assumption that historic hydrology will repeat itself. The California Aqueduct supplies include Metropolitan's SWP Table A Allocation, DWA and CVWD Table A Allocation, San Luis Carryover water (including DWA and CVWD carryover supplies), and supply from the four Central Valley Storage and Transfer agreements. CRA supplies include Metropolitan's fourth priority water supplies, supplies obtained through the conservation program with IID, and PVID's Land Management Program. In-basin storage is utilized in dry years to meet demands; 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 1-10: Projected Metropolitan Imported Supplies in a Single Dry Year with Interim Delta Operating Rules (acre-ft/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	723,922	729,103	734,283	739,464	742,054
Colorado River Aqueduct	722,000	664,000	664,000	664,000	664,000

Metropolitan Supply	**2,594,922**	**2,554,103**	**2,511,283**	**2,469,464**	**2,423,054**

a. From Table 4-8: In-Basin Storage Supplies, 2030 (acre-feet/year).
b. From Table 4-7: California Aqueduct Supplies with Interim Delta Operating Rules, 2030 (acre-feet/year).
c. From Table 4-4: Colorado River Aqueduct Supplies, 2030 (acre-feet/year).

Multiple dry year supplies for Metropolitan, shown in Table 4-11, are estimated based on 1990-1992 drought and also assumes that historic hydrologic events will be repeated. The same supply sources are utilized, but in differing amounts than in a single dry year. For instance, more SWP Table A supplies are available

Table 1-11: Projected Metropolitan Supplies in Multiple Dry Years with Interim Delta Operating Rules (acre-ft/year)

	2010	2015	2020	2025	2030
In-Basin Storage	514,000	518,000	502,000	487,000	470,000
California Aqueduct	724,543	727,386	730,229	733,072	734,494
Colorado River Aqueduct	722,000	664,000	664,000	664,000	664,000
Total Dry Year Supply	**1,960,543**	**1,909,386**	**1,896,229**	**1,884,072**	**1,868,494**

a. From Table 4-8: In-Basin Storage Supplies, 2030 (acre-feet/year).
b. From Table 4-7: California Aqueduct Supplies with Interim Delta Operating Rules, 2030 (acre-feet/year).
c. From Table 4-4: Colorado River Aqueduct Supplies, 2030 (acre-feet/year).

through the California Aqueduct in multiple dry years, and less of the San Luis carryover water is necessary to meet projected demands. The CRA 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.

1.2.3.6. Determining Imported Water Supply to the Basin

For years in which Metropolitan's supplies are sufficient to meet firm demands, imported supplies to the Orange County Basin were determined using a demand-proportionate approach. The demands for the cities of Anaheim, Fullerton, and Santa Ana (all direct members of Metropolitan) were compared to the demands of the entire Metropolitan service area; these ratios were then applied to Metropolitan's projected supplies to determine the demand-proportionate supply that can reasonably be expected to be received by the agencies listed below (Appendix B). All other imported supplies received in the basin are wholesaled by MWDOC. Projected demand data provided in MWDOC's 2005 UWMP, broken down by member agency, was utilized for the demand-proportionate approach (see Appendix C); projected demands for Huntington Beach were updated with information provided in the City's 2005 UWMP. The demands projected for member agencies within

OCWD were compared to the total demand of all MWDOC members; this ratio was then applied to projected MWDOC imported supplies to determine the demand-proportionate supply that can reasonably be expected to be received (see Appendix D).

For years in which Metropolitan's supplies are insufficient to meet firm demands, imported supplies to the Orange County Basin were determined using the Water Supply Allocation Plan (WSAP) refer to Appendix E. 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 Delta, Metropolitan is faced with the possibility that it may not have access to the supplies necessary to meet total firm demands 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 plan includes many factors used to accomplish an equitable regional allocation of Metropolitan supplies during times of shortage. These factors include the impact on retail customers and the economy, growth allowances, changes in local supplies, recycling and conservation, and investment in Metropolitan's facilities. The plan includes sample calculations for determining a particular member agency's allocation, as well as estimated retail 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 included estimated retail and wholesale reliability for member agencies based on shortage percentage. The shortage percentages, which correspond to designated shortage levels outlined in the Plan, 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 the factors, such as impact on retail customers and level of investment in Metropolitan's facilities, described above. 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). These values are shown in Table 4-12.

Table 1-12: Wholesale Reliability for Imported Supplies within the Basin (acre-ft/year)

Shortage Percentage (Regional Shortage)	10%	20%	40%
Anaheim	96.7%	92.4%	84.6%
Fullerton	96.4%	91.9%	83.7%
Santa Ana	96.6%	92.4%	84.5%
MWDOC (in basin)	94.9%	89.2%	78.3%

Source: Metropolitan Water District of Southern California. Board of Directors, Water Planning and Stewardship Committee. February 12, 2009 Board Meeting. *Attachment 2. Values shown are for the proposed formula.*

These values were interpolated to determine the effects of a 5, 15, 25, 30, and 35 percent regional shortage. Projected regional shortages based on a basin-wide supply demand comparison 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 wholesale allocations of supplies during years of insufficient water, the wholesale reliability percentages shown in and interpolated from Table 4-12 were applied to the projected imported supplies in normal, single dry, and multiple dry years, shown in Table 4-13, Table 4-14, and Table 4-15, respectively. As stated above, during years of sufficient supplies, a demand-proportionate method was used to determine member agency allocation.

Table 1-13: Projected Normal Year Imported Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year)[a]

Agency	2010	2015	2020	2025	2030
Anaheim	25,722	27,310	27,465	26,212	24,355
Fullerton	8,237	10,037	10,203	9,083	7,797
Santa Ana	16,408	17,807	18,580	18,675	17,407
MWDOC (in basin)	104,711	126,839	134,895	128,053	118,960
Total In-Basin Imported Supply	**155,078**	**181,993**	**191,143**	**182,023**	**168,520**

Notes:
Based on calculated demand-proportionate supply of imported water supplied by Metropolitan as shown in Appendix B and derived from WSAP (Appendix E).

Table 1-14: Projected Single Dry Year Imported Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year)

Agency	2010	2015	2020	2025	2030
Anaheim	27,761	29,937	29,428	27,512	25,191
Fullerton	12,397	15,921	15,917	14,483	12,472
Santa Ana	17,717	19,516	19,908	19,605	18,005
MWDOC (in basin)	129,774	164,928	171,781	161,012	145,918
Total In-Basin Imported Supply	**187,649**	**230,303**	**237,034**	**222,612**	**201,587**

Notes:
Based on calculated demand-proportionate supply of imported water supplied by Metropolitan as shown in Appendix B and derived from

WSAP (Appendix E).

Table 1-15: Projected Multiple Dry Year Imported Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year)

Agency	2010	2015	2020	2025	2030
Anaheim	18,540	19,549	19,724	18,232	16,784
Fullerton	7,612	10,333	10,564	9,396	8,046
Santa Ana	11,872	12,692	13,246	12,856	11,985
MWDOC (in basin)	81,880	102,701	110,217	100,544	91,425
Total In-Basin Imported Supply	**119,904**	**145,274**	**153,752**	**141,028**	**128,240**

Notes:
Based on calculated demand-proportionate supply of imported water supplied by Metropolitan as shown in Appendix B and derived from WSAP (Appendix E).

1.2.4 Supply Analysis for the Region and Basin

A determination of imported supplies within the basin in normal, single dry and multiple dry years was developed using a demand-proportionate approach (model) for all years through 2025. The results of this analysis are shown in Tables 4-16, 4-17 and 4-18. After 2025, the WSAP formula (see Appendix E) was used to determine imported water supplies to the basin in 2030 when Metropolitan supplies are no longer sufficient to meet projected demands. A comparison of supply and demands is presented in Section 5. As shown in Table 5-4 (Section 5, page 5-2), projected supplies are insufficient to meet firm demands in multiple dry years, which assumes multiple dry year scenarios could occur in any given year.

1.2.5 Total Supplies within the Basin

Total supplies within the basin are primarily composed of local groundwater managed by OCWD and imported water managed by Metropolitan, as discussed previously. There is, however, a limited amount of local surface water used within the basin by Serrano Water District (SWD). SWD serves a population of 6,500 in the City of Villa Park and a small portion of the City of Orange. SWD receives its water supply from local surface water which is stored in Irvine Lake and groundwater from three wells located within the City of Villa Park (groundwater supply is analyzed in Section 4.2.1). According to the OCWD Engineer's Report for 2005-2006, SWD used 1,382 acre-feet of local surface water diverted from Irvine Lake. SWD is largely built out with an opportunity for a small amount of infill; for this reason, surface water supplies are not expected to increase in the future.

Total basin supplies in an average year are shown in Table 4-16.

Table 1-16: Projected Normal Year Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year)

Water Supply Source	2010	2015	2020	2025	2030
Groundwater[a]	384,500	384,500	384,500	384,500	384,500
Imported Water[b]	155,078	181,993	191,143	182,023	168,520
Local Surface Water[c]	1,382	1,382	1,382	1,382	1,382
Total Water Supply	**540,960**	**567,875**	**577,025**	**567,905**	**554,402**

Notes:
a. Based on Table 4-3: Sustainable Yield of the Orange County Basin, 2005.
b. Based on Table 4-13: Projected Average Year Imported Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year).
c. Based on Orange County Water District. 2005-2006 Engineer's Report on the Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District. p. 34. Because Serrano Water District is largely built-out, 2005 use of local surface water is expected to remain constant.

Total basin supplies in single dry and multiple dry years are shown in Table 4-17 and Table 4-18, respectively. The sustainable yield of the basin is currently estimated to be 324,500 acre-feet annually. Production in the last two years has been within that amount; however, production in the previous eight years exceeded that amount, with a maximum annual production of 383,367 acre-feet occurring in 1999-2000. Regardless, the basin is still operating in a safe range according to OCWD, and with recent production being less than average recharge and the implementation of the Groundwater Replenishment System (which will bring the sustainable yield of the basin to 384,500 acre-feet annually), the basin will be able to withstand temporary increases in production due to the occurrence of dry years or multiple dry years.

Table 1-17: Projected Single Dry Year Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year)

Water Supply Source	2010	2015	2020	2025	2030
Groundwater[a]	384,500	384,500	384,500	384,500	384,500
Imported Water[b]	187,649	230,303	237,034	222,612	201,587
Local Surface Water[c]	1,382	1,382	1,382	1,382	1,382
Total Water Supply	**573,531**	**616,185**	**622,916**	**608,494**	**587,469**

Notes:
a. Based on Table 4-3: Sustainable Yield of the Orange County Basin, 2005.
b. Based on Table 4-13: Projected Average Year Imported Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year).
c. Based on Orange County Water District. 2005-2006 Engineer's Report on the Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District, p. 34. Because Serrano Water District is largely built-out, 2005 use of local surface water is expected to remain constant.

Table 1-18: Projected Multiple Dry Year Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year)

Water Supply Source	2010	2015	2020	2025	2030
Groundwater[a]	384,500	384,500	384,500	384,500	384,500
Imported Water[b]	119,904	145,274	153,752	141,028	128,240
Local Surface Water[c]	1,382	1,382	1,382	1,382	1,382
Total Water Supply	**505,786**	**531,156**	**539,634**	**526,910**	**514,122**

Notes:
a. Based on Table 4-3: Sustainable Yield of the Orange County Basin, 2005.
b. Based on Table 4-13: Projected Average Year Imported Supplies within the Basin with Interim Delta Operating Rules (acre-ft/year).
c. Based on Orange County Water District. 2005-2006 Engineer's Report on the Groundwater Conditions, Water Supply and Basin Utilization in the Orange County Water District, p. 34. Because Serrano Water District is largely built-out, 2005 use of local surface water is expected to remain constant.

There are several Water Shortage Contingency Plans that guide the management of water resources in dry year conditions. Metropolitan has a Water Surplus and Drought Management Plan (WSDM Plan), 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. Metropolitan has also recently adopted a Water Supply Allocation Plan for use in dry years. This Plan was described previously in this section. Lastly, MWDOC has developed a Water Shortage Contingency Plan, contained in its RUWMP. The Plan contains information related to water shortage stages and actions and the three-year minimum water supply. Although MWDOC can only enforce restrictions of use on imported water, it has developed mandatory water use prohibitions, water reduction methods, and penalties for excessive water use. OCWD manages the groundwater basin to handle drought conditions, and 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 of Huntington Beach also has a Water Shortage Contingency Plan, which provides procedures, rules, and regulations for mandatory water conservation, based on phases and associated actions. This Plan is included in the City's UWMP and is based upon Chapter 14.18 of the City's Municipal Code. In addition, the City's Water Efficient Landscape Requirements, included in Chapter 14.52 of the City's Municipal Code, sets forth standards for landscape irrigation during drought and non-drought times. Chapter 14.16 of the City's Municipal Code establishes overall Water Use Regulations, including regulations for water meters. Provisions of the City's Municipal Code will be implemented in congruence with the policy of MWDOC and OCWD's water shortage/drought activities. MWDOC's policy will be based on Metropolitan's adopted WSDM Plan. The WSDM Plan is designed to guide management of regional water supplies to achieve reliability goals for Southern California.

APPENDIX B

City of Huntington Beach Tentative List of Pre-Evaluated & Pending Development Projects

Appendix B: City of Huntington Beach Tentative List of Pre-Evaluated & Pending Development Projects

PACIFIC CITY
BLUE CANVAS
PARKSIDE
BRIGHTWATER
SENIOR CENTER
BELLA TERRA Phase II (w/Hotel)
RIPCURL

Total Pre-Evaluated Development Projects = 835 AFY

Downtown Specific Plan Update (DTSP) = 371 AFY

Total Pre-Evaluated Development Projects & DTSP = 1206 AFY

APPENDIX C

Population Characteristics, Center for Demographic Research, California State University Fullerton, City of Huntington Beach

HUNTINGTON BEACH

2000 MAIN STREET
HUNTINGTON BEACH, CA 92648

INCORPORATED: 1909
AREA: 27.3 square miles
TELEPHONE: (714) 536-5511
WEBSITE: www.ci.huntington-beach.ca.us

Mayor:	Debbie Cook
Mayor Pro Tem:	Keith Bohr
Council Members:	Joe Carchio
	Gil Coerper
	Cathy Green
	Don Hansen
	Jill Hardy

City Manager:	(714) 536-5575
Community Development:	536-5271
City Council:	536-5553
Parks & Recreation:	536-5486
Fire Department:	536-5411
Police Department:	960-8811

Population Characteristics

Population

1950:	5,237	(*1)
1960:	11,492	(*1)
1970:	115,960	(*1)
1980:	170,505	(*1)
1990:	181,519	(*1)
2000:	189,594	(*1)
1997:	189,823	(*2)
1998:	193,304	(*2)
1999:	197,600	(*2)
2000:	189,627	(*2)
2001:	192,412	(*6)
2002:	194,781	(*6)
2003:	197,087	(*6)
2004:	198,831	(*6)
2005:	199,896	(*6)
2006:	200,608	(*6)
2007:	201,315	(*6)
2008:	201,993	(*6)

2000 Racial and Ethnic Population (*1)

	Number	%
White	136,237	71.9%
Hispanic	27,798	14.7%
Asian & Pacific Islander	17,976	9.5%
Black	1,383	0.7%
All Other Races	6,200	3.3%
Total Population:	189,594	100.0%

Current Projections Series (*3) Population (OCP 2006)

2010	212,957
2015	217,822
2020	220,892
2025	222,570
2030	224,788
2035	225,815

Vital Statistics (*4)

	2001	2002	2003
Total Births	2,443	2,283	2,349
Birth Rate*	12.7	11.7	11.9
Total Deaths	1,233	1,181	1,143
Death Rate*	6.4	6.1	5.8

2000 Population by Age (*1)

	Total	%
0-4	11,728	6.2%
5-9	12,393	6.5%
10-14	11,423	6.0%
15-19	10,834	5.7%
20-24	11,735	6.2%
25-34	33,082	17.4%
35-44	33,163	17.5%
45-54	26,951	14.2%
55-59	10,662	5.6%
60-64	7,967	4.2%
65-74	11,125	5.9%
75-84	6,578	3.5%
85+	1,953	1.0%
Total:	189,594	100.0%

Median Age: 36.0

Percent of County: 6.7%

Voter Registration, 2008 (*5)

Democratic	35,805	Peace & Freedom	301
Republican	60,331	Misc.	738
Independent	2,902	Decline To State	24,557
Green	883		
Libertarian	1,099	**Total:**	**126,616**

Sources: (*1) April Decennial Census of Population, U.S. Census Bureau.
(*2) January *Revised* Estimate, State Dept. of Finance.
(*3) Center for Demographic Research, CSUF.
(*4) Orange County Health Care Agency
*Rates per 1,000 population.
(*5) OC Registrar of Voters, May 2008.
(*6) E-5 Released May 2008, State Dept. of Finance.

APPENDIX D

May 2009 Report for the Water Surplus and Drought Management Plan

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Report

Water Resource Management

- **Water Surplus and Drought Management Plan on water supply and demand as of May 21, 2009**

Summary

This is a monthly report providing updates on CY 2009 regional water supply and demand conditions and potential actions under the Water Surplus and Drought Management Plan (WSDM Plan). The WSDM Plan provides the overall strategy for managing Metropolitan's resources to meet the range of estimated demands for the calendar year. This report considers conditions as of May 21, 2009. Staff will provide oral updates to this report at the monthly meeting of the Water Planning and Stewardship Committee. The following are report highlights for this month:

- Estimated January 1, 2009 WSDM Storage Balance: 1.09 MAF
- Total CRA Related Supplies including Five-Year Supply Plan Actions: 1.1 MAF
- Total SWP Contract Related Supplies including Five-Year Supply Plan Actions: 0.914 MAF
- Total WSDM storage withdrawal capacity available at current 40 percent SWP Allocation: 668 TAF
- CY 2009 Estimated Total Demand with WSAP Level 2: 2.16 MAF

Attachments

Attachment 1: Projected CRA and SWP Supplies for CY 2009

Attachment 2: Projected WSDM Supplies for CY 2009

Attachment 3: Future Payback Obligations

Detailed Report

This letter is the sixth in a series of monthly WSDM Plan updates on the developing water supply and demand conditions for CY 2009. These reports apprise the Board of conditions that may impact water supply reliability for CY 2009, and identify any potential WSDM actions that may be required.

The Board approved the implementation of Metropolitan's Water Supply Allocation Plan at a Level 2 at its April 14, 2009 meeting. This action was taken in order to manage demands through the period of July 1, 2009 through June 20, 2010 given the limited supplies available in CY 2009, including limiting withdrawals of storage in order to maintain reasonable reserve levels.

2009 Water Supply and Demand Balance

Colorado River Aqueduct

Staff's estimate of total Colorado River supplies for CY 2009, including related Five-Year Supply Plan actions is approximately 1.1 MAF. This schedule includes Metropolitan's Basic Apportionment (550 TAF) and all other Colorado River supplies developed to date, including water transfers, that are diverted at Metropolitan's intake at Lake Havasu. A detailed listing of the Colorado supplies is included as **Attachment 1.**

There has been no change in the estimate of total Colorado River supplies for CY 2009.

State Water Project

On May 20, 2009, the California Department of Water Resources (DWR) announced that the Table A allocation has been increased to 40 percent of Table A contract amount. This increase is due to the observed runoff and the following storage and hydrologic conditions: Lake Oroville storage is approximately 64 percent full and the Northern Sierra snowpack is 85 percent of normal for May 17. It is also reflective of the actual and anticipated delivery restrictions in the Delta to protect Delta smelt. These restrictions have had an estimated impact to Metropolitan since the beginning of CY 2009 of approximately 90 TAF. Although the snow surveys are completed for the year, DWR is still expected to review and update the Table A allocation based on runoff and storage conditions.

Under the current 40 percent Table A allocation, Metropolitan would receive Table A supplies of 765 TAF. Metropolitan would also take delivery of 85 TAF from Metropolitan's transfer and exchange agreements with the Desert Water Agency and Coachella Valley Water District (DWCV), and the City of Port Hueneme; the SWP Turnback Pool; and Article 56 carryover water from 2008. Total CY 2009 SWP contract supplies under the current allocation are projected at about 850 TAF. An additional 46 TAF from the related Five Year Resource Options and 18 TAF from the Yuba Multi-Year Transfers results in total SWP supplies of 914 TAF. A detailed listing of SWP supplies is contained in **Attachment 1.**

There has been an increase of approximately 210 TAF of SWP basic supplies since last month's report due to the recent increase in Table A allocation.

Water Demands

The current trend water demand estimate for CY 2009 is 2.16 MAF. This demand reflects that the region will be operating under a Level 2 Water Supply Allocation Plan implementation, including a 30 percent reduction under the Interim Agricultural Water Program (IAWP). Actual demands for the year will vary based on water sales prior to the July 1, 2009 WSAP implementation and on actual local supply production by the member agencies during the allocation year. The total demands do not include deliveries of water as part of the exchange with DWCV. Metropolitan intends to meet this exchange obligation through the recovery of stored water in the Advance Delivery Account and deliveries from its CRA supply.

WSDM Supplies and Management Actions

WSDM Storage Portfolio

In addition to the CRA and SWP related supplies described above, Metropolitan had a total of approximately 1.09 MAF of storage in its WSDM resource portfolio as of the beginning of CY 2009 (this figure excludes water stored for emergency purposes). Accounting for conveyance constraints, approximately 668 TAF of this amount is available in CY 2009. Some of the programs have contract provisions that allow for a supply increase in relation to an increase in SWP allocation. This estimate reflects the contractual minimum amounts of the programs and/or any agreed upon increase in minimum contractual amounts with banking partners. Detailed program level estimates of operational WSDM supplies for 2009 under the current SWP allocation, along with projected storage levels, are shown in **Attachment 2**. Metropolitan staff will continue to work cooperatively with its member agencies and other partners to ensure coordination and effective program management. **Attachment 2** also shows approximately 219 TAF of water supply programs that are currently under development in 2009.

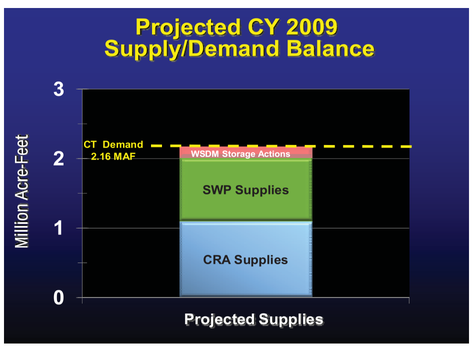
Since last month's report, there has been a net 32 TAF increase in the amount of WSDM storage available. This difference is attributed to an increase in projected supplies from the Central Valley groundwater storage programs as a result of the higher SWP allocation.

Storage/Exchanges

The table in **Attachment 3** shows a list of the future payback obligations from the exchange and storage programs in which Metropolitan has participated. The exchange agreement executed in 2002 with the Southern Nevada Water Authority allows Metropolitan to store unused Nevada apportionment of Colorado River water in California. The total amount of water stored through 2008 under this agreement is 70 TAF. Nevada will request recovery of this stored water in the future. It is expected that Nevada will not request this water until 2018. An agreement specifying return conditions is currently being negotiated and is expected to be brought to the Board for consideration in the next few months. Metropolitan also has an obligation to pay back approximately 79 TAF of Article 54 – Flexible Storage water that was withdrawn from DWR storage in CY 2007 and 2008. The 2007 water must be paid back by 2013, and the 2008 water must be paid back by 2014. In 2003, Metropolitan entered into an agreement with Coachella Valley Water District (CVWD) to credit the agency 32 TAF for CRA deliveries made in 2003. Metropolitan has made payback deliveries in 2007 and 2008 and it is estimated that Metropolitan will pay the remaining balance in full during CY 2010. In 2008, Metropolitan entered into an exchange agreement with Desert Water Agency (DWA) for up to 36 TAF. DWA delivered approximately 8 TAF of non-state project water in 2008. Metropolitan has exchanged a total of 1,200 AF of CRA water in 2008 and 2009. Under the agreement provision, Metropolitan will deliver an annual minimum amount of CRA water until the balance is paid in full. The current balance would be paid in full by no later than 2014.

Water Balance and Actions

Under the current trend demand estimate of 2.16 MAF, which reflects a WSAP Level 2, and the currently projected supplies on the SWP and CRA of 2.00 MAF, there is a resulting supply need of approximately 154 TAF. This need will be met through the withdrawal of WSDM storage actions as shown in the graphic below.



Five-Year Supply Plan Resource Options

The Board has received reports and updates on the goals and progress of the Five-Year Supply Plan. These options could yield approximately 429 TAF or more of additional supply if successfully implemented. Staff continues to pursue their resource options that focus on six initiatives: extraordinary conservation, Colorado River transactions, near-term Delta actions, SWP transactions, groundwater recovery, and local resources. These supplies and conservation measures would enhance water supply reliability in Metropolitan's service area given continued dry conditions and restrictions on the State Water Project deliveries from the Delta. As previously noted, related actions from the Five-Year Supply Plan are being accounted for under either the SWP or CRA total delivery estimates. The conservation measures associated with the Five-Year Supply Plan now account for actions that are necessary to achieve water savings needed to meet allocations under a Level 2 WSAP allocation.

CY 2009 Projected CRA and SWP Supplies

CRA BASIC PROGRAMS		
Basic Total Apportionment		550,000
MWD Water Budget Agricultural Adjustment		-60,000
Priority 1,2, and 3b	*-56,000*	
Imperial ID	*0*	
Coachella Valley WD	*0*	
Misc and Indian PPR's	*-4,000*	
DWCV Obligation		-68,000
IID-MWD Conservation Program		85,000
Lower Colorado Water Supply Project		7,000
PVID Land Fallowing		118,000
Canal Lining Water to MWD		15,000
Exchange with CVWD		-35,000
Water Exchanged with SDCWA (IID Transfer & All American Canal Lining)		131,000
Other Programs/Ag Adjustment/DWCV Callback		190,000
Ag Adjustment	*60,000*	
DWCV Callback	*40,000*	
Other Programs	*90,000*	
CRA BASIC PROGRAMS TOTAL		**933,000**
FIVE YEAR SUPPLY RESOURCE OPTIONS: CRA		
Additional PVID Transfers (Crop Stressing / Fallowing)		30,000
Yuma Desalter		5,000
Arizona Programs		60,000
Expand SNWA Agreement		40,000
Agreements with CVWD		25,000
TOTAL: CRA 5 YEAR SUPPLY RESOURCE OPTIONS		**160,000**
Colorado River Supplies Total		**1,093,000**
SWP BASIC PROGRAMS		
MWD Table A		765,000
MWD 2008 Carryover		15,000
Desert Water/Coachella Valley exchange (Table A)		68,000
Port Hueneme Agreement /Turnback Pool/Westland Mitigation		2,000
SWP BASIC SUPPLIES TOTAL		**850,000**
Yuba Multi Year Transfers		18,000
5 YEAR SUPPLY RESOURCE OPTIONS: SWP		
Drought Water Bank / NOD Transfers		25,000
In-Delta Transfers -- Delta Wetlands		11,000
North Kern / DWA Exchange		10,000
TOTAL: SWP 5 YEAR SUPPLY RESOURCE OPTIONS		**46,000**
SWP Supplies Total		**914,000**
TOTAL SUPPLIES WITH 5 YEAR SUPPLY RESOURCE OPTIONS		**2,007,000**

CY 2009 Projected WSDM Supplies

Program	Projected 1/1/2009 Storage Levels	Amount Available at 40% SWP Allocation	Amount Available at 50% SWP Allocation	CY 2009 Put Capacity
SURFACE STORAGE	**450,000**	**403,000**	**403,000**	**794,000**
Lake Mead ICS Account	*92,000*	*60,000*	*60,000*	*200,000*
*MWD '08 Carryover**	*15,000*	*0*	*0*	*0*
Castaic Lake (DWR Flex Storage)	*79,000*	*79,000*	*79,000*	*75,000*
Lake Perris (DWR Flex Storage)	*61,000*	*61,000*	*61,000*	*4,000*
Diamond Valley Lake	*203,000*	*203,000*	*203,000*	*400,000*
Lake Mathews & Lake Skinner (Dry-Year Storage)	*0*	*0*	*0*	*115,000*
CENTRAL VALLEY BANKING PROGRAMS	**311,000**	**147,000**	**189,000**	**132,000**
Arvin Edison Storage Program	*152,000*	*35,000*	*52,000*	*45,000*
Semitropic Storage Program	*126,000*	*86,000*	*104,000*	*32,000*
Kern Delta Storage Program	*23,000*	*23,000*	*23,000*	*55,000*
Mojave Storage Program	*10,000*	*3,000*	*10,000*	*0*
GROUNDWATER STORAGE PROGRAMS	**331,000**	**118,000**	**118,000**	**254,000**
CONJUNCTIVE USE PROGRAMS	**165,000**	**75,000**	**75,000**	**87,000**
IEUA/TVMWD (Chino Basin)	*63,000*	*30,000*	*30,000*	*25,000*
Long Beach (Cent. Basin)	*7,000*	*0*	*0*	*3,000*
Long Beach (Lakewood)	*2,000*	*1,000*	*1,000*	*1,000*
Foothill (Raymond and Monkhill)	*1,000*	*1,000*	*1,000*	*2,000*
Calleguas (N. Las Posas)	*54,000*	*20,000*	*20,000*	*33,000*
MWDOC (Orange County Basin)	*36,000*	*22,000*	*22,000*	*17,000*
Three Valleys (Live Oak)	*1,000*	*0*	*0*	*1,000*
Three Valleys (upper Claremont)	*0*	*0*	*0*	*1,000*
Compton	*1,000*	*1,000*	*1,000*	*1,000*
Western	*0*	*0*	*0*	*3,000*
CYCLIC PROGRAMS	**13,000**	**13,000**	**13,000**	**0**
Cyclic - USG	*0*	*0*	*0*	*0*
Cyclic - PM (Three Valleys)	*13,000*	*13,000*	*13,000*	*0*
Cyclic - IEUA (Chino Basin)	*0*	*0*	*0*	*0*
SUPPLEMENTAL PROGRAMS	**10,000**	**0**	**0**	**0**
Supplemental Storage Program (Los Angeles)	*10,000*	*0*	*0*	*0*
OTHER PROGRAMS	**143,000**	**30,000**	**30,000**	**167,000**
*Advance Delivery Account (DWCV) **	*57,000*	*0*	*0*	*167,000*
SBVMWD Coordinated Operating Agreement	*50,000*	*0*	*0*	*0*
Central Arizona Storage Demonstration Project	*36,000*	*30,000*	*30,000*	*0*
TOTAL	**1,092,000**	**668,000**	**710,000**	**1,180,000**

* *MWD '08 Carryover and DWCV, and are shown as zero because they have been accounted for in base supplies*

Programs Under Development in 2009

Program	Projected 1/1/2009 Storage Levels	Amount Available at 40% SWP Allocation	Amount Available at 50% SWP Allocation	CY 2009 Put Capacity
Conj. Use - Pasadena	*22,000*	*0*	*0*	*0*
MWD '09 Carryover	*0*	*0*	*0*	*200,000*
DWCV '09 Carryover	*0*	*0*	*0*	*86,000*
Hayfield Storage Program	*100,000*	*0*	*0*	*0*
EWA Wet/Dry Exchange	*50,000*	*0*	*0*	
Sac. Valley Transfers Stored in Shasta	*47,000*	*0*	*0*	*0*
TOTAL	**219,000**	**0**	**0**	**286,000**

Future Payback Obligations

Program	Amount (Acre-Feet)	Year Initiated	Payback Deadline
Storage and Interstate Release Agreement with Southern Nevada Water Authority	10,000	2004	As requested*
	10,000	2005	
	5,000	2006	
	45,000	2008	
Subtotal	***70,000***		
SWP Flexible Storage Account	15,400	2007	2013
	63,400	2008	2014
Subtotal	***78,800***		
Coachella Valley Water District	8,000	2003	2010**
Desert Water Agency	7,100	2008	2014
Subtotal	***15,100***		
TOTAL	**163,900**		

* *Metropolitan wouldn't be expected to pay back the water until at least 2018*
** *Letter agreement under development to defer payback deadline.*

APPENDIX E

MWDOC Draft Water Supply Allocation Plan (WSAP) with Metropolitan WSAP

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

Item No. 6-6

ACTION ITEM
February 18, 2009

TO: Board of Directors

FROM: Kevin Hunt
General Manager

Staff Contact: Harvey De La Torre

SUBJECT: RESOLUTION ADOPTING MWDOC SUPPLY ALLOCATION PLAN

STAFF RECOMMENDATION

Staff recommends the Board of Directors:

1. Set a public hearing on adoption of the MWDOC Water Supply Allocation Plan for the regular Board meeting scheduled for 8:30 am on February 18, 2009. Although not a "water rate resolution," recommend compliance with 10-day notice provision for water rate resolutions set forth in MWDOC Administrative Code section 1117 as a courtesy to client agencies.
2. Consider adoption of the attached Resolution adopting MWDOC's Water Supply Allocation Plan.
3. Review procedures for implementing the MWDOC Water Supply Allocation Plan in the event Metropolitan declares a regional water shortage and sets a "Regional Shortage Level" as provided in Metropolitan's Water Supply Allocation Plan.

COMMITTEE RECOMMENDATION

Committee concurred with staff recommendation to: (1) Hold Public Hearing on MWDOC Supply Allocation Plan and receive comments at the February 18th meeting; (2) Consider adoption of Resolution adopting MWDOC's Water Supply Allocation Plan; and (3) Review procedures for implementing the MWDOC Water Supply Allocation Plan in the event MET declares a regional water shortage and sets a "Regional Shortage Level" as provided in MET's Water Supply Allocation Plan.

Budgeted (Y/N):	Budgeted amount:
Action item amount:	Line item:
Fiscal Impact (explain if unbudgeted):	

SUMMARY

For the past year, MWDOC staff has been working on the development of its Water Supply Allocation Plan. Through the Board's recommended policy principles, Client Agency technical workshops, and MWDOC Committee meetings, staff has developed a plan to allocate imported water in a fair and equitable manner to all of its 28 Client Agencies within its service area. Attached is the MWDOC Draft Allocation Plan and Resolution for the Board of Directors review and approval.

DETAILED REPORT

Since Metropolitan Water District (MET) approved its water supply allocation plan in February 2008, MWDOC has been working diligently on its own plan to allocate imported water to its 28 Client Agencies. Through a collaborative process with the MWDOC Board and its Client Agencies, the attached plan is a document that describes in detail how MWDOC plans to distribute imported water its receives from MET, during a declared shortage, in a fair and equitable manner within its service area.

In preparation of the plan, the MWDOC Board of Directors adopted the following policy principles to help guide staff:

- Seek best allocation available from MET
- Develop the MWDOC Plan in collaboration with its Client Agencies
- When reasonable, use similar method/approach as MET
- When MET method would produce significant unintended consequence, use an alternative approach
- Develop accurate data on local supply, conservation, recycling, rate structures, growth and other relevant adjustment factors
- Seek opportunities within MWDOC service area to provide mutually beneficial shortage mitigation

Using these policy principles as the basis of discussion, MWDOC held five technical workshop meetings with its Client Agencies. The technical workshops provided an arena for in-depth discussion on the objectives, mechanics, and policy aspects of the plan. In addition, there were a number of individual meetings that provided more specific agency-related issues and questions. All of these meetings provided tremendous input in the development of the Plan including feedback on MET's allocation plan.

MWDOC staff also briefed its board members at its monthly Committee meeting through a series of updates and policy discussions. From these Committee meetings, the Board provided significant input regarding MWDOC implementation of penalty rates and the process for appeals. In addition, the Board also allowed the opportunity to revisit the plan if any changes or revisions are needed as a result of new information or lessons learned after one year of its implementation.

The most important section of this plan is the formulas and steps to determine an agency's allocation. Each step describes in detail how MWDOC plans to calculate, adjust and credit a Client Agency's baseline in order to determine their allocation. Below are the five steps:

Step 1 – Determine an Agency's Baseline

Step 2 – Establish Allocation Year Information

Step 3 – Calculate Initial Minimum Allocation based on Declared Shortage Level

Step 4 – Assign Allocation Adjustments and Conservation Credits

Step 5 – Sum Total Allocations and Calculate Retail Reliability

However, although these steps are similar to MET's allocation process; there were situations where an alternative approach was needed for MWDOC's service area such as the Growth Adjustment (based on Client Agency's population growth), Retail Impact Adjustment (based on a Prorated Share methodology), Conservation Credits (based on a Prorated Share methodology), and the assessment of allocation penalties (Melded Rate Structure).

Most important to the Client Agencies and the item most discussed at the MWDOC Committee meetings, was the method for assessing penalties to those Client Agencies that exceeded their allocation limit at the end of the year. Similar to MWDOC's rates and charges, the Melded Rate Structure was recommended by a majority of the Client Agencies and by the MWDOC Committee because of its regional approach. This method assesses penalties to the Client Agency's prorated share (acre-feet over its allocation limit) to MWDOC's penalty amount with MET. If no penalties are assessed to MWDOC, then no penalties are assessed to the Client Agencies regardless of their over usage.

To provide the opportunity to change and/or correct a Client Agency's allocation, the plan describes the process for an appeal. To ensure all appeals are handled properly, MWDOC listed out steps in which staff plans to manage an agency's appeal. Although staff anticipates all appeals will be submitted to MET, the plan allows the opportunity, if an appeal is denied, for MWDOC to recommend a solution to the Board.

The plan also describes how MWDOC staff plans to track each Client Agency's water usage and evaluate their water demands during an allocation in order to help them avoid over usage. Not only will this information be useful to MWDOC but also to MET in reporting to its Board MWDOC's total usage and projected water demands for the year.

Staff and Legal Counsel reviewed the procedures for adopting the Plan and recommend a resolution as provided in Water Code section 375. The proposed resolution, which is attached, would authorize implementation of the Plan without further Board action upon MET's declaration of a regional water shortage. Once established, the Plan's methodology will produce results based on the Regional Shortage Level declared by MET and the amount of penalty rates assessed by MET, if any.

Following the Board's policy principles in developing an allocation plan for MWDOC, it is staff's recommendation that the Board set a hearing for adoption of MWDOC's Water Supply Allocation Plan via the attached Resolution.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

The proposed actions are exempt under the provisions of CEQA and the State CEQA Guidelines. The Water Supply Allocation plan is related to existing facilities involving

negligible or no expansion of use beyond that is existing at this time, with no possibility of significantly impacting the physical environment. The Water Supply Allocation Plan distributes imported water it receives from MET, during a declared shortage, in a fair and equitable manner within its service area. As such, the Water Supply Allocation Plan is intended to promote conservation during periods of water shortage and therefore is consistent with MWDOC's responsibilities and authority under Section 375 of the Water Code. Accordingly, the proposed actions qualify under Class 1, Class 7, and Class 8 Categorical Exemptions. (Sections 15301, 15307 and 15308 of the State CEQA Guidelines.). In addition, the Water Supply Allocation Plan also qualifies for the CEQA exemption set forth in Section 15061(b)(3) of the State CEQA Guidelines because it can be seen with certainty that there is no possibility that the plan may have a significant effect on the environment. Finally, none of the exceptions to exemptions set forth in Section 15300.2 of the State CEQA Guidelines are applicable.

RESOLUTION NO. ___
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
ADOPTING A WATER SUPPLY ALLOCATION PLAN

Whereas, the Municipal Water District of Orange County (MWDOC) was formed by Orange County voters in 1951 for the purpose of procuring imported water supplies from the Metropolitan Water District of Southern California (Metropolitan); and

Whereas, water procured from Metropolitan by MWDOC is imported from northern California via the State Water Project and from the Colorado River via the Colorado River Aqueduct and local storage; and

Whereas, MWDOC sells water on a wholesale basis to 28 client agencies to meet the commercial, industrial, agricultural and household water demands of approximately 2.3 million Orange County residents; and

Whereas, judicial orders limiting pumping from the Sacramento-San Joaquin River Delta to protect threatened fish species, a statewide drought, and lower-than-normal annual snowpacks with early runoffs have severely impacted Orange County's imported water supply from Northern California; and

Whereas, continuing drought along the Colorado River watershed has also reduced the amount of imported water available to Orange County; and

Whereas, local water supplies sources in Orange County have also been adversely impacted by the drought because less imported water has been available to recharge groundwater basins; and

Whereas, the impact of these conditions on the availability of imported water and the reasonable expectation that the conditions and their impacts will remain for the foreseeable future, combined with the depletion of Metropolitan's water reserves by more than 1.1 million acre feet during the past two years to meet demands, have resulted in a serious threat to Metropolitan's ability to provide adequate water supplies to meet demands within its six county, 5,200 square mile service area; and

Whereas, in preparation for this threat, Metropolitan adopted a "Water Supply Allocation Plan" in February 2008 that includes "specific formulas for calculating member agency supply allocations and the key implementation elements needed for administering an allocation," should Metropolitan declare a shortage; and

Whereas, in the event Metropolitan declares a water shortage and implement its Water Supply Allocation Plan, the result would be an allocation of water to its member agencies, including MWDOC, which will be enforced through a penalty rate structure; and

Whereas, to meet its water resource management and planning responsibilities and to ensure adequate and equitable service to its client agencies following a shortage allocation by Metropolitan, MWDOC has worked in cooperation with its client agencies to develop its own Water Supply Allocation Plan, attached hereto as Exhibit "A," which can be implemented by the MWDOC Board in the event of such a shortage allocation by Metropolitan; and

Whereas, MWDOC's Board may, under Water Code section 375, adopt and enforce a water conservation program such as the Water Supply Allocation Plan to reduce the quantity of water used by its client agencies; and

Whereas, the proposed action to adopt the Water Supply Allocation Plan is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed action involves a water allocation plan related to existing public facilities involving negligible or no expansion of use and no possibility of significantly impacting the physical environment. Furthermore, the plan is intended to promote conservation during periods of water shortage and therefore is consistent with MWDOC's responsibilities and authority under Section 375 of the Water Code. Accordingly, the proposed actions qualify under Class 1, Class 7, and Class 8 Categorical Exemptions. (Sections 15301, 15307 and 15308 of the State CEQA Guidelines.); and

Whereas, in addition, the Water Supply Allocation Plan also qualifies for the exemption from CEQA set forth in Section 15061(b)(3) of the State CEQA Guidelines because it can be seen with certainty that there is no possibility that the plan may have a significant effect on the environment. Finally, none of the exceptions to exemptions set forth in Section 15300-2 of the State CEQA Guidelines are applicable; and

Whereas, based on the increasing likelihood that Metropolitan will implement a shortage allocation in 2009, adoption of the MWDOC Water Supply Allocation Plan at this point is now timely and will enable MWDOC and its client agencies to better plan for that eventuality.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Municipal Water District of Orange County as follows:

1. The above recitals are true and correct statements and are incorporated fully herein.
2. On February 18, 2009, MWDOC's Board conducted a noticed public hearing on the Water Supply Allocation Plan at MWDOC's Board Room, located at 18700 Ward Street, Fountain Valley, California.
3. Based on the adverse water supply conditions noted above and the high likelihood that Metropolitan will declare a shortage allocation in 2009, the Board hereby finds the adoption of the Water Supply Allocation Plan necessary at this time.
4. Based on the above recitals, the Board directs staff to prepare and file a Notice of Exemption within five (5) working days of adoption of this Resolution.
5. The MWDOC Board hereby adopts and authorizes the implementation of the Water Supply Allocation Plan, which shall hereafter be implemented as and when set forth in the Plan, attached as Exhibit "A."

6. This Resolution shall be effective immediately upon adoption, and shall be published once in full in a newspaper of general circulation within 10 days of the effective date.

Said Resolution was adopted, on roll call, by the following vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No._____, adopted by the Board of Directors of Municipal Water District of Orange County at its meeting of February 18, 2009.

____
Maribeth Goldsby, Secretary
Municipal Water District of Orange County

Municipal Water District of Orange County

DRAFT Water Supply Allocation Plan

January 2009

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List of Tables and Figures

TABLES

FIGURES

Section 1: Introduction

The Municipal Water District of Orange County (MWDOC) is dedicated to ensuring water reliability for the communities we serve. Hundreds of thousands of Orange County residents have taken advantage of our water conservation rebates to install water saving toilets, clothes washers, and other water saving devices. We continue to partner with our client agencies to develop new local supplies such as recycled water, brackish water desalting, ocean water desalination, and the Groundwater Replenishment System.

However, a combination of water supply challenges have brought about the possibility that MWDOC may not have access to the imported supplies necessary to meet the demands of its client agencies in the coming years. The following factors have dramatically impacted water supply conditions not only in Orange County, but all of Southern California:

- In 2007 many areas of California experienced the driest year on record. California received below average rainfall again in 2008. On June 4, 2008, Governor Schwarzenegger proclaimed a statewide drought.
- The Colorado River experienced the driest 9 years in over a century. Reservoirs along the river are less than half full. Supplies from this source have been reduced since 2003 and will continue to be limited.
- A federal court ruling in late 2007 to protect a threaten fish species, the Delta Smelt, has resulted in the largest court-ordered water transfer restrictions in State history. Pumping from the Sacramento-San Joaquin River Delta (Delta) to the State Water Project has been reduced by up to 30 percent and will remain restricted until permanent solutions can be approved and constructed. Threats to additional Delta species, including Longfin Smelt, could result in further pumping restrictions.

To meet the imported water demands of its member agencies, the Metropolitan Water District of Southern California (MET) is quickly withdrawing supplies from surface and groundwater storage. Over the past two years, MET has drawn down half of its available reserve.

The recent dry conditions and the uncertainty about future supplies from the State Water Project have raised the possibility that MET will not have access to the supplies necessary to meet the imported water demands of its member agencies. As a result, MET has developed a Water Supply Allocation Plan that allocates wholesale imported water supplies among its 26 member agencies throughout Southern California.

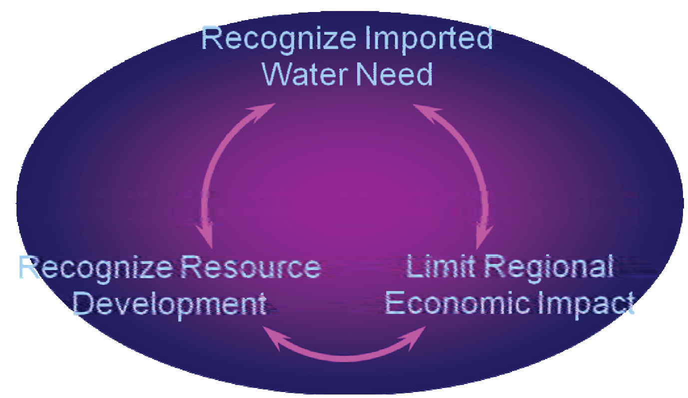
To prepare for the possibility of an allocation of imported water supplies from MET; MWDOC has worked in collaboration with its 28 client agencies to develop this Water Supply Allocation Plan to allocate imported water supplies at the retail level. This document lays out the essential components of how MWDOC plans to determine and implement each agency's allocation during a time of shortage.

Section 2: Metropolitan Water District's Water Supply Allocation Plan

In February 2008, MET approved a Water Supply Allocation Plan (WSAP) designed to distribute imported water to all of its member agencies during a shortage. The WSAP follows the principles and considerations identified in MET's Water Surplus and Drought Management 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 Metropolitan WSAP seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level. To achieve this, it takes into account:

- The impact on retail customers and the economy
- Allowance for population and growth
- Change and/or loss of local supply
- Reclamation/Recycling
- Conservation
- Investments in local resources
- Participation in MET's interruptible programs
- Investments in MET's facilities



The WSAP states that MET staff will go before the Board with a recommendation in April, from which the Board of Directors will make a determination on the level of the Regional Shortage. If the Board determines allocations are necessary they will go into effect in July and remain for a twelve-month period. *Note: This schedule is at the discretion of the Metropolitan Board, and is subject to change.*

The recommendation to declare a regional shortage will be based upon water supply availability from the State Water Project, the Colorado River Aqueduct, and the amount of surface and groundwater storage remaining in Metropolitan's reserves. It will also take into account the implementation of MET's water management actions i.e. Five Year Water Supply Plan, extraordinary conservation efforts, the acceleration of local resource projects, and the purchases of water transfers.

A full copy of MET's Draft Water Supply Allocation Plan is available in Appendix B.

Section 3: Development Process

In preparation for possible allocation of imported water supplies from MET, MWDOC's Board first adopted the following policy principles to help guide staff and the client agency technical workgroup to develop a plan that is fair and equitable for everyone within its service area:

- **Seek best allocation available from MET**
- **Develop MWDOC Plan in collaboration with client agencies**
- **When reasonable, use similar method/approach as MET**
- **When MET's method would produce significant unintended result, use an alternative approach**
- **Develop accurate data on local supply, conservation, recycling, rate structures, growth and other relevant adjustment factors**
- **Seek opportunities within MWDOC service area to provide mutually beneficial shortage mitigation**

Client Agency Input

Between the months of July and December of 2008, MWDOC staff worked cooperatively with the client agencies through a series of technical workgroups to develop a formula and implementation plan to allocate imported supplies in the event that MET declares a regional shortage. These workgroups provided an arena for in-depth discussion of the objectives, mechanics, and policy aspects of the different parts of the Plan. MWDOC staff also met individually with a number of client agencies for detailed discussions on elements of the Plan. The discussions, suggestions, and comments expressed by the client agencies during this process played a key part in the development of this Plan.

The following MWDOC client agencies participated in the Technical Workgroup:

- **City of Brea**
- **City of Buena Park**
- **City of Fountain Valley**
- **City of Garden Grove**
- **City of Huntington Beach**
- **City of La Habra**
- **City of La Palma**
- **City of Newport Beach**
- **City of Orange**
- **City of San Clemente**
- **City of San Juan Capistrano**
- **City of Seal Beach**
- **City of Tustin**
- **City of Westminster**
- **East Orange County Water District**
- **El Toro Water District**

- **Golden State Water Co.**
- **Irvine Ranch Water District**
- **Laguna Beach County Water District**
- **Mesa Consolidated Water District**
- **Moulton Niguel Water District**
- **Orange County Water District**
- **Santa Margarita Water District**
- **South Coast Water District**
- **Trabuco Canyon Water District**
- **Yorba Linda Water District**

In addition to the workshops, individual meetings were held between MWDOC staff and the following MWDOC client agencies to address more specific and agency-related questions:

Table 3.1: Client Agency Meetings

Agency	Date
East Orange County Water District	8/25/2008
El Toro	9/3/2008
City of Huntington Beach	9/4/2008
East Orange County Water District	9/18/2008
Golden State Water Company	9/25/2008
City of Orange	9/26/2008
Trabuco Canyon Water District	9/30/2008
San Juan Capistrano	10/1/2008
Irvine Ranch Water District	10/6/2008
City of Seal Beach	10/8/2008
City of Tustin	10/15/2008
Yorba Linda Water District	10/16/2008 & 10/22/08
City of Garden Grove	10/20/2008
City of San Juan Capistrano	10/28/2008
East Orange County Water District & City of Tustin	11/25/2008
Santa Margarita Water District	12/11/2008

These individual meetings provided MWDOC staff with a great deal of insight on exactly how a retail agency would implement allocations at the customer level. Such information was extremely valuable in our regional discussion at MET and in the development of this Plan.

Board of Directors Input

Throughout the Plan's development process, the MWDOC Board of Directors was provided with regular progress reports on the status of the Plan and the technical workgroup discussions. During the months the Plan was being developed, the Planning and Operations Committee was kept apprised of key issues regarding MET's and

MWDOC's allocation plan. Moreover, the Committee played an integral part in the development of key implemental issues such as the appeal process and the penalty rate structure.

Section 4: Water Supply Allocation Formula

The MWDOC Water Supply Allocation Model follows five (5) basic steps to determine an agency's imported supply allocation:

- Step 1: Determine Baseline Information
- Step 2: Establish Allocation Year Information
- Step 3: Assess the Shortage Reduction Stage (Based on MET's Declared Shortage Level)
- Step 4: Apply Allocation Adjustments and Credits in the areas of retail impacts, conservation, and the interim agriculture water program
- Step 5: Sum total allocations and determine retail reliability

A description of how the calculation is used in each step is described below:

Step 1 – Determine Baseline Information

In order to determine a client agency's retail demands and imported supply needs in the allocation year, the model needs to establish a historical base period for water supply and delivery data. The base period for each of the different categories of demands and supplies is calculated using data from the last three non-shortage years (calendar years 2004, 2005, and 2006).

The following is a description of the base period calculations:

Base Period Local Supplies: Local supplies for the base period are calculated using a three-year average (from calendar years 2004, 2005, and 2006) of groundwater production, groundwater recovery, surface water production, and other non-imported supplies. *Note: Recycled water production is not included in this calculation to address the impact of demand hardening due to recycled water use.*

Base Period Wholesale ("Imported") Firm Demands: Firm demands on MWDOC for the base period are calculated using a three-year average (from calendar years 2004, 2005, and 2006) of full-service, seawater barrier, seasonal shift, and surface storage operating agreement demands.

Base Period In-lieu Deliveries: Base period in-lieu deliveries to client agencies are calculated using a three year average (from calendar year 2004, 2005, and 2006) of In-lieu deliveries to long-term groundwater replenishment, conjunctive use, cyclic, and supplemental storage programs. In-lieu deliveries are not calculated as imported supplies from MET. They are calculated as local supplies to account for the corresponding reduction in base year local production that was required to take In-lieu deliveries.

Base Period Retail Demands: Total retail municipal and industrial demands for the base period are calculated by adding the Base Period Local Supplies, Base Period Wholesale Imported Firm Demands, and Base Period In-Lieu Deliveries.

Base Period Interim Agricultural Water Program (IAWP) Deliveries: For those agencies that remain in the IAWP, the base period will be Fiscal Year 2003/04 IAWP deliveries. However, for those agencies[1] that opt-out of the program their IAWP baseline would be added to their imported firm demands baseline, after the growth adjustment has been applied.

Base Period Conservation: Conservation savings for the base period are calculated using modeled estimates of the most recent year's savings (in this case calendar year 2006) from active, passive, and avoided system losses. Note that this is different than other Base period calculations, which used three-year averages. This is because, for demand hardening purposes, it is preferable to use the most recent estimate of installed water savings as opposed to a three-year average. Due to the complexity in determining each client agency's conservation savings, MWDOC has determined an alternative approach which is described in Step 4.

Step 2 – Establish Allocation Year Information

In this step, the model adjusts for each member agency's water need in the allocation year. To do so, it adjusts the base period estimates for increased water demand i.e. growth and gains/losses in local supplies.

The following is a description of how the allocation year information is established:

Allocation Year Retail Demands: Total retail M&I demands for the allocation year are calculated by adjusting the Base Period Retail Demands for growth. The method in which MWDOC determines each client agency's growth is through population increases for the calendar years 2006 to 2008[2]. Based on the data received from California State University of Fullerton, Center for Demographic Research, MWDOC prorated each agency's population increase share to MWDOC's growth adjustment received from MET[3], as shown in Appendix C.

Allocation Year Local Supplies: Allocation year local supplies are calculated using the Base Year Local Supplies plus Base Period In-Lieu Deliveries and adjusting for any gains or losses in local supply, including extraordinary increases in local production, which is defined below. In-lieu deliveries are considered as local supplies to account for the corresponding reduction in base year local production that was required to take in-lieu deliveries. Gains/losses and extraordinary increases of local supply are also added to the Base Period local supplies to reflect a more accurate estimate of actual supplies in the allocation year, and in turn more accurately estimates an agency's demand for imported supplies. Below are more detailed descriptions of these categories:

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[1] As of January 2009, the following MWDOC client agencies opt-out of the IAWP program: City of Brea, Irvine Ranch WD, City of San Juan Capistrano, Trabuco Canyon WD, and Yorba Linda WD.

[2] Although many options were discussed in the technical workgroup sessions, this option was chosen to best reflect the increase in water demand as due to population growth as intended by MWD's allocation formula for each client agency in the MWDOC service area.

[3] MET's growth adjustment is calculated by using the average of the last three year County-wide population growth rates, which include not only MWDOC's service area but also the Cities of Fullerton, Anaheim, and Santa Ana.

- *Gain of Local Supply Adjustment*: This adjustment accounts for planned or scheduled gains in local supply production above the base period, which are not due to extraordinary actions to increase water supply in the allocation year. Gains of local supply include increases in groundwater production that do not result in the mining of a groundwater basin, new brackish water treatment facilities, or increases to surface water supplies due to changes in hydrology. These are considered planned and scheduled increases in local supply production, which are added to the base period local supplies.

- *Loss of Local Supply Adjustment*: This adjustment accounts for losses of local supply production from the base period. Losses of local supply due to hydrology or water quality are subtracted from the Base Period Local Supplies. They cannot be used to cover IAWP shortages.

- *Extraordinary Increased Production Adjustment*: This adjustment accounts for extraordinary increases in local supplies above the base period. Extraordinary increases in production include such efforts as purchasing transfers or mining of groundwater basins. In order not to discourage such extraordinary efforts, only a percentage of the yield from these supplies is added back to Allocation Year Local Supplies in shortage level 3 and beyond as shown below. This has the effect of "setting aside" the majority of the yield for the agency who procured the supply. The percentage of the extraordinary increases in local supply corresponds according to the regional shortage level.

Table 4.1
Extraordinary Increased Production Adjustment

Regional Shortage Level	Regional Shortage Percentage	Extraordinary Increase Percentage
1	5%	0%
2	10%	0%
3	15%	15%
4	20%	20%
5	25%	25%
6	30%	30%
7	35%	35%
8	40%	40%
9	45%	45%
10	50%	50%

Step 3 – Calculate Initial Minimum Allocation Based on Declared Shortage Level

This step sets the initial allocation. After a regional shortage level is established, MWDOC will calculate the initial allocation as a percentage of adjusted Base Period Imported needs within the model for each client agency.

Shortage Levels: The model allocates shortages of supplies over ten levels: from 5 to 50 percent, in 5 percent increments.

Shortage Percentage: The maximum total regional shortage percentage of MWDOC's available supplies when compared to the sum of the demands in the allocation year.

Wholesale ("Imported") Supply Minimum Allocation: The Wholesale Minimum Allocation is established to ensure a minimum level of imported supplies. The Wholesale Minimum Allocation ensures that client agencies will not experience shortages on the wholesale level that are greater than one-and-a-half times the percentage shortage of Metropolitan's regional water supplies. As illustrated below, the Wholesale Minimum Allocation percentage is equal to 100 minus one-and-a-half times the shortage level. The allocation is based on each agency's demand of firm MET water.

Table 4.2
Wholesale ("Imported") Supply Minimum Allocation

Regional Shortage Level	Regional Shortage Percentage	Wholesale Minimum Allocation
1	5%	92.5%
2	10%	85.0%
3	15%	77.5%
4	20%	70.0%
5	25%	62.5%
6	30%	55.0%
7	35%	47.5%
8	40%	40.0%
9	45%	32.5%
10	50%	25.0%

Step 4 – Assign Allocation Adjustments and Conservation Credit

In this step, the model assigns additional water to address disparate impacts at the retail level caused by an across-the-board cut of imported supplies. It also applies a conservation credit given to those agencies that have achieved additional water savings at the retail level as a result of successful implementation of water conservation devices, programs and rate structures.

Retail Impact Adjustment: The Retail Impact Adjustment is the factor used to address major differences in retail level shortages associated with across-the-board cuts. The purpose of this adjustment is to ensure that agencies with a high level of dependence on MET do not experience highly disparate shortages compared to other agencies when faced with a reduction in imported supplies. The Retail Impact Adjustment factor is calculated as the difference between the Regional Shortage Percentage and the Wholesale Imported Minimum Allocation. The amount of the adjustment each client agency receives is prorated on a linear scale, based on its dependence on imported water at the retail level. The prorated amount of allocation is referred to as the Retail Impact Adjustment Allocation. For agencies that are 100 percent dependent on MWDOC, this method will result in an allocation of MWDOC supplies that, at the retail level, will result in a shortage equal to the Regional Shortage Percentage. This adjustment is only applied when the regional shortage levels are 15 percent (level 3) or greater. Table 4.3 below illustrated the maximum adjustment an agency may receive according to the regional shortage level.

Table 4.3
Retail Impact Adjustment

Regional Shortage Level	Regional Shortage Percentage	Retail Impact Adjustment Maximum
1	5%	0.0%
2	10%	0.0%
3	15%	7.5%
4	20%	10.0%
5	25%	12.5%
6	30%	15.0%
7	35%	17.5%
8	40%	20.0%
9	45%	22.5%
10	50%	25.0%

Unfortunately, the Retail Impact Adjustment MWDOC receives from MET may be less than the total retail impact adjustment for its client agencies. To mitigate this difference, MWDOC decreased each client agency's retail impact adjustment according to their prorated share. However, in doing so the model ensures that no MWDOC client agency falls below the Wholesale Minimum Allocation Percentage Level, as illustrated in Table 4.2.

Conservation Demand Hardening Credit: The Conservation Demand Hardening Credit is used to address the increased difficulty in achieving additional water savings at the retail level due to implementation of conservation. The credit is calculated by multiplying an agency's quantified conservation savings (in acre-feet) by its estimated retail shortage percentage prior to applying the credit. Each agency's quantified conservation savings is calculated from a combination of the following categories:

- *Active Conservation* – The water savings from Water-Use Efficiency devices according to the most recent year data available (year 2006 is currently used within the model). MWDOC's database determines the amount of active conservation each client agency has saved.

- *Passive Conservation* – The water savings from code-based savings in new development and natural replacement of devices. A two-part calculation was used to determine each client agency's passive conservation savings. New development savings were determined by calculating the increase in retail service connections within each client agency's service area for the years 1993

to 2008; in order to incorporate the year that new plumbing codes were established. Natural replacement savings were calculated by prorating each agency's share of existing service connections for the year 1993; prior to new plumbing codes.

- *System Losses* –The water savings from reduced system flows as a result of conservation. This credit is prorated over the savings from the previous two categories.

A detailed description of each client agency's conservation savings and its method of calculation are shown in Appendix D.

Retail Water Rate Conservation: An additional credit will be given to those agencies that have a conservation rate structure. To qualify, a retail agency's rate structure must have at least two tiers of volumetric rates, with a price differential between the bottom and top tiers of at least 10 percent. Retail agencies must submit a report of the percentage of their total service area retail demand that is covered by a qualifying water rate structure to MWDOC prior to allocation implementation. Upon verification of the report by MWDOC and MET, the client agency will be given a credit of 0.5 percent of covered Base Period Retail Demand to be added to the Base Period Conservation estimate listed above.

Step 5 – Sum Total Allocations and Calculate Retail Reliability

This is the final step in calculating an agency's total allocation for imported supplies. The model sums an agency's total imported allocation with all of the adjustments and credits and then calculates each agency's retail reliability compared to its Allocation Year Retail Demand.

Total Metropolitan Allocation: The allocation of imported supplies to an agency for its Municipal and Industrial retail demand is the sum of the Wholesale Imported Minimum Allocation, their Retail Adjustment, their Conservation Demand Hardening Credit, and IAWP Allocation (if applicable).

Interim Agricultural Water Program (IAWP) Allocation: In late 2008, the MET Board took action to phase out the IAWP. In doing so, the Board allowed participants in the program the options to either remain in the program until 2012 or opt-out with certain provisions. One such provision, as it relates to the allocation plan, is if an agency opts-out, their IAWP baseline would be added to their imported baseline, after the growth adjustment has been applied.

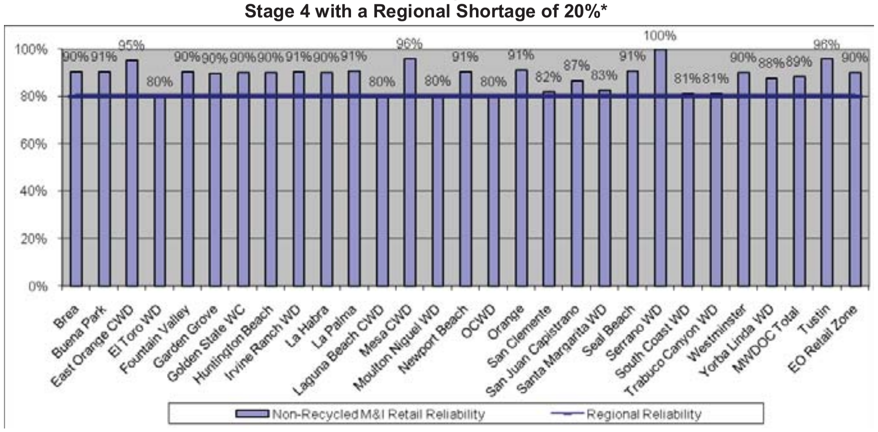
If an agency remains in the IAWP, their IAWP allocation will decrease according to the regional shortage level as illustrated below in Table 4.4

Table 4.4
Interim Agricultural
Water Program Allocation

Regional Shortage Level	Regional Shortage Percentage	IAWP Reduction
1	5%	30.0%
2	10%	30.0%
3	15%	40.0%
4	20%	50.0%
5	25%	75.0%
6	30%	90.0%
7	35%	100.0%
8	40%	100.0%
9	45%	100.0%
10	50%	100.0%

Agency's Retail Reliability: This calculates an agency's total MET allocation versus their allocation year retail demands to determine their overall reliability percentage (supplies as a percentage of retail demand) under a regional shortage level. This percentage excludes recycled water supplies from an agency's total water supply. Figure 4.1 illustrated the MWDOC client agencies' reliability percentages under a stage 4 regional shortage level (20%).

Figure 4.1
MWDOC's Water Supply Allocation Plan
Stage 4 with a Regional Shortage of 20%*



Source: MWDOC Allocation Model Version 1.5 and assumes a BPP of 58%.
[*] These are estimated reliability percentages for MWDOC client agencies under a regional shortage stage 4 (20%) and are subject to change based on local supply data received from the client agencies and OCWD's projected BPP for 2009/10.

Section 5: Plan Implementation

This section covers implementation issues which include: the appeal process, penalties rate structure and billing, tracking and reporting water usage, timeline and option to revisit the plan.

Allocation Appeals Process

The purpose of the appeals process is to provide client agencies the opportunity to request a change to their allocation based on new or corrected information. The grounds for appeal can include but are not limited to:

- Adjusting errors in historical data used in the Base period calculations
- Adjusting for unforeseen losses or gains in local supplies
- Adjusting for extraordinary increases in local supplies
- Adjusting for population growth rates
- Adjusting for credits with the Conservation base data, including Conservation Rate Structure

MWDOC anticipates that under most circumstances, a client agency's appeal will be the basis for an appeal to MET by MWDOC. MWDOC staff will work with client agencies to ensure that such an appeal is a complete and accurate reflection of the client agency's allocation and is properly reviewed by MET. To accomplish this, MWDOC will require the following information from the client agency submitting an appeal:

- Written letter (in the form of a letter or e-mail) from the client agency requesting an appeal
- Brief description of the type of appeal e.g. incorrect base data, loss/gain in local supply, extraordinary increase in local supply, adjustment in agency's conservation base data, or other
- Rationale for the appeal
- Quantity in acre-feet in question
- Verifiable documentation that supports the rationale i.e. billing statements, invoices for conservation device installations, Groundwater reports

To provide clarity of the process and ensure your appeal is properly handled, the following steps will occur:

Step 1 – Submit Appeal – Client agency will submit the necessary information, described above, to MWDOC.

Step 2 – Notification of Response and Appeal Meeting – Once MWDOC staff receives the appeal information, MWDOC will send a response and schedule a meeting with MWDOC staff and the client agency, within two weeks of receiving the information, to discuss the appeal in further detail.

Step 3 – Submittal to MET & MWDOC Board Notification – Using the information received from the client agency, MWDOC will prepare and submit the appeal to MET no later than one month of receiving the information. In addition, MWDOC staff will notify its Board of the submittal to MET.

Step 4 – MET Appeal Process - MWDOC will follow the terms of MET's appeal process, as described in Appendix B. Client agencies will also be invited, as deemed appropriate, by MWDOC to attend any meetings with MET on their appeal.

Step 5 –Client Agency Notification of MET's Decision – Once MET has made a determination of the appeal, MWDOC staff will notify the client agency of the decision and determine if additional actions are needed i.e. Appeal to MET board.

In the event that MET denies the appeal, MWDOC staff will continue to work with the appealing agency to resolve their issue(s). Any action that will result in adjustments to client agency' allocation will be submitted to the Board for review and approval.

Allocation Penalty Rates & Billing

Metropolitan's Penalty Rates

Metropolitan will enforce its allocations through a tiered penalty rate structure. MET will assess penalty rates to a member agency that exceeds its total annual allocation at the end of the twelve-month allocation period, according to the rate structure below:

Table 5.1: Metropolitan Water District Allocation Penalty Rate Structure (2010 Rates)*

Water Use up to:	(1) Base Rate	(2) Penalty Rate**	(1)+(2) = Total Rate
100% Allocation	Tier 1 ($695/AF)	-	**$695/AF**
100% < = 115%	Tier 1 ($695/AF)	2 x Tier 2*** (1,286/ AF)	**1,981/AF**
Use > 115%	Tier 1 ($695/AF)	4 x Tier 2*** (2,572/ AF)	**3,267/AF**

[*] These are based on MET's proposed 21% rate and charge increases for CY 2010.
[**] If MWDOC exceeds its allocation limit but is within its equivalent preferential right amount, MET will decrease the penalty rate by one level.
[***] The Tier 2 penalty rate excludes the treatment surcharge

These penalty rates will be assessed according to MET water rates in effect at the time of billing. Any penalty funds collected by MET will be invested back to the MET member agency through conservation and local resource development.

MWDOC Penalty Rates

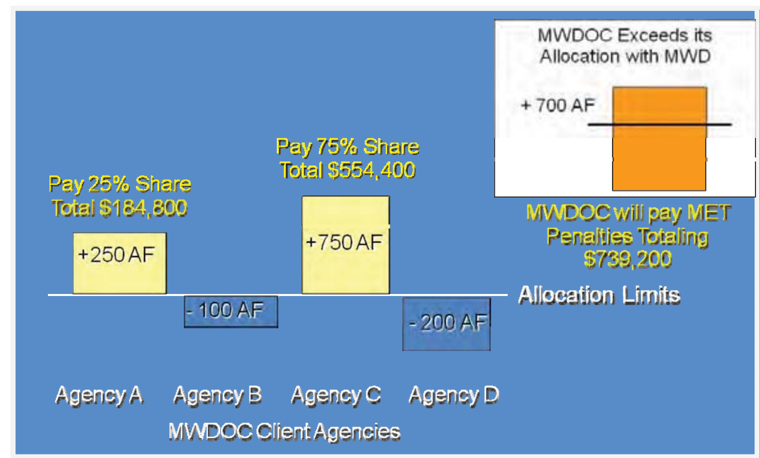
As a water wholesaler, MWDOC has the opportunity to assess penalties in many different ways. A number of options were discussed and analyzed with the client

agencies and Board Committee members. The key components that helped guide development of a penalty structure included:

- A financial incentive to discourage water usage above a client agency's allocation
- A penalty rate structure that is administratively easy to understand and implement
- Penalty rates that are fair and appropriate during a shortage

From these components and input received from both the MWDOC Board and the client agencies, a melded penalty rate structure was recommended. This was mainly due to its "region-wide" style approach and similar structure to other MWDOC rates and charges.

Melded Penalty Rate Structure – At the end of the allocation year, MWDOC would charge a penalty to each client agency that exceeded their allocation. This penalty would be assessed according to the client agency's prorated share (acre-feet over usage) of MWDOC penalty amount with MET. Below is an example of how this penalty rate structure would apply:



Under the melded penalty rate structure, client agencies will only be assessed penalties if MWDOC exceeds its total allocation and is required to pay a penalty to MET.

MWDOC Billing

During the allocation period, MWDOC billing will remain the same. Only at the end of the twelve-month allocation period will MWDOC calculate each member agency's total potable water use based on the local supply certification and MWDOC allocation model and determine which agencies exceeded their annual allocation. From those agencies that exceeded their allocation, MWDOC will assess penalty rates according to the melded penalty rate structure on their next water invoice.

Understanding that the penalties can be significant to a retail agency, MET and MWDOC will allow payment of these penalties to be spread over three monthly billing periods. Therefore, a third of the penalties will be applied each month to the agency's water invoice over a three-month period

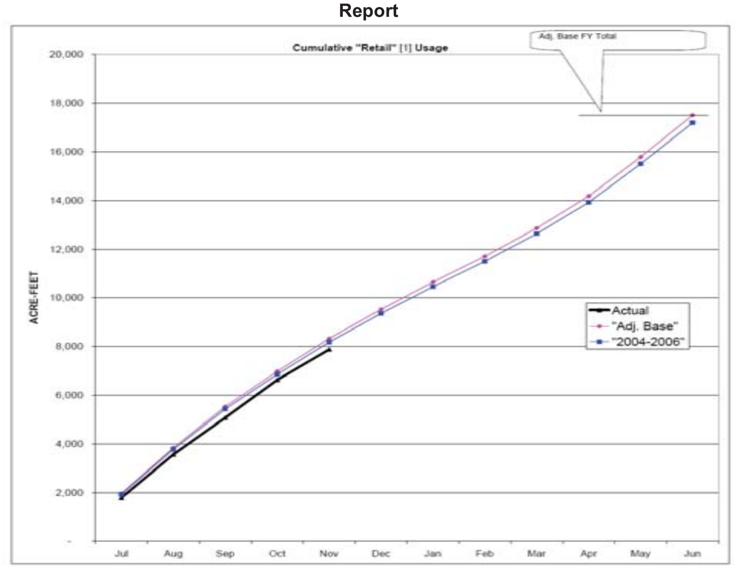
Tracking and Reporting

In preparing for allocation, it is important to track the amount of water the region and each client agency is using monthly. This data is important to help MWDOC and client agencies project their annual usage, evaluate their current demands, and avoid any over usage that will result in allocation penalties. MWDOC will provide water use monthly reports that will compare each client agency's current cumulative retail usage to their allocation baseline (average usage for years 2004 to 2006). In addition, MWDOC will provide quarterly reports on its cumulative retail usage versus its allocation baseline.

To develop these reports, MWDOC will need to work closely with each client agency to get their local supply data on a monthly basis. This data will not only be used by MWDOC to track monthly usage but also by MET to assess MWDOC's total projected water demands.

Below in Figure 5.2 is an example of the type of monthly report MWDOC will provide to each client agency during the allocation period.

Figure 5.2
Example of a Client Agency's Monthly Usage Report



[1] "Retail" usage includes MET water and Local water (except for recycled water)

Key Dates for Implementation

If a regional shortage is declared, the allocation period will cover twelve consecutive months, e.g. July 1st of a given year through June 30. Barring unforeseen large-scale circumstances, the Regional Shortage Level will be set for the entire allocation period, which will provide the client agencies an established water supply shortage allocation amount. Figure 5.3 Illustrates the Metropolitan timeline for allocations during a two year period.

Figure 5.3: Metropolitan Water District
Adopted Allocation Timeline

Year	Month	Year 1 Board Allocation Decision	Year 1 Allocation Year	Year 2 Board Allocation Decision	Year 2 Allocation Year
YEAR 1	January				
	February				
	March				
	April	**Declaration**			
	May				
	June				
	July		**Effective Period** Continuous Tracking Of Member Agency Local Supply and Imported Water Use		
	August				
	September				
	October				
	November				
	December				
YEAR 2	January				
	February				
	March				
	April			**Declaration**	
	May				
	June				
	July				
	August		**Assess Penalties**		**Effective Period** Continuous Tracking Of Member Agency Local Supply and Imported Water Use
	September				
	October				
	November				
	December				
YEAR 3	January				
	February				
	March				
	April				
	May				
	June				

It important to note, MWDOC does not anticipate calling for allocation unless the Metropolitan Board declares a shortage through it WSAP; and no later than 30 days from MET declaration will MWDOC announce allocation to its client agencies.

Revisiting the Plan

Calculating and determine how the amount of imported water each client agency receives during a water shortage is not an easy task. The key objective in developing this allocation plan is to ensure that a proper and fair distribution of water is given to each client agency. However, due to the complexity of this issue and the potential for unforeseen circumstances that may occur during an allocation year, MWDOC offers the opportunity to review and refine components of this plan where deemed necessary.

After one year of implementation, the MWDOC staff and client agencies have the opportunity to revisit the plan and offer any recommendations to the MWDOC Board that will improve the method, calculation, and approach of this plan.

Metropolitan has a similar process which will allow opportunity to review their plan as approved.

Appendix A

List of Acronyms:

AF- Acre-feet
IAWP-Interim Agricultural Water Program
M&I- Municipal and Industrial
MET-Metropolitan Water District of Southern California
WSAP-Water Supply Allocation Plan

Definitions:

Extraordinary Increases in Production: Local water production efforts that increase local supplies, including purchasing water transfers or overproducing groundwater yield.

Groundwater Recovery: The extraction and treatment of groundwater making it usable for a variety of applications by removing high levels of chemicals and/or salts.

In-lieu deliveries: Metropolitan-supplied water bought to replace water that would otherwise be pumped from the groundwater basins.

Overproducing groundwater yield: Withdrawal (removal) of groundwater over a period of time that exceeds the recharge rate of the supply aquifer. Also referred to as overdraft or mining the aquifer.

Seasonal Shift- Water requested in a period of low demand (winter) for use in high demand periods (summer). This water will not be available beyond 2009.

Seawater Barrier: The injection of water by OCWD into wells along the coast to protect the OCWD groundwater basin from seawater intrusion. The injected water acts like a wall, blocking seawater that would otherwise migrate into groundwater basins as a result of pumping inland.

Appendix B

Metropolitan's Draft Water Supply Allocation Plan

DRAFT

Water Supply Allocation Plan

Metropolitan Water District of Southern California

Inside cover: Photo courtesy of Cora Edmonds/ArtXchange for the Healing Planet

Water Supply Allocation Plan

Table of Contents

List of Tables and Figures:

List of Acronyms:

Af- Acre-feet
CWD- County Water District
DWP- Drought Management Plan
IAWP-Interim Agricultural Water Program Reductions and Rates
IICP- Incremental Interruption and Conservation Plan
IRP- Integrated Resources Plan
M&I- Municipal and Industrial
MWD- Municipal Water District
RUWMP- Regional Urban Water Management Plan
SWP - State Water Project
WSDM- Water Surplus and Drought Management

Definitions:

Extraordinary Increases in Production- Local water production efforts that increase local supplies, including purchasing water transfers or overproducing groundwater yield.

Groundwater Recovery- The extraction and treatment of groundwater making it usable for a variety of applications by removing high levels of chemicals and/or salts.

In-lieu deliveries- Metropolitan-supplied water bought to replace water that would otherwise be pumped from the groundwater basins.

Overproducing groundwater yield- Withdrawal (removal) of groundwater over a period of time that exceeds the recharge rate of the supply aquifer. Also referred to as overdraft or mining the aquifer.

Seasonal Shift- Water requested in a period of low demand for use in high demand periods. This water will not be available beyond 2009.

Seawater Barrier- The injection of fresh water into wells along the coast to protect coastal groundwater basins from seawater intrusion. The injected fresh water acts like a wall, blocking seawater that would otherwise seep into groundwater basins as a result of pumping.

Surface Storage Operating Agreement Demand- Deliveries made to the San Diego County Water Authority under the Surface Storage Operating Agreement. Water delivered under this program is used by San Diego County Water Authority to offset peak period delivery requirements.

Section 1: Introduction

Calendar Year 2007 introduced a number of water supply challenges for the Metropolitan Water District of Southern California (Metropolitan) and its service area. Critically dry conditions affected all of Metropolitan's main supply sources. In addition, a ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt in the Sacramento-San Joaquin River Delta which brought uncertainty about future pumping operations from the State Water Project. This uncertainty, along with the impacts of dry conditions, raised the possibility that Metropolitan would not have access to the supplies necessary to meet total firm demands[1] and would have to allocate shortages in supplies to the member agencies[2].

In preparing for this possibility, Metropolitan staff worked jointly with the member agency managers and staff to develop a Water Supply Allocation Plan (Plan). This Plan includes the specific formulas for calculating member agency supply allocations and the key implementation elements needed for administering an allocation should a shortage be declared. Ultimately, the Plan will be the foundation for the urban water shortage contingency analysis required under Water Code Section 10632 and will be incorporated into Metropolitan's Regional Urban Water Management Plan (RUWMP).

Section 2: Development Process

Member Agency Input

Between July 2007 and February 2008, Metropolitan staff worked cooperatively with the member agencies through a series of member agency manager meetings and workgroups to develop a formula and implementation plan to allocate supplies in case of shortage. These workgroups provided an arena for in-depth discussion of the objectives, mechanics, and policy aspects of the different parts of the Plan. Metropolitan staff also met individually with fifteen member agencies for detailed discussions of the elements of the recommended proposal. Metropolitan introduced the elements of the proposal to many nonmember retail agencies in its service area by providing presentations and feedback to a number of member agency caucuses, working groups, and governing boards. The discussions, suggestions, and comments expressed by the member agencies during this process contributed significantly to the development of this Plan.

Board of Directors Input

Throughout the development process Metropolitan's Board of Directors was provided with regular progress reports on the status of this Plan, with oral reports in September, October, and December 2007, an Information Board of Directors Letter with a draft of the Plan in November 2007, and a Board of Directors Report with staff recommendations in January 2008. Based on Water Planning and Stewardship Committee discussion of the staff recommendations and further review of the report by

[1] Firm demands are also referred to as uninterruptable demands; likewise non-firm demands are also called interruptible demands.
[2] See Appendix A for list of member agencies.

the member agencies, refinements were incorporated into the Plan for final consideration and action in February 2008. The Plan was adopted at the February 12, 2008 Board of Directors meeting[3].

Section 3: Review of Historical Shortage Plans[4]

The Plan incorporates key features and principles from the following historical shortage allocation plans but will supersede them as the primary and overarching decision tool for water shortage allocation.

Interruptible Water Service Program

As part of the new rate structure implemented in 1981, Metropolitan's Board of Directors adopted the Interruptible Water Service Program (Interruptible Program) which was designed to address short-term shortages of imported supplies. Under the Interruptible Program, Metropolitan delivered water for particular types of use to its member agencies at a discounted rate. In return for this discounted rate, Metropolitan reserved the right to interrupt delivery of this Interruptible Program water so that available supplies could be used to meet municipal and industrial demands.

Incremental Interruption and Conservation Plan

The ability to interrupt specific deliveries was an important element of Metropolitan's strategy for addressing shortage conditions when it adopted the Incremental Interruption and Conservation Plan (IICP) in December 1990. Reductions in IICP deliveries were used in concert with specific objectives for conservation savings to meet needs during shortages. The IICP reduced Interruptible Service deliveries in stages and provided a pricing incentive program to insure that reasonable conservation measures were implemented.

1995 Drought Management Plan

The 1995 Drought Management Plan (DMP) was a water management and allocation strategy designed to match supply and demand in the event that available imported water supplies were less than projected demands. Adopted by the Metropolitan Board of Directors in November 1994, the 1995 DMP was a short-term plan designed to provide for the 1995 calendar year only. The primary objective of the 1995 DMP was to identify methods to avoid implementation of mandatory reductions. The 1995 DMP included various phases and a step-by-step strategy for evaluating supply and demand conditions and utilizing Metropolitan's available options, with the final phase being implementation of the revised IICP.

1999 Water Surplus and Drought Management Plan

Metropolitan staff began work on the Water Surplus and Drought Management (WSDM) Plan in March 1997 as part of the Integrated Water Resources Plan (IRP), which was adopted by Metropolitan's Board of Directors in January 1996. The IRP established regional water resource targets, identifying the need for developing resource management policy to guide annual operations. The WSDM Plan defined Metropolitan's resource management policy by establishing priorities for the use of regional resources

[3] A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix B of this report.
[4] A summary of the key elements in the following allocation plans is found in Appendix C.

to achieve the region's reliability goal identified in the IRP. In April 1999, Metropolitan's Board of Directors adopted the WSDM Plan.

The WSDM Plan also included a set of principles and considerations for staff to address when developing specific allocation methods. The WSDM Plan stated the following guiding principle to be followed in developing any future allocation scheme:

> *"Metropolitan will encourage storage of water during periods of surplus and work jointly with its member agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage."*[5]

This principle reflects a central desire for allocation methods that are both equitable and minimize regional hardship to retail water consumers. The specific considerations postulated by the WSDM Plan to accomplish this principle include the following:[6]

- The impact on retail customers and the economy
- Allowance for population and growth
- Change and/or loss of local supply
- Reclamation/Recycling
- Conservation
- Investment in local resources
- Participation in Metropolitan's interruptible programs
- Investment in Metropolitan's facilities.

Section 4: Water Supply Allocation Formula

Based on the guiding principle and considerations described in the WSDM Plan, Metropolitan staff and the member agencies developed a specific formula for allocating water supplies in times of shortage. The formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level, and takes into account growth, local investments, changes in supply conditions and the demand hardening[7] aspects of non-potable recycled water use and the implementation of conservation savings programs. The formula, described below[8], is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third section contains specific methodology developed for this Plan.

Step 1: Base Period Calculations

The first step in calculating a water supply allocation is to estimate water supply and demand using a historical base period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the three most recent non-shortage years, 2004-2006.[9]

[5] WSDM Plan, p. 1. Emphasis added.
[6] WSDM Plan, p. 2.
[7] Demand hardening is the effect that occurs when all low-cost methods of decreasing overall water demand have been applied (e.g., low-flow toilets, water recycling) and the remaining options to further decrease demand become increasingly expensive and difficult to implement.
[8] Detailed operational elements of these objectives and a numerical example are discussed in Appendix D of this report.
[9] Exceptions to this methodology are noted in the descriptions of base period calculations.

(a) Base Period Local Supplies: Local supplies for the base period are calculated using a three-year average of groundwater production, groundwater recovery, Los Angeles Aqueduct supply, surface water production, and other imported supplies. Non-potable recycling production is not included in this calculation due to its demand hardening effect.

(b) Base Period Wholesale Demands: Firm demands on Metropolitan for the base period are calculated using a three-year average of full-service, seawater barrier, seasonal shift, and surface storage operating agreement demand.

(c) Base Period Retail Demands: Total retail-level municipal and industrial (M&I) demands for the base period are calculated by adding the Base Period Wholesale Demands and the Base Period Local Supplies. This estimates an average total demand for water from each agency.

(d) Base Period In-lieu Deliveries: Base period in-lieu deliveries to member agency storage are calculated using a three-year average of in-lieu deliveries to long-term groundwater replenishment, conjunctive use, cyclic, and supplemental storage programs.

(e) Base Period Interim Agricultural Water Program Deliveries: Through discussions with the member agencies, fiscal year 2003/04 was established as the base period for Interim Agricultural Water Program (IAWP) deliveries. This baseline will remain in place for the period in which the IAWP Reduction is in effect and for droughts continuing into successive years.

(f) Base Period Conservation: Conservation savings for the base period are calculated using modeled estimates of the most recent year's savings from active programs, code-based savings, and system losses. This is different than other base period calculations because, for demand hardening purposes, it is preferable to use the most recent estimate of installed water savings as opposed to a three-year average. Modeled estimates are generated using device-based savings and decay rates provided by California Urban Water Conservation Council and other recognized sources. These estimates currently include savings accumulated from Metropolitan funded programs. Agencies with verified conservation device installations from conservation efforts funded without Metropolitan assistance can be added through an appeals process.

(g) Qualifying Conservation Rate Structure: An additional consideration will be given to agencies whose retail-level water use is subject to a qualifying water rate structure. A qualifying rate structure is defined as one with at least two tiers of volumetric rates, with a price differential between the bottom and top tiers of at least 10 percent. Agencies with a qualifying rate structure will be given a credit of .5 percent of the qualified Base Period Retail Demand to be added to the Base Period Conservation estimate listed above.

Step 2: Allocation Year Calculations

The next step in calculating the water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population or economic growth and changes in local supplies.

(a) Allocation Year Retail Demands: Total retail M&I demands for the allocation year are calculated by adjusting the Base Period Retail Demands for growth. The growth adjustment is calculated using the average annual rate of population growth at the county level, as generated by the California Department of Finance, over the three-year base period. On an appeals basis, member agencies may request that their adjustment be calculated using a weighted combination of actual population and actual employment growth rates.

(b) Allocation Year Local Supplies: Allocation year local supplies are estimated using the Base Period Local Supplies plus Base Period In-Lieu Deliveries and adjusting for any local gain or loss in supply, including extraordinary increases in production. In-lieu deliveries are added to reflect the corresponding reduction in base year local production that was required to certify in-lieu deliveries to storage. Planned or scheduled increases in supply, which are not due to extraordinary increases in production over the base year, are added to the Base Period Local Supplies. Losses of local supply due to such things as hydrology or water quality are subtracted from the Base Period Local Supplies[10]. These adjustments are made to give a more accurate estimate of actual supplies in the allocation year and more accurately reflect an agency's demand for Metropolitan supplies.

(c) Allocation Year Wholesale Demands: Demands on Metropolitan for the allocation year are calculated by subtracting the Allocation Year Local Supplies from the Allocation Year Retail Demands.

Step 3: Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. The following table displays the elements that form the basis for calculating the supply allocation. Each element and its application in the allocation formula is discussed below.

[10] Losses of local supply that are not covered by this adjustment include groundwater losses that are less than or equal to base period replenishment deliveries (for a two year period following interruptions of replenishment deliveries) and supplies that were used to cover IAWP shortages and are no longer available to meet firm demands.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
1	5%	0%	92.5%	0.0%	30%
2	10%	0%	85.0%	0.0%	30%
3	15%	15%	77.5%	7.5%	40%
4	20%	20%	70.0%	10.0%	50%
5	25%	25%	62.5%	12.5%	75%
6	30%	30%	55.0%	15.0%	90%
7	35%	35%	47.5%	17.5%	100%
8	40%	40%	40.0%	20.0%	100%
9	45%	45%	32.5%	22.5%	100%
10	50%	50%	25.0%	25.0%	100%

(a) **Regional Shortage Levels:** The formula allocates shortages of Metropolitan supplies over ten levels.

(b) **Regional Shortage Percentage:** The total regional shortage is determined by dividing Metropolitan's available supplies by the sum of the Allocation Year Wholesale Demands and subtracting this amount from 1, presented as a percentage in five percent increments from five to 50.

(c) **Extraordinary Increased Production Adjustment:** This adjustment accounts for extraordinary increases in local supplies in times of shortage above the base period, including such efforts as purchasing water transfers or overproducing groundwater yield. In order not to discourage these efforts, only a percentage of the yield from these supplies is added back to Allocation Year Local Supplies, as seen in Table 1. This has the effect of "setting aside" the majority of the yield for the agency who procured the supply.

(d) **Wholesale Minimum Allocation:** The Wholesale Minimum Allocation ensures a minimum level of Metropolitan supplied wholesale water service to the member agencies equal to 100 percent of Allocation Year Wholesale Demand minus one-and-a-half times the Shortage Percent. The Wholesale Minimum Allocation ensures that member agencies will not experience shortages on the wholesale level that are greater than one-and-a-half times the Regional Shortage Percentage.

(e) **Maximum Retail Impact Adjustment:** The purpose of this adjustment is to ensure that agencies with a high level of dependence on Metropolitan do not experience disparate shortages at the

retail level compared to other agencies when faced with a reduction in wholesale water supplies. The Maximum Retail Impact Percentage is calculated as the difference between the Regional Shortage Percentage and the Wholesale Minimum Percentage then prorated on a linear scale[11] based on each member agency's dependence on Metropolitan at the retail level. This percentage is then multiplied by the agency's Allocation Year Wholesale Demand to determine an additional allocation. For agencies that are 100 percent dependent on Metropolitan, this will result in a shortage equal to the Regional Shortage Percentage.

(f) **Interim Agricultural Water Program Reductions:** Certified Interim Agricultural Water Program (IAWP) allocation is calculated by decreasing the base year IAWP deliveries by the IAWP Reduction Percentage as seen in Table 1. Penalty rates for noncompliance with this reduction schedule shall be consistent with the rates described in Administrative Code Section 4907.

(g) **Conservation Demand Hardening Credit:** The Conservation Demand Hardening Credit addresses the increased difficulty in achieving additional water savings at the retail level that comes as a result of successful implementation of water conserving devices and conservation savings programs. This supply credit is calculated in two steps. First, an estimated retail shortage percentage is calculated by adding Wholesale Minimum Percentage, Retail Impact Allocation, and Allocation Year Local Supplies and dividing by Allocation Year Retail Demands and then subtracting this from 1. Finally, this retail shortage percentage is multiplied by the agency's quantified conservation savings to find the Conservation Demand Hardening Credit. This indicates the fraction of an agency's conservation savings that will be credited back to the agency as additional allocation.

(h) **Municipal & Industrial Allocation:** The allocation to an agency for its M&I retail demand is the sum of the Wholesale Minimum Allocation, the Retail Impact Adjustment, and the Conservation Demand Hardening Credit.

(i) **Total Allocation:** The total allocation of Metropolitan supplies to an agency is calculated by adding together the Municipal & Industrial Allocation and the Interim Agricultural Water Program Reductions. This is the total amount of water the agency will receive from Metropolitan at any given Regional Shortage Level, factoring in local production, wholesale allocation, retail allocation, IAWP allocation, and conservation[12].

Section 5: Plan Implementation

The Plan will take effect if a regional shortage is declared by the Board of Directors. The following implementation elements are necessary for administering the Plan during a time of shortage. These

[11] This pro-rated adjustment is only applied when Metropolitan Shortage Level is three or greater.

[12] See Appendix D for specific allocation formulae.

elements cover the processes needed to declare a regional shortage level as well as provide a penalty rate structure for enforcing each agency's allocation.

Allocation Period

The allocation period covers twelve consecutive months, from July of a given year through the following June. This period was selected to minimize the impacts of varying State Water Project (SWP) allocations and to provide member agencies with sufficient time to implement their outreach strategies and rate modifications.

Setting the Regional Shortage Level

Metropolitan staff is responsible for recommending a Regional Shortage Level for the Board of Directors' consideration. The recommendation shall be based on water supply availability, and the implementation of Metropolitan's water management actions as outlined in the WSDM Plan.
Metropolitan staff will keep the Board of Directors apprised to the status of water supply conditions and management actions through monthly reports to the Water Planning and Stewardship Committee. To further facilitate staff in the development of a recommended regional shortage level, member agency requests for local supply adjustments shall be submitted by April 1st.
Metropolitan's Board of Directors, through the Water Planning and Stewardship Committee, is responsible for approving the final Regional Shortage Level at its April meeting. By the April meeting, the majority of the winter snowfall accumulation period will have passed and will allow staff to make an allocation based on more stable water supply estimates. Barring unforeseen large-scale circumstances, the Regional Shortage Level will be set for the entire allocation period, which will provide the member agencies an established water supply level for their planning.

Allocation Appeals Process

An appeals process is necessary for the administration of any changes or corrections to an agency's allocation. Metropolitan's General Manager will designate, subsequent to a declaration of an allocation by the Board of Directors, an Appeals Liaison as the official point of contact for all information and inquiries regarding appeals. All Member Agency General Managers will be notified in writing of the name and contact information of the Appeals Liaison. Only appeals that are made through the Appeals Liaison and in accordance with the provisions outlined in Appendix G will be evaluated. Basis for appeals claims can include but are not limited to:

- Adjusting erroneous historical data used in base period calculations
- Adjusting for unforeseen loss or gain in local supply
- Adjusting for extraordinary increases in local supply
- Adjusting for population growth rates
- Reviewing calculation of base period, allocation year and supply allocation figures for consistency with the standards outlined in the Plan

Additional details and a checklist for the appeals process are available in Appendix G and H.

Allocation Penalty Rates

Member agency allocations are enforced through a penalty rate structure. The applicable rates are based on Metropolitan's established tiered pricing structure[13]. Penalty rates and charges will only be assessed to the extent that an agency's total annual usage exceeds its total annual allocation. Any funds collected will be applied towards investments in conservation and local resources development within the area the penalties are incurred. No billing or assessment of penalty rates will take place until the end of the twelve-month allocation period.

(1) **Standard Penalty Rates:** The recommended penalty rate structure is an ascending block structure that provides a lower penalty for minor overuse of allocations and a higher penalty for major overuse of allocations. The structure and applicable rates are listed in Table 2. The penalty rates shall be based on the official Metropolitan water rates in effect the last day in June of the twelve-month allocation period.

Table 2: Standard Penalty Rates

Water Use	Base Water Rate[14]	Penalty Rate[15]	Total Rate
100% of Allocation	Tier 1	0	Tier 1
Between 100% and 115%	Tier 1	2 x Tier 2	Tier 1 + (2 x Tier 2)
Greater than 115%	Tier 1	4 x Tier 2	Tier 1 + (4 x Tier 2)

(2) **Penalty Rates in Recognition of Section 135 of the MWD Act[16]:** Section 135 of the Metropolitan Water District Act declares that a member agency has the right to invoke its preferential right to water. Each year, Metropolitan calculates each agency's percentage of preferential rights based on a formula of collected cumulative revenues. Table 3 shows the preferential rights percentages as of July 2007.

[13] See Appendix E for tiered pricing rates as of January 10, 2008.
[14] The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).
[15] Penalty rate is the fully loaded untreated Tier 2 rate.
[16] For further definition of Preferential Rights, see Appendix F.

Table 3: Preferential Water Rights by Member Agency[17]	
Member Agency	Preferential Right as Percent of Total
City of Anaheim	0.97%
City of Beverly Hills	1.01%
City of Burbank	0.94%
Calleguas MWD	3.85%
Central Basin MWD	7.48%
City of Compton	0.26%
Eastern MWD	3.11%
Foothill MWD	0.68%
City of Fullerton	0.59%
City of Glendale	1.29%
Inland Empire Utilities Agency	2.47%
Las Virgenes MWD	0.80%
City of Long Beach	2.54%
City of Los Angeles	20.97%
MWD of Orange County	13.99%
City of Pasadena	1.08%
San Diego CWA	16.73%
City of San Fernando	0.10%
City of San Marino	0.20%
City of Santa Ana	0.77%
City of Santa Monica	0.88%
Three Valleys MWD	2.62%
City of Torrance	1.17%
Upper San Gabriel MWD	3.74%
West Basin MWD	8.16%
Western MWD	3.60%

There is a discounted penalty rate schedule in recognition of these preferential rights. Using the regional supply amount used in the determination of a Regional Shortage Level, Metropolitan staff will also calculate an allocation to each member agency based on its most recent preferential right percentage. Member agencies that exceed allocations under the Water Supply Allocation Plan formula but do not exceed an equivalent calculation using preferential rights will be subject to the penalty rate schedule described in Table 4.

[17] Calculated by Metropolitan staff and audited June 30 of each year.

Table 4: Preferential Right Penalty Rate[18]			
Water Use	Base Water Rate	Penalty Rate[19]	Total Rate
100% of Allocation	Tier 1	0	Tier 1
Between 100% and 115%	Tier 1	1 x Tier 2	Tier 1 + (1 x Tier 2)
Greater than 115%	Tier 1	3 x Tier 2	Tier 1 + (3 x Tier 2)

As previously stated, the penalty rates shall be based on the official Metropolitan water rates in effect the last day in June of the twelve-month allocation period. Metropolitan staff will include equivalent preferential rights calculations in monthly reports of each member agency's water use compared to allocations.

Tracking and Reporting

Subsequent to a declared regional shortage by the Board of Directors, Metropolitan staff will produce monthly reports of each member agency's water use compared to its allocations based on monthly delivery patterns to be submitted by the member agency. In order to produce these reports, member agencies are requested to submit their local supply use on a monthly basis and certify end of allocation year local supply use. These reports and comparisons are to be used for the purposes of tracking and communicating potential underage/overage of an agency's annual allocations.

Key Dates for Water Supply Allocation Implementation

The timeline for implementation of an allocation is shown in Table 5. A brief description of this timeline follows:

January to March: Water Surplus and Drought Management reporting occurs at Metropolitan's Water Planning and Stewardship Committee meetings. These reports will provide updated information on storage reserve levels and projected supply and demand conditions.

April: Member agencies report their projected local supplies for the coming allocation year. This information is incorporated in staff analysis of storage reserves and projected supply and demand conditions in order to provide an allocation recommendation to the Board. Metropolitan's Board will consider whether an allocation is needed. A declaration of an allocation will include the level of allocation to be in effect for the allocation year.

June 30th: The allocation year is complete.

[18] The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).

[19] Penalty rate is the fully loaded untreated Tier 2 Rate.

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July 1st: If the Board declared an allocation in April, then it will be effective starting July 1st. The allocation level will be held through June 30th, barring unforeseen circumstances. Member agencies will now be requested to submit their local supply use on a monthly basis and certify end of allocation year local supply use. Local production data must be reported to Metropolitan by the end of the month following the month of use (use in July must be reported by the end of August). This information will be combined with Metropolitan sales information in order to track retail water use throughout Metropolitan's service area. Each month Metropolitan will report on member agency water sales compared to their allocation amounts.

June 30th: The allocation year is complete.

July: Member agency local supplies must be certified for the month of June, the last month of the previous allocation year.

August: Metropolitan will calculate each member agency's total potable water use based on local supply certifications and actual sales data for the allocation year of July through June. Penalties will be assessed for usage above a given member agency's final adjusted allocation (reflecting the actual local supply and imported water use that occurred in the allocation year).

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Table 5: Board Adopted Allocation Timeline

Year	Month	Year 1 Board Allocation Decision	Year 1 Allocation Year	Year 2 Board Allocation Decision	Year 2 Allocation Year
Year 1	January				
	February				
	March				
	April	Declaration *			
	May				
	June				
	July		**Effective Period** Continuous Tracking of Member Agency Local Supply and Imported Water Use		
	August				
	September				
	October				
	November				
	December				
Year 2	January				
	February				
	March				
	April			Declaration *	
	May				
	June				
	July				**Effective Period** Continuous Tracking of Member Agency Local Supply and Imported Water Use
	August		Assess Penalties		
	September				
	October				
	November				
	December				
Year 3	January				
	February				
	March				
	April				
	May				
	June				

* Member agency projections of local supplies are due on April 1st to assist Metropolitan staff in determining the need for an allocation in the coming allocation year.

Revisiting the Plan

There will be a formal revisit of the Plan commencing in February 2010. The scheduled revisit ensures the opportunity for Metropolitan staff and the member agencies to re-evaluate the plan and recommend appropriate changes to the Board of Directors. The Plan will also be reviewed twelve months following a Board of Directors implementation of the Plan to consider any immediate refinements that are necessary based on lessons learned.

Appendix A: Member Agency List as of November 2007

Table 6: Member Agencies		
City of Anaheim	City of Glendale	City of San Marino
City of Beverly Hills	Inland Empire Utilities Agency	City of Santa Ana
City of Burbank	Las Virgenes MWD	City of Santa Monica
Calleguas MWD	City of Long Beach	Three Valleys MWD
Central Basin MWD	City of Los Angeles	City of Torrance
City of Compton	MWD of Orange County	Upper San Gabriel MWD
Eastern MWD	City of Pasadena	West Basin MWD
Foothill MWD	San Diego CWA	Western MWD
City of Fullerton	City of San Fernando	

Source: http://mwdh2o.com/mwdh2o/pages/memberag/member04.html

Appendix B: Water Supply Allocation Plan Process Timeline

July 2007

- City of Long Beach Water Department staff briefing
- Member Agency Managers/Member Agency Workgroup meeting
- Northern Managers Group meeting
  - Foothill MWD, City of Pasadena, City of Long Beach, Calleguas MWD, City of Los Angeles, West Basin MWD, City of Burbank, Three Valleys MWD, City of Glendale, Upper San Gabriel MWD

August 2007

- Central Basin MWD staff briefing
- Eastern MWD staff briefing
- San Diego CWA staff briefing
- Member Agency Managers/Member Agency Workgroup meeting
- Western MWD staff briefing
- City of Beverly Hills staff briefing

September 2007

- Member Agency Subgroup meetings
  - MWD of Orange County, San Diego CWA, West Basin MWD, Central Basin MWD
- MWD of Orange County staff briefing
- Member Agency Workgroup meeting
- Member Agency Workgroup meeting
- MWD Board of Directors Oral Report

October 2007

- Inland Empire Utilities Agency staff briefing
- Central Basin MWD Caucus Meeting (included sub-agencies)
- Three Valleys MWD staff briefing
- MWD of Orange County staff briefing
- West Basin MWD staff briefing
- MWD Board of Directors Oral Report

November 2007

- West Basin MWD Caucus Meeting (included sub-agencies)
- West Basin Water Users Association presentation
- Walnut Valley MWD staff briefing (sub-agency of Three Valleys MWD)
- Foothill MWD Managers Meeting (included sub-agencies)
- Central Basin MWD staff briefing
- City of Claremont City Council (sub-agency of Three Valleys MWD)
- MWD Board of Directors Information Letter with Draft Proposal

December 2007

- Northern Managers Group Meeting
- California Department of Public Health staff briefing
- City of Long Beach Water Department staff briefing
- Santa Ana River Watershed Project Authority presentation
- Foothill MWD Managers Meeting (included sub-agencies)
- MWD Board of Directors Oral Report

January 2008

- Northern Managers Group Meeting
- Water Replenishment District Board of Directors presentation
- Three Valleys MWD staff briefing
- Member Agency Conservation Coordinator's Group presentation
- Member Agency Managers/Member Agency Workgroup meeting
- City of Chino Hills presentation (sub-agency of IEUA)
- Member Agency Workgroup meeting
- Hemet/San Jacinto Exchange Club presentation
- MWD Board of Directors Report with Staff Recommended Water Supply Allocation Plan

February 2008

- MWD of Orange County and Irvine Ranch WD staff briefing
- MWD Board of Directors Action Item
- San Gabriel Valley Water Association Meeting
- Orange County Water Policy Meeting
- SCAG Water Policy Task Force Meeting

Appendix C: Summary of Historical Shortage Plans

These five elements incorporated into the Plan have, in four out of five instances, been used in previous shortage plans. Both the IICP and the 1995 DMP used a historical base period calculation, adjusted for growth, made local supply adjustments, and used conservation hardening credits in their formulations. The retail impact adjustment is the only feature of the Plan that has not been used historically.

Table 7: Historical Shortage Plan Overview

Plan Element	1991 IICP	1995 DMP	Water Supply Allocation Plan
Historical Base Period	√	√	√
Growth Adjustment	√	√	√
Local Supply Adjustment	√	√	√
Conservation Hardening Credit	√	√	√
Retail Impact Adjustment			√

Appendix D: Water Supply Allocation Formula Example

The following example gives a step-by-step description of how the formula would be used to calculate an allocation of Metropolitan supplies for a hypothetical member agency. All numbers are hypothetical for the purpose of the example and do not reflect any specific member agency.

Step 1: Base Period Calculations

(a) Base Period Local Supplies: Calculated using a three-year average of groundwater (gw), groundwater recovery (gwr), Los Angeles Aqueduct supply(laa), surface water(sw), and other non-Metropolitan imported supplies(os).

$$[(gw^1+gwr^1+laa^1+sw^1+os^1)+(gw^2+gwr^2+laa^2+sw^2+os^2)+(gw^3+gwr^3+laa^3+sw^3+os^3)]\div 3=59{,}000 \text{ af}$$

(For the purpose of this example, assume that the three year average is 59,000 af.)

(b) Base Period Wholesale Demands: Calculated using the same three-year time period as the Base Period Local Supplies. The Base Period Wholesale Demands include full-service (fs), seawater barrier (sb), seasonal shift (ss), and surface storage operating agreement (ssoa).

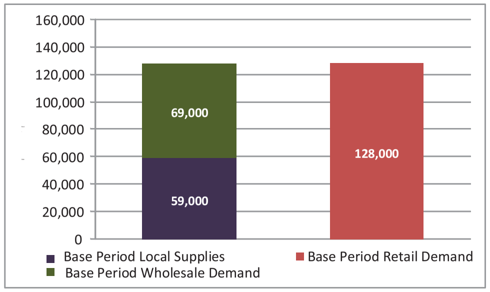
$$[(fs^1+sb^1+ss^1+ssoa^1)+ (fs^2+sb^2+ss^2+ssoa^2)+(fs^3+sb^3+ss^3+ssoa^3)]\div 3=69{,}000 \text{ af}$$

(For the purpose of this example, assume that the three year average is 69,000 af.)

(c) Base Period Retail Demands: Calculated as the sum of the Base Period Local Supplies and Base Period Wholesale Demand.

59,000 + 69,000 = 128,000 af

Figure 1: Base Period Calculations



(d) Base Period In-lieu Deliveries: Calculated by averaging in-lieu deliveries from the same three-year period that was used to calculate the Base Period Local Supplies and Demands.

(4,000 af +5,000 af +4,500 af)÷3=4,500 af

(e) Base Period Interim Agricultural Water Program Deliveries: Fiscal year 2003/04 was established as the base period for Interim Agricultural Water Program (IAWP) deliveries

Base Period IAWP Deliveries = 6,000 af

(f) Base Period Conservation: Calculated using a tool developed by Metropolitan staff that inputs the total amount of conservation savings devices and programs installed by each member agency and standardized water savings factors provided by the CUWCC and other recognized bodies.

Base Period Conservation=14,500 af

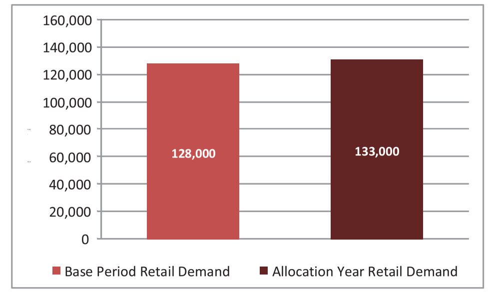
(g) Qualifying Conservation Rate Structure: Agencies that have retail use that is covered by a qualifying conserving water rates structure would be able to add .5 percent of their covered Base Period Retail Demand to the Base Period Conservation.

Step 2: Allocation Year Calculations

(a) Allocation Year Retail Demand: Calculated by adjusting the Base Period Retail Demand for growth that occurred since the Base Period using the average annual rate of county-level population growth over the three-year base period or a weighted combination of population and employment growth rates if an agency so requests through the appeals process.

128,000 af + 5,000 af (based on average annual growth rates)= 133,000 af

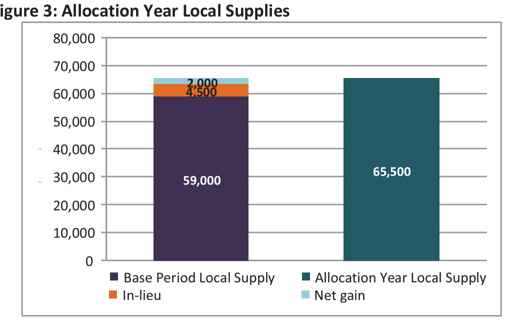
Figure 2: Allocation Year Retail Demand



(b) Allocation Year Local Supplies: Calculated by adding the Base Period Local Supplies (59,000 af), Base Year In-Lieu Deliveries (4,500 af), and adjustments for gains or losses of local supply. For the purposes of this example a net gain in local supply of 2,000 af is assumed.

59,000 af + 4,500 af + 2,000 af =65,500 af

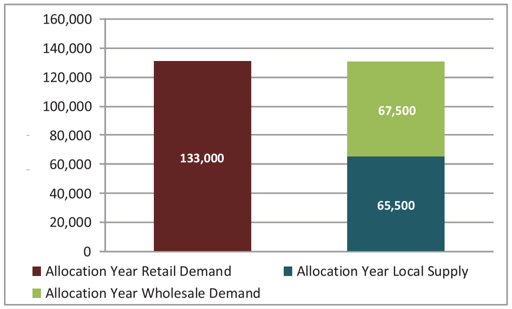
Figure 3: Allocation Year Local Supplies



(c) Allocation Year Wholesale Demands: Calculated by subtracting the Allocation Year Local Supplies (65,500 af) from the Allocation Year Retail Demands (133,000 af).

133,000 af -65,500 af= 67,500 af

Figure 4: Allocation Year Wholesale Demand



Step 3: Supply Allocation Calculations

Regional Shortage Levels 1 &2: For regional shortages of 10 percent or less, the allocation is an across-the-board reduction in wholesale supplies to all agencies with adjustments for conservation demand hardening. There is no adjustment to address disparate retail level shortages in Regional Shortage Levels 1 & 2.

(a) **Regional Shortage Levels:** For the example, we will use calculations from Table 1 for Regional Shortage Level 2.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
2	10%	0%	85.0%	0.0%	30%

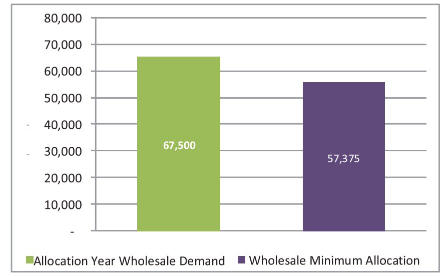
(b) **Regional Shortage Percentage:** The Regional Shortage Percentage at Regional Shortage Level 2 = 10%

(c) **Extraordinary Increased Production Adjustment:** There is no increase in Allocation Year Local Supplies for Extraordinary Increased Production in Regional Shortage Levels 1 and 2.

(d) **Wholesale Minimum Allocation:** Calculated by multiplying the agency's Allocation Year Wholesale Demand (67,500 af) by the Wholesale Minimum Percentage (85%) from the Table 1 for Regional Shortage Level 2.

67,500 af*.85 = 57,375 af

Figure 5: Wholesale Minimum Allocation Shortage Level 2

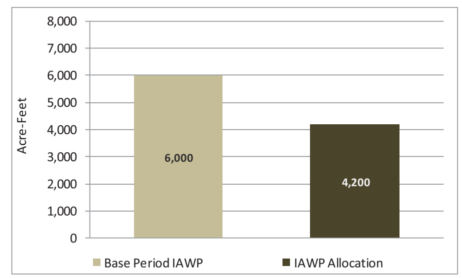


(e) **Maximum Retail Impact Adjustment:** There is no adjustment for Maximum Retail Impact Adjustment for Regional Shortage Levels 1 and 2.

(f) **Interim Agricultural Water Program Reductions:** Calculated by reducing the Base Year IAWP deliveries (6,000 af) by the IAWP Reduction Percentage (30%). At Regional Shortage Level 2 this agency would see a 30 percent reduction in IAWP deliveries in the allocation year.

6,000 af x .30 = 1,800 af reduction
6,000 af- 1,800 af= 4,200 af IAWP Allocation

Figure 6: Interim Agricultural Water Program Reductions Shortage Level 2



(g) **Conservation Demand Hardening Credit:** Calculated by multiplying the agency's quantified conservation savings in acre-feet (14,500 af) by its estimated retail shortage percentage. The retail shortage percentage is calculated by adding Wholesale Minimum Allocation (57,375 af) and Allocation Year Local Supplies (65,500 af), dividing by Allocation Year Retail Demands (133,000 af) and then subtracting this from 1. .

1- ((57,375 + 65,500) ÷ 133,000) = .076 = 7.6%.

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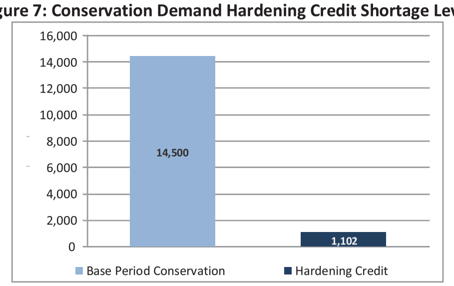
14,500 af*.076= 1,102 af

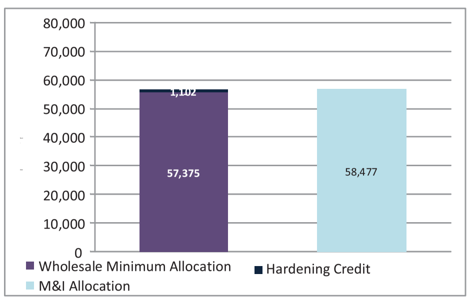
Figure 7: Conservation Demand Hardening Credit Shortage Level 2



(h) Municipal & Industrial Allocation: Calculated by adding the Wholesale Minimum Allocation (57,375 af) and the Conservation Hardening Credit (1,102 af).

57,375 af + af+1,102 af= 58,477 acre-feet.

Figure 8: Municipal and Industrial Allocation Shortage Level 2



(i) Total Allocation: Add Municipal & Industrial Allocation (58,477 af) and Interim Agricultural Water Program (4,200 af) totals.

58,477 af + 4,200 af = 62,677 af

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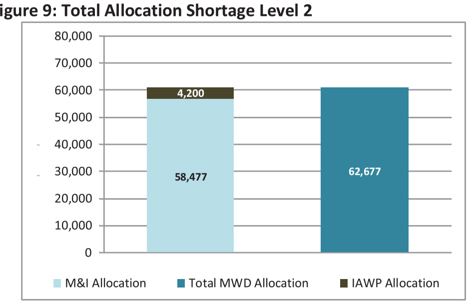
Figure 9: Total Allocation Shortage Level 2



Regional Shortage Levels 3-10: For deeper regional shortages greater than 10 percent, the Allocation Plan formula includes a Retail Impact Adjustment Allocation to address disparate retail level shortages. This example will follow the allocation formula through a Regional Shortage Level 4.

(a) Regional Shortage Levels: Calculate from Table 1 for Regional Shortage Level 4.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
4	20%	20%	70.0%	10.0%	50%

(b) Regional Shortage Percentage: The Regional Shortage Percentage at Regional Shortage Level 4 is 20%

(c) Extraordinary Increased Production Adjustment: Let us assume that the agency has produced 3,700 af of extraordinary production of local supplies in a shortage year. This is calculated by multiplying the extraordinary production (3,700 af) and the Extraordinary Increase Percentage (20%).

3,700 af*.20=740 af

This is then added to the Allocation Year Local Supply (65,500 af).

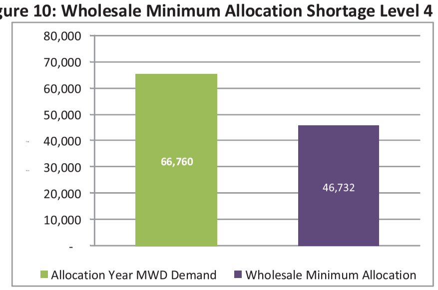
65,500 af + 740 af = 66,240 af

The **Allocation Year Wholesale Demand** (67,500 af) is then decreased by the extraordinary local supply production (740 af) because Allocation Year Retail Demands (133,000 af) remain unchanged.

133,000 af- 66,240 af = 66,760 af or
67,500 af-740 af=66,760 af

(d) **Wholesale Minimum Allocation:** Calculated by multiplying the agency's Allocation Year Wholesale Demand (66,760 af) by the Wholesale Minimum Percentage (70%) from the Table 1 for Regional Shortage Level 4.
66,760 af*.70 = 46,732 af

Figure 10: Wholesale Minimum Allocation Shortage Level 4



(e) **Maximum Retail Impact Adjustment:** Calculated first by determining the agency's dependence on Metropolitan by dividing the Allocation Year Wholesale Demand (66,760 af) by the Allocation Year Retail Demand (133,000 af) and multiplying by 100.

(66,760 af/ 133,000 af)*100=50.2%

Next, this percentage dependence on Metropolitan (50.2%) is multiplied by the Maximum Retail Impact Percentage for Shortage Level 4 (10%).

.502 * .10 =.050=5%

This percentage is now multiplied by the Allocation Year Wholesale Demand (66,760 af) for the Maximum Retail Impact Adjustment.

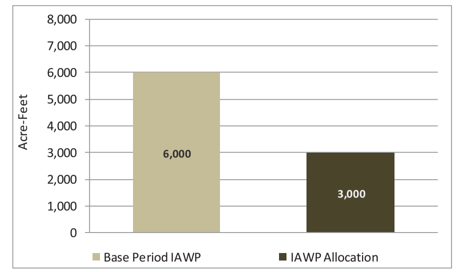
66,760 af*.050=3,351 af

(f) **Interim Agricultural Water Program Reductions:** Calculated by reducing the Base Year IAWP deliveries by the IAWP Reduction Percentage. Under a Regional Shortage Level 4 the agency

would see 50% reduction in IAWP deliveries in the allocation year. We will assume the agency has 6,000 af IAWP water.

6,000 af * .50 = 3,000 af

Figure 11: Interim Agricultural Water Program Reductions Shortage Level 4



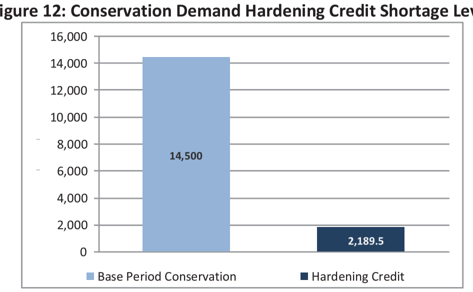
(g) **Conservation Demand Hardening Credit:** Calculated by adding Wholesale Minimum Allocation (46,732 af) and Allocation Year Local Supplies (66,240 af), dividing by Allocation Year Retail Demands (133,000 af) and then subtracting this from 1.

1- ((46,732 + 66,240) ÷ 133,000) = .151 = 15.1%.

Next, multiply the agency's quantified conservation savings in acre-feet (14,500 af) by its estimated retail shortage percentage calculated in the step above.

14,500 af*.151= 2,189.5af

Figure 12: Conservation Demand Hardening Credit Shortage Level 4



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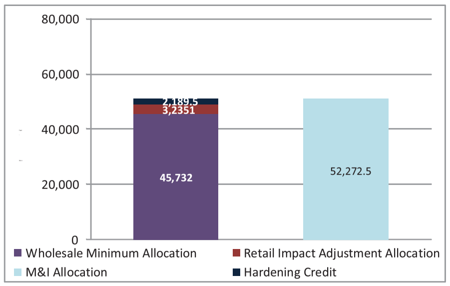
(h) Municipal & Industrial Allocation: Calculated by adding the Wholesale Minimum Allocation (46,732 af), the Maximum Retail Impact Adjustment (3,351 af), and the Conservation Hardening Credit (2,189.5 af).

46,732 af + 3,351af+ 2,189.5 af= 52,272.5 af

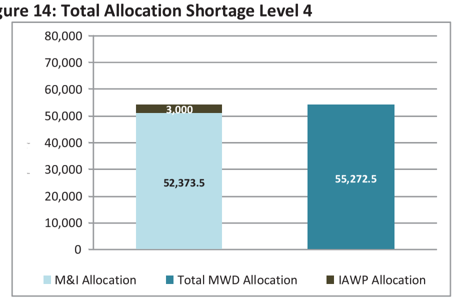
Figure 13: Municipal and Industrial Allocation Shortage Level 4



(i) Total Allocation: Calculated by adding the Municipal and Industrial Allocation (52,272.5 af) and the Interim Agricultural Water Program Allocation (3,000 af).

52,272.5 af + 3,000 af= 55,272.5 af

Figure 14: Total Allocation Shortage Level 4



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Appendix E: Water Rates, Charges, and Definitions

Definitions:

Table 8: Tiered Water Pricing Rates and Charges		
Rate	**2007**	**2008**
Tier 1 Supply Rate (dollars per acre-foot)	$73	$73
Tier 2 Supply Rate (dollars per acre-foot)	$169	$171
System Access Rate (dollars per acre-foot)	$143	$143
Water Stewardship Rate (dollars per acre-foot)	$25	$25
System Power Rate (dollars per acre-foot)	$90	$110
Full Service Untreated Volumetric Cost ($/AF)		
Tier 1	$331	$351
Tier 2	$427	$449
Replenishment Water Rate: untreated (dollars per acre-foot)	$238	$258
Interim Agricultural Water Program: untreated (dollars per acre-foot)	$241	$261
Treatment Surcharge (dollars per acre-foot)	$147	$157
Full Service Treated Volumetric Cost ($/AF)		
Tier 1	$478	$508
Tier 2	$574	$606
Treated Replenishment Water Rate (treated dollars per acre-foot)	$360	$390
Treated Interim Agricultural Water Program (dollars per acre-foot)	$364	$394
Readiness-to-Serve Charge (millions of dollars)	$80	$82
Capacity Charge (dollars per cubic foot second)	$6,800	$6,800

(1) **Tier 1 Supply Rate -** recovers the cost of maintaining a reliable amount of supply.
(2) **Tier 2 Supply Rate** - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.
(3) **System Access Rate** – recovers a portion of the costs associated with the delivery of supplies.
(4) **System Power Rate** – recovers Metropolitan's power costs for pumping supplies to Southern California.
(5) **Water Stewardship Rate** – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.
(6) **Replenishment Water Rate** – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.
(7) **Treated Replenishment Water Rate** – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.
(8) **Interim Agricultural Water Rate** – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.
(9) **Treated Interim Agricultural Water Program Rate** – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.
(10) **Treatment Surcharge** – recovers the costs of treating imported water.

(11) **Readiness-to-Serve Charge -** a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.
(12) **Capacity Charge** – the capacity charge recovers the cost of providing peak capacity within the distribution system.

http://www.mwdh2o.com/mwdh2o/pages/finance/finance_03.html

Appendix F: Preferential Rights

Any review of Metropolitan's methods for allocating supplies during shortages must recognize Section 135 of the 1927 Metropolitan Water District Act (Act). Under Section 135, each member agency has a preferential right to a percentage of Metropolitan's available water supplies based on a legislatively established formula. That percentage is equal to the ratio of each member agency's total accumulated payments to Metropolitan's capital costs and operating expenses compared to the total of all member agencies' payments toward those costs, exempting payments for water purchases. As a result, a member agency's preferential right roughly equals it's pro rata share of all tax assessments and other payments.
In the event of a water supply shortage or drought, any Metropolitan member agency can request that its preferential right be invoked; however, Metropolitan's Board of Directors has never exercised this provision of the Act, even in response to the two statewide droughts in 1976-77 and 1987-92.

Appendix G: Allocation Appeals Process

Step 1: Appeals Submittal:
All appeals shall be submitted to the Appeals Liaison in the form of a written letter signed by the Member Agency General Manager. Each appeal must be submitted as a separate request, submittals with more than one appeal will not be considered. The appeal request is to include:

- A designated Member Agency staff person to serve as point of contact.
- The type of appeal (erroneous baseline data, loss of local supply, etc.).
- The quantity (in acre-feet) of the appeal.
- A justification for the appeal which includes supporting documentation.

A minimum of 60 days are required to coordinate the appeals process with Metropolitan's Board process.
Step 2: Notification of Response and Start of Appeals Process
The Appeals Liaison will phone the designated Member Agency staff contact within 3 business days of receiving the appeal to provide an initial receipt notification, and schedule an appeals conference. Subsequent to the phone call, the Liaison will send an e-mail to the Agency General Manager and designated staff contact documenting the conversation. An official notification letter confirming both receipt of the appeal submittal, and the date of the appeals conference, will be mailed within 2 business days following the phone contact
Step 3: Appeals Conference
All practical efforts will be made to hold an appeals conference between Metropolitan staff and Member Agency staff at Metropolitan's Union Station Headquarters within 15 business days of receiving

the appeal submittal. The appeals conference will serve as a forum to review the submittal materials, and ensure that there is consensus understanding as to the spirit of the appeal. Metropolitan staff will provide an initial determination of the size of the appeal (small or large), and review the corresponding steps and timeline for completing the appeals process.

Steps 4-7 of the appeals process differ depending upon the size of the appeal

Small Appeals
Small appeals are defined as those that would change an agency's allocation by less than 10 percent, or are less than 5,000 acre-feet in quantity. Small appeals are evaluated and approved or denied by Metropolitan staff.

Step 4: Preliminary Decision
Metropolitan staff will provide a preliminary notice of decision to the Member Agency within 10 business days of the appeals conference. The Appeals Liaison will mail a written letter to the Member agency staff contact and General Manager, stating the preliminary decision and the rationale for approving or denying the appeal.

Step 5: Clarification Conference
Following the preliminary decision the Appeals Liaison will schedule a clarification conference. The Member Agency may choose to decline the clarification conference if they are satisfied with the preliminary decision. Declining the clarification conference serves as acceptance of the preliminary decision, and the decision becomes final.

Step 6: Final Decision
Metropolitan staff will provide a final notice of decision to the Member Agency within 10 business days of the clarification conference. The Appeals Liaison will mail a written letter to the Member agency staff contact and General Manager, stating the final decision and the rationale for the decision. A copy of the letter will also be provided to Metropolitan executive staff.

Step 6a: Board Resolution of Small Appeal Claims
Member agencies may request to forward appeals that are denied by Metropolitan staff to the Board of Directors through the Water Planning and Stewardship Committee for final resolution. The request for Board resolution shall be submitted to the Appeals Liaison in the form of a written letter signed by the Member Agency General Manager, this request will be administered according to Steps 6 and 7 of the large appeals process.

Step 7: Board Notification
Metropolitan staff will provide a report to the Board of Directors, through the Water Planning and Stewardship Committee, on all submitted appeals including the basis for determination of the outcome of the appeal.

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Large Appeals

Large appeals are defined as those that would change an agency's allocation by more than 10 percent, and are larger than 5,000 acre-feet. Large appeals are evaluated and approved or denied by the Board of Directors.

Step 4: Preliminary Recommendation

Metropolitan staff will provide a preliminary notice of recommendation to the Member Agency within 10 business days of the appeals conference. The Appeals Liaison will mail a written letter to the Member agency staff contact and General Manager, stating the preliminary recommendation and the rationale for the recommendation. A copy of the draft recommendation will also be provided to Metropolitan executive staff.

Step 5: Clarification Conference

Following the preliminary recommendation the Appeals Liaison will schedule a clarification conference. The Member Agency may choose to decline the clarification conference if the satisfied with preliminary recommendation. Declining the clarification conference signifies acceptance of the preliminary recommendation, and the recommendation becomes final.

Step 6: Final recommendation

Metropolitan staff will provide a final notice of recommendation to the Member Agency within 10business days of the clarification conference . The Appeals Liaison will mail a written letter to the Member agency staff contact and General Manager, stating the final recommendation and the rationale for the recommendation. A copy of the final recommendation will also be provided for Metropolitan executive review.

Step 7: Board Action

Metropolitan staff shall refer the appeal to the Board of Directors through the Water Planning and Stewardship Committee for approval.

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Appendix H: Appeals Submittal Checklist

Appeal Submittal

- ☐ Written letter (E-mail or other electronic formats will not be accepted)
- ☐ Signed by the Agency General Manager
- ☐ Mailed to the appointed Metropolitan Appeals Liaison

Contact Information

- ☐ Designated staff contact
  - Name
  - Address
  - Phone Number
  - E-mail Address
- ☐ General Manager
  - Name
  - Address
  - Phone Number
  - E-mail Address

Type of Appeal

- ☐ State the type of appeal
  - Erroneous historical data used in base period calculations
    - Metropolitan Deliveries
    - Local Production
    - Growth adjustment
    - Conservation savings
  - Unforeseen loss or gain in local supply
  - Extraordinary increases in local supply

Quantity of Appeal

- ☐ State the quantity in acre-feet of the appeal

Justification and Supporting Documentation

- ☐ State the rationale for the appeal
- ☐ Provide verifiable documentation to support the stated rationale
  - Examples of verifiable documentation Include, but are not limited to:
    - Billing Statements
    - Invoices for conservation device installations
    - Basin Groundwater/Watermaster Reports
    - CA Department of Finance economic or population data
    - Department of Public Health reports

Appendix I: Frequently Asked Questions

General Questions

1) What would be considered a "shortage" that would cause the plan to go into effect?

   Answer: An allocation may be needed in a condition where projected water supplies and reasonably managed storage withdrawals are not adequate to meet projected demands for water.

2) Can allocations be carried over to future months (use underutilization in one month to offset exceeding allocations in other months?

   Answer: Member agency allocations are annual in nature. Technically, there is no such thing as an under or over utilization on a monthly basis. However, Metropolitan will report monthly tracking to member agencies for their information.

3) Can unused allocation credits be sold to other agencies?

   Answer: No. Unused allocations remain within the regional pool of water supplies to be distributed or allocated in a later year.

4) How will the allocations be enforced (other than penalties)? Will there be any physical restrictions or will agencies be allowed to overdraw with penalties?

   Answer: Water use in excess of a member agency's allocation will be enforced through the penalty rate structure as defined in the Water Supply Allocation Plan. However, Metropolitan reserves the right to impose physical restrictions on water deliveries.

5) In the revisit of the plan in the third year, what will be the process for re-evaluating the plan and incorporating changes/recommendations from member agencies prior to recommending any proposed changes?

   Answer: The process will be similar to the one used to develop the plan, meaning a collaborative member agency process where issues can be discussed. Proposed resolutions to issues will be taken to the Board for approval.

Interim Agricultural Water Program Issues

6) How will Metropolitan track IAWP vs. M&I usage in an allocation?

   Answer: Metropolitan will look at total deliveries to each member agency and track those deliveries against the sum of the agency's monthly IAWP reduction limits and WSAP allocation limits. This will give a rough feel for how an agency is tracking. IAWP may need to be certified within a month, if an M&I allocation is declared. The current IAWP requirement is a three-month certification timeframe. Shortening the certification deadline will allow more timely reporting of performance against allocation targets.

Conservation Hardening Credit

7) How will Metropolitan evaluate appeals for larger conservation hardening credits due to Conservation-based rate structure savings?

   Answer: Agencies with qualifying conservation-based rate structures receive, by default, a credit of 0.5 percent of their retail demand that is covered by the rate structure. An appeal for a larger hardening credit will, at a minimum, need to include documentation of savings that are larger than the .5 percent. An appeal will be approved or denied on the basis of the documentation.

8) Are conservation savings due to higher water prices factored into the conservation data that leads to a conservation hardening credit for a member agency?

   Answer: Price-effect savings are not included as part of the calculation of conservation for the conservation hardening credit.

9) How current is the conservation data used to calculate each member agency's allocation baseline (CY 2006 or later)?

   Answer: The conservation data used is from the most recent calendar year with complete data. For an allocation declared in April of 2009, Metropolitan will work to use data through the end of 2008, if it is complete.

10) If an agency has been managing and conserving water over the base period, doesn't an allocation plan penalize such a conservation-conscious agency?

   Answer: The plan recognizes these efforts and the impacts through the conservation hardening credit. This is consistent with the goal to provide water on a needs-basis through the Water Supply Allocation Plan.

Local Supplies

11) What is the process to request a loss of local supply adjustment?

   Answer: The loss of local supply adjustment increases the amount of water Metropolitan will have to deliver under a given allocation. For this reason, an initial estimate of loss of local supplies needs to be submitted by April 1, 2009. These adjustments will be taken into account as Metropolitan staff recommends the depth of allocation that is needed.

   Once an allocation is declared, Metropolitan will need to track sales against the allocation on a monthly basis. This will require agencies to certify their local water used each month, so Metropolitan can track how each agency is faring compared to their allocation. As the year progresses and more information on actual local supply use become available, member agency allocations will be adjusted to reflect the actual local supply use. Member agencies can submit appeals to have local supplies that are in excess of their baseline period use characterized as "extraordinary" production, as opposed to normal gains in local supply. Metropolitan may also ask to review a member agency's local supply projection if actual production data for the year indicates local supplies that are significantly different than the projection submitted on April 1st.

12) How will actual data for local production that occurs within an allocation year be viewed vs. projected local production data that the allocation is based on?

Answer: Member agency projections of local supply for the coming allocation year will be submitted to Metropolitan by April 1st of each year. This information will be used to help determine the need and depth of an allocation in the coming allocation year. Initial member agency allocations will be set based on these local supply assumptions. As the year progresses, member agency allocation limits will be adjusted by the actual local supply production that occurs within the year.

13) Will Met review initial forecasted local supplies to screen for potential gaming or unrealistic estimates?

Answer: Forecasted local supplies will require documentation as to reasons why it is different from the base period. As mentioned in Questions 13 and 14, final member agency allocations will reflect the actual local supply use that occurs within the allocation year, which should limit potential "gaming" of the allocation framework.

14) What is the impact if large loss-of-local-supply adjustments are given up front and then actual local supplies are higher than estimated in the allocation year?

Answer: If actual local supplies are higher than estimated, regional water use will be lower than expected and will result in a lesser need for an allocation in the following year. It is possible that loss of local supply adjustments given at the beginning of the period will result in a higher allocation level than needed. This is why it is critical for agencies to provide accurate and documented estimates of their supplies.

15) What criteria will be used to determine the difference between "planned increases" and "extraordinary increases" in local supply?

Answer: Planned increases are defined as increased local supplies that have been previously identified through UWMP's and/or other planning or CIP documents. "Extraordinary Increases" are defined as increased local supplies that occur solely due to the circumstances in that year.

16) How will the two year performance requirement for Replenishment interruption affect adjustments for loss of local supply?

Answer: The allocation formula does not allow a loss of local supply for agencies that purchased replenishment water in the base period (limited by the annual average amount of replenishment water purchased) until a period of two years following the end of the base period.

17) Extraordinary increased production adjustment: why penalize the agencies at all, even with a percentage adjustment?

Answer: The extraordinary increased production adjustment does not penalize agencies. Instead, it is consistent with the regional sharing concept that is one of the foundations of the plan.

Penalty Rates and Billing

18) How will Metropolitan collect any penalties for over use in an allocation? Will the penalties be assessed as a one-time lump-sum payment or will they be spread over time?

Answer: Penalties will be assessed for water sales that are above an agency's 12-month allocation amount. Penalties will be assessed in one lump-sum.

19) How will certifications be factored into determination of final penalty status? How soon will Metropolitan have a good accounting of Full Service vs. Interim Agricultural Water Program (IAWP) deliveries?

Answer: Member agencies may be required to submit IAWP certifications within one month of the month of use. Water not certified within this timeframe as IAWP will be counted as full service deliveries. Certification of deliveries out of Metropolitan's groundwater conjunctive use accounts will be treated in the same way.

20) What will be the billing timeframe for penalties?

Answer: There will be a one-month delay between the end of the 12-month allocation period and the assessment of penalties. This delay will allow for local supply certifications, which will modify an agency's final allocation total. An allocation that goes into effect in July will run from July through June of the following year. Each month during the allocation period, member agencies must certify the use of local supplies in their service area. This will allow Metropolitan to properly track actual water use within each member agency, which will result in adjustments to each agency's allocation limit. This allocation period will end in June, with local supply certifications due in the following month (July). Based on these certifications, Metropolitan will assess penalties for the 12-month allocation period on the bills that are sent out in August.

21) Will the allocation penalties accrue interest?

Answer: Late payments will be handled as defined in Section 4508 of Metropolitan's Administrative Code, which sets forth additional charges for delinquent payments. In general, late charges are equivalent to two percent of the delinquent payment for each month or portion thereof that such payment remains delinquent.

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Seawater Barrier Deliveries

22) How will Metropolitan handle deliveries to seawater barrier that are required for mixing with recycled water to meet state requirements?

    Answer: Seawater Barrier deliveries will be treated the same as other full service water deliveries. Deliveries for Seawater Barrier purposes will be counted toward an agency's allocation limit.

Base Period

23) Will the base period data be available online? How often will it be updated?

    Answer: The base period data will not likely change, except in cases where recertification of MWD purchases from 2004-2006 take place. The data supporting each member agency's allocation will be available through Metropolitan's member agency website.

24) What is the source for the non-MWD data?

    Answer: Local supply information is provided by the member agencies.

25) What is the source for the employment growth rates?

    Answer: The WSAP does not use employment growth rates as a default. Agencies that file an appeal to use employment growth rates as part of their growth adjustment will be required to have documentation of the source of those growth rates.

Appendix C

MWDOC Growth Adjustment Table per Client Agency

Attachment A

Population of MWDOC Retail Water Agencies

Water Agency	Jan-06	Jan-07	Jan-08	Increase (Decrease) 06 to 08	Pct of MWDOC Increase
Brea	39,471	39,672	40,069	598	1.3%
Buena Park	81,397	82,280	82,985	1,588	3.5%
East Orange CWD Retail Zone	3,651	3,642	3,665	14	0.0%
El Toro WD	50,989	51,275	51,623	634	1.4%
Fountain Valley, City of	57,801	57,974	58,424	623	1.4%
Garden Grove, City of	172,897	173,434	174,515	1,618	3.5%
Golden State Water Co.	166,573	167,186	168,683	2,110	4.6%
Huntington Beach, City of	201,978	202,675	203,490	1,512	3.3%
Irvine Ranch WD includ. OPA	309,976	318,550	329,263	19,287	42.1%
La Habra	62,001	62,520	62,957	956	2.1%
La Palma	15,291	15,329	15,413	122	0.3%
Laguna Beach CWD includ. EBS	21,621	21,704	21,796	175	0.4%
Mesa Consolidated WD	108,657	108,997	109,624	967	2.1%
Moulton Niguel WD	167,957	168,314	169,559	1,602	3.5%
Newport Beach	64,428	64,854	65,317	889	1.9%
Orange	136,654	137,129	139,946	3,292	7.2%
San Clemente	55,031	54,919	55,158	127	0.3%
San Juan Capistrano	39,540	39,849	40,357	817	1.8%
Santa Margarita WD	147,424	150,400	151,977	4,553	9.9%
Seal Beach	25,033	25,452	25,588	555	1.2%
Serrano WD	6,543	6,559	6,597	54	0.1%
South Coast WD	37,292	37,434	37,653	361	0.8%
Trabuco Canyon WD	14,831	14,882	14,961	130	0.3%
Tustin	66,938	67,075	67,706	768	1.7%
Westminster	93,762	93,970	94,555	793	1.7%
Yorba Linda WD	75,082	75,998	76,747	1,665	3.6%
Total of MWDOC Agencies	2,222,818	2,242,073	2,268,628	45,810	100.0%

Source: Center for Demographic Research, CSU Fullerton, Sept. 2008 (unpublished data set). Numbers are for the actual service area of the water agency, which may be different than the political boundary. Numbers are tied to the State Dept. of Finance numbers for total population of Orange County.

Appendix D

MWDOC Conservation Hardening Credit Table per Client Agency

Passive Conservation Savings per MWDOC client agency

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MWDOC's Natural Replacement	21,861	AF
MWDOC's New Construction	14,009	AF
MWDOC's Total Passive	**35,870**	**AF**

Water Agency	AF saving by new construction	AF saving by Natural Replacement	Total Passive Savings
Brea, City of	327	410	737
Buena Park, City of	254	774	1,028
EOCWD	75	650	725
El Toro WD	-	441	441
Fountain Valley, City of	87	710	797
Garden Grove, City of	99	1,468	1,567
Golden State WC	512	1,668	2,180
Huntington Beach, City of	554	2,114	2,668
Irvine Ranch WD today	4,367	2,524	6,891
La Habra, City of	84	511	594
La Palma, City of	16	184	201
Laguna Beach CWD	37	364	401
Mesa Consolidated WD	27	1,011	1,037
Moulton Niguel WD	1,692	1,754	3,446
Newport Beach, City of	109	1,118	1,227
Orange, City of, total	706	1,368	2,073
San Clemente	349	636	985
San Juan Capistrano	224	407	632
Santa Margarita WD	3,649	1,099	4,748
Seal Beach, City of	97	210	307
Serrano WD	11	95	107
South Coast WD	52	508	560
Trabuco Canyon WD	196	109	306
Westminster, City of	31	851	882
Yorba Linda WD	455	875	1,330
TOTAL	**14,009**	**21,861**	**35,870**

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Passive Conservation by New Construction

Water Agency[1]	FY 1993	FY 2008	Increase in New Service Connections	% Share	Passive saving per Agency by new construction (AF)
Brea, City of	9,329	11,842	2,513	2.33%	327
Buena Park, City of	17,600	19,550	1,950	1.81%	254
EOCWD	14,772	15,346	574	0.53%	75
El Toro WD	10,015	9,900	-	0.00%	-
Fountain Valley, City of	16,133	16,805	672	0.62%	87
Garden Grove, City of	33,360	34,123	763	0.71%	99
Golden State WC	37,901	41,838	3,937	3.66%	512
Huntington Beach, City of	48,044	52,300	4,256	3.95%	554
Irvine Ranch WD today	57,360	90,923	33,563	31.17%	4,367
La Habra, City of	11,608	12,251	643	0.60%	84
La Palma, City of	4,193	4,316	123	0.11%	16
Laguna Beach CWD	8,273	8,554	281	0.26%	37
Mesa Consolidated WD	22,969	23,175	206	0.19%	27
Moulton Niguel WD	39,861	52,864	13,003	12.08%	1,692
Newport Beach, City of	25,414	26,250	836	0.78%	109
Orange, City of, total	31,081	36,505	5,424	5.04%	706
San Clemente	14,450	17,136	2,686	2.49%	349
San Juan Capistrano	9,255	10,979	1,724	1.60%	224
Santa Margarita WD	24,976	53,022	28,046	26.05%	3,649
Seal Beach, City of	4,778	5,525	747	0.69%	97
Serrano WD	2,169	2,255	86	0.08%	11
South Coast WD	11,550	11,948	398	0.37%	52
Trabuco Canyon WD	2,487	3,997	1,510	1.40%	196
Westminster, City of	19,347	19,585	238	0.22%	31
Yorba Linda WD	19,891	23,387	3,496	3.25%	455
TOTAL	**496,816**	**604,376**	**107,675**	**100%**	14,009 [2]

[1] Numbers certified by the retail agencies to MWDOC for the Annual Retail Service Connection Charge.
[2] MWDOC's "New Construction" Saving Amount from MWD (as of CY 2006)

Passive Conservation by Natural Replacement

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Water Agency[1]	FY 1993	% Share	Passive Saving per Agency by Natural Replacement (AF)
Brea, City of	9,329	1.88%	410
Buena Park, City of	17,600	3.54%	774
EOCWD	14,772	2.97%	650
El Toro WD	10,015	2.02%	441
Fountain Valley, City of	16,133	3.25%	710
Garden Grove, City of	33,360	6.71%	1,468
Golden State WC	37,901	7.63%	1,668
Huntington Beach, City of	48,044	9.67%	2,114
Irvine Ranch WD today	57,360	11.55%	2,524
La Habra, City of	11,608	2.34%	511
La Palma, City of	4,193	0.84%	184
Laguna Beach CWD	8,273	1.67%	364
Mesa Consolidated WD	22,969	4.62%	1,011
Moulton Niguel WD	39,861	8.02%	1,754
Newport Beach, City of	25,414	5.12%	1,118
Orange, City of, total	31,081	6.26%	1,368
San Clemente	14,450	2.91%	636
San Juan Capistrano	9,255	1.86%	407
Santa Margarita WD	24,976	5.03%	1,099
Seal Beach, City of	4,778	0.96%	210
Serrano WD	2,169	0.44%	95
South Coast WD	11,550	2.32%	508
Trabuco Canyon WD	2,487	0.50%	109
Westminster, City of	19,347	3.89%	851
Yorba Linda WD	19,891	4.00%	875
TOTAL	**496,816**	**100.00%**	21,861 [2]

[1] Numbers certified by the retail agencies to MWDOC for the Annual Retail Service Connection Charge.
[2] MWDOC's Natural Replacement Saving Amount from MWD (as of CY 2006)

APPENDIX F

Comprehensive Demand Discussion

1.0 Water Demand

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 Orange County Water District boundary; the project-specific analysis demand calculations are based on information provided by the project proponent.

1.1.1 Supply and Demand Comparison at the Metropolitan Level

A supply and demand comparison is necessary at the Metropolitan service area level to determine if supplies are adequate, and if not, how to allocate insufficient supplies between member agencies at the basin level.

1.1.1.1. 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 Southern California Association of Governments 2004 Regional Transportation Plan and the San Diego Association of Governments 2030 forecasts. Firm demands are calculated by Metropolitan 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). Firm demands on Metropolitan projected from 2010 to 2030 are shown in Table 1-1.

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

	2010	2015	2020	2025	2030
Firm Demands in an Average Year	2,036,000	1,947,000	1,983,000	2,110,000	2,246,000
Firm Demands in a Single Dry Year	2,320,000	2,196,000	2,229,000	2,358,000	2,487,000
Firm Demands in a Multiple Dry Year	2,392,000	2,302,000	2,309,000	2,448,000	2,585,000

Source: Metropolitan Water District of Southern California. 2005. *Regional Urban Water Management Plan.* p. II-8 through II-10.

1.1.1.2. Supply and Demand Comparison

Supplies in Metropolitan's service area are sufficient to meet firm demands in average years through 2025. Currently existing supplies are insufficient to meet firm demands by 2030, as shown in, as shown in Table 1-2.

Table 1-2: Supply Demand Comparison for Metropolitan in Average Years with Interim Delta Operating Rules (acre-ft/year)

	2010	2015	2020	2025	2030
Total Supply[a]	2,225,679	2,179,178	2,199,677	2,221,176	2,231,925
Firm Demands[b]	2,036,000	1,947,000	1,983,000	2,110,000	2,246,000
Surplus (Deficit)	189,679	232,178	216,677	111,176	(14,075)
Deficit (as % of Demand)	**0%**	**0%**	**0%**	**0%**	**-1%**

a. From **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**
b. From Table 1-1: Projected Metropolitan Firm Demands in Average, Single Dry and Multiple Dry Year Types (acre-ft/year).

Supplies in Metropolitan's service area are sufficient to meet firm demands in single dry years through 2025. Currently existing supplies are insufficient to meet firm demands by 2030, as shown in Table 1-3.

Table 1-3: Supply Demand Comparison for Metropolitan in Single Dry Years with Interim Delta Operating Rules (acre-ft/year)

	2010	2015	2020	2025	2030
Total Supply[a]	2,594,922	2,554,103	2,511,283	2,469,464	2,423,054
Firm Demands[b]	2,320,000	2,196,000	2,229,000	2,358,000	2,487,000
Surplus (Deficit)	274,922	358,103	282,283	111,464	(63,946)
Deficit (as % of Demand)	**0%**	**0%**	**0%**	**0%**	**-3%**

a. From Table 4-8: In-Basin Storage Supplies, 2030 (acre-feet/year), Table 4-7: California Aqueduct Supplies with Interim Delta Operating Rules, 2030 (acre-feet/year), Table 4-4: Colorado River Aqueduct Supplies, 2030 (acre-feet/year)
b. From Table 5-1: Projected Metropolitan Firm Demands in Average, Single Dry and Multiple Dry Year Types (acre-ft/year).

Currently existing supplies are insufficient in multiple dry years to meet firm demands in all years as shown in Table 1-4.

Table 1-5: Supply Demand Comparison for Metropolitan in Multiple Dry Years with Interim Delta Operating Rules (acre-ft/year)

	2010	2015	2020	2025	2030
Total Supply[a]	1,960,543	1,909,386	1,896,229	1,884,072	1,868,494
Firm Demands[b]	2,392,000	2,302,000	2,309,000	2,448,000	2,585,000
Surplus (Deficit)	(431,457)	(392,614)	(412,771)	(563,928)	(716,506)
Deficit (as % of Demand)	**-18%**	**-17%**	**-18%**	**-23%**	**-28%**

a. From **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**
b. From Table 1-1: Projected Metropolitan Firm Demands in Average, Single Dry and Multiple Dry Year Types (acre-ft/year).

1.2 Regional Water Demand

Regional projected demand in OCWD's service area, shown in Table 1-6, is based upon demand estimated by the individual producers and submitted to the Municipal Water District of Orange County (MWDOC) as part of its Annual Survey in spring 2008. Demands of member agencies located outside of the Orange County Groundwater Basin were removed from the dataset. Non-potable demands were also removed from the dataset.

Table 1-6: Total Projected Demand within the Basin in an Normal Year (acre-ft/year)

Agency	2010	2015	2020	2025	2030
Anaheim	76,520	81,548	86,760	87,540	87,659
Fullerton	32,650	32,800	32,800	32,600	32,400
Santa Ana	48,950	50,834	54,090	56,810	56,810
MWDOC (in basin)	342,841	362,646	369,814	373,880	375,928
Total Demand	**500,961**	**527,828**	**543,464**	**550,830**	**552,797**

Source: MWDOC. Water Demands (Acre-feet) in the OCWD Basin. Projections by the Retail Agency. Draft. 2008. Provided by MWDOC staff upon request.

1.2.1.1. Regional Dry Year Demands

Regional dry year demands are typically higher than average year demands; this is largely due to lack of rainfall and subsequent need for increased water for landscaping in dry years. Updated demands from the spring 2008 MWDOC Annual Survey were used as the baseline, normal year demand. Dry year demands were based on the percent increase over normal year demands provided in the Urban Water Management Plans for the agencies listed below. Anaheim and Santa Ana projected a 105.5 percent increase in single dry year demands over normal year demands. Fullerton and MWDOC used 106 percent of normal year demands to represent single dry year demands. The results are incorporated into Table 1-7.

Table 1-7: Total Projected Demand within the Basin in a Single Dry Year (acre-ft/year)

Agency	2010	2015	2020	2025	2030
Anaheim[a]	80,729	86,033	91,532	92,355	92,480
Fullerton[b]	34,609	34,768	34,768	34,556	34,344
Santa Ana[c]	51,642	53,630	57,065	59,935	59,935
MWDOC (in basin)[d]	363,411	384,405	392,003	396,313	398,484
Total Demand	**530,391**	**558,836**	**575,368**	**583,158**	**585,242**

a. Single dry year demand increase of 105.5% from City of Anaheim Urban Water Management Plan. 2005. p. 4-22.
b. Single dry year demand increase of 106% from City of Fullerton Urban Water Management Plan. 2005. p. 4-12.
c. Single dry year demand increase of 105.5% from City of Santa Ana Urban Water Management Plan. 2005, p. 4-21.
d. Single dry year demand increase of 106% from MWDOC Urban Water Management Plan. 2005. p. 133.
Source: MWDOC. Water Demands (Acre-feet) in the OCWD Basin. Projections by the Retail Agency. Draft. 2008. Provided by MWDOC staff upon request.

A similar approach was used to calculate demand within the basin in multiple dry year conditions. However, for the multiple dry year scenario, demands were averaged between the three multiple dry years. This approach was taken from and is consistent with Metropolitan's RUWMP. Table 1-8 projects supplies for multiple dry year periods for years ending in "0" or "5". The results presented for multiple dry years are for an average of three years with this extreme hydrology. Thus, the results presented for 2010 can be considered representative of results for 2008, 2009

and 2010. The specific percent increases over normal year demands are shown in the table footnotes.

Table 1-8: Total Projected Demand within the Basin in a Multiple Dry Year (acre-ft/year)

Agency	2010	2015	2020	2025	2030
Anaheim[a]	80,576	85,870	91,358	92,180	92,305
Fullerton[b]	34,609	34,768	34,768	34,556	34,344
Santa Ana[c]	51,544	53,528	56,957	59,821	59,821
MWDOC (in basin)[d]	362,269	383,196	390,770	395,067	397,231
Total Demand	**528,998**	**557,362**	**573,853**	**581,623**	**583,700**

a. Multiple dry year demand increase (106.7%, 103.7%, and 105.5%) from City of Anaheim Urban Water Management Plan. 2005. p. 4-23 through 4-27.
b. Multiple dry year demand increase (106%, 106%, and 106%) from City of Fullerton Urban Water Management Plan. 2005. p. 4-13 through 4-17.
c. Multiple dry year demand increase (106.7%, 103.7%, and 105.5%) from City of Santa Ana Urban Water Management Plan. 2005, p. 4-22 through 4-26.
d. Multiple dry year demand increase (107%, 104%, and 106%) from MWDOC Urban Water Management Plan. 2005. p. 136 through 148.
Source: MWDOC. Water Demands (Acre-feet) in the OCWD Basin. Projections by the Retail Agency. Draft. 2008. Provided by MWDOC staff upon request.

1.3 Total Demand within the Basin

Total demand within the basin is equivalent to demands captured by the 2008 MWDOC Annual Producer Survey for in-basin users, in addition to demands in the cities of Anaheim, Fullerton, and Santa Ana, and demands associated with development of the proposed project. In norma; years, total demands in the basin reach a maximum of approximately 554,000 acre-feet annually by 2030 (see Table 1-9).

Table 1-9: Total Projected Demand within the Basin in an Normal Year Including the Proposed Project (acre-ft/year)

	2010	2015	2020	2025	2030
Total Basin Demand (without Project)[a]	500,961	527,828	543,464	550,830	552,797
Net Demand of Project[b]	1,104.8	1,104.8	1,104.8	1,104.8	1,104.8
Total Demand in Basin with Project	**502,066**	**528,933**	**544,569**	**551,935**	**553,902**

a. From Table 1-6: Total Projected Demand within the Basin in an Normal Year (acre-ft/year).
b. From **Error! Reference source not found.**.

Demands in the basin increase slightly in single and multiple dry years, which include the proposed project as shown in Table 1-10 and Table 1-11

Table 1-10: Total Projected Demand within the Basin in a Single Dry Year Including the Proposed Project (acre-ft/year)

	2010	2015	2020	2025	2030
Total Basin Demand (without Project)[a]	530,391	558,836	575,368	583,158	585,242
Net Demand of Project[b]	1,104.8	1,104.8	1,104.8	1,104.8	1,104.8
Total Demand in Basin with Project	**531,496**	**559,941**	**576,473**	**584,263**	**586,347**

a. From Table 1-7: Total Projected Demand within the Basin in a Single Dry Year (acre-ft/year).
b. From **Error! Reference source not found.**.

Table 1-11: Total Projected Demand within the Basin in Multiple Dry Years Including the Proposed Project (acre-ft/year)

	2010	2015	2020	2025	2030
Total Basin Demand (without Project)[a]	528,998	557,362	573,853	581,623	583,700
Net Demand of Project[b]	1,104.8	1,104.8	1,104.8	1,104.8	1,104.8
Total Demand in Basin with Project	**530,103**	**558,467**	**574,958**	**582,728**	**584,805**

a. From Table 1-8: Total Projected Demand within the Basin in a Multiple Dry Year (acre-ft/year).
b. From **Error! Reference source not found.**.

APPENDIX G

Discussion of Supplies under Development

1.0 Supplies Under Development - Alternative Supplies

1.1 Metropolitan Water District of Southern California – Supplies Under Development

Metropolitan is continually investigating ways to diversify its water supply portfolio and increase water supply reliability. There are numerous programs currently being negotiated to meet reliability goals, discussed below. Metropolitan's RUWMP considers these "Supplies under Development" to be firm supplies[1] Further, the UWMPs prepared by MWDOC and the cities of Anaheim, Fullerton, and Santa Ana also consider these to be firm supplies, and they are included in each of the above-mentioned UWMPs.

The following information related to Metropolitan's supplies under development is taken from Metropolitan's 2005 RUWMP.

1.1.1 Colorado River Aqueduct

Supplies under development related to the Colorado River include several groundwater storage projects and the Salton Sea Restoration Transfer, discussed in more detail below.

1.1.1.1. Aquifer Storage and Recovery

There are a number of groundwater storage projects currently being studied and planned by Metropolitan. These include the Hayfield Groundwater Storage Project, which is expected to hold up to 500,000 acre-feet of CRA water and could be extracted at a rate of 100,000 acre-feet per year; the Lower Coachella Valley Groundwater Storage Program, which has the potential to provide up to 500,000 acre-feet of storage capacity and could be expected to produce 150,000 acre-feet per year of dry year supplies, and; the Chuckwalla Groundwater Storage Program, which could also hold 500,000 acre-feet of water and be extracted at a rate of up to 150,000 acre-feet annually.

Metropolitan's board approved the Hayfield Groundwater Storage Program in June 2000. The program will allow CRA water to be stored in the Hayfield Groundwater Basin in east Riverside County for future withdrawal and delivery to the CRA. Three years after board approval, there were 73,000 acre-feet in storage. In 2003, construction of well field facilities

1 Metropolitan Water District of Southern California. November 2005. *The Regional Urban Water Management Plan.*

Appendix G: Discussion of Supplies under Development

for extracting the water in storage began, but it was then deferred for two years because drought conditions in the Colorado River watershed resulted in a lack of surplus Colorado River supplies for storage. According to Metropolitan's website, the Hayfield Groundwater Storage Program completed design and construction in early 2006. At that point, assuming this program is fully operational Metropolitan will use this program to develop storage capacity of about 800,000 acre-feet.[2] The program includes 50 wells in 8,000 acres, infiltration rates of 135,000 acre-feet per year and extraction rates of 150,000 acre-feet annually.[3]

Metropolitan, the CVWD, and the DWA are investigating the feasibility of a conjunctive use storage program in the Lower Coachella groundwater basin. The basin, which is currently in an over-drafted condition, has the potential to provide a total storage capacity of 500,000 acre-feet for Metropolitan. The Lower Coachella Program would have the advantage of using the All American and Coachella canals to deliver water for storage, preserving capacity in the CRA for service area demands.

Under the proposed Chuckwalla Groundwater Storage Program, Colorado River water would be stored in the Upper Chuckwalla Groundwater Basin for future delivery to the Colorado River Aqueduct. Metropolitan has also decided to defer this program until water becomes more plentiful in the Colorado River Basin.

The groundwater storage programs (Hayfield, Chuckwalla and Lower Coachella) all depend on the availability of surplus water supplies from the Colorado. This water could come from a number of sources: when supplies above 4.4 million acre-feet are available for California use; when other California agencies use less than their allotted Colorado River Aqueduct water supplies; or if Metropolitan were to obtain water transfers from agencies in other Colorado River states. However, drought conditions in the Colorado River basin means that little additional water is likely to be available from these sources in the immediate future, so Metropolitan has deferred future expenditures on these programs until surplus water is more likely to be available.

2 Metropolitan Water District of Southern California. Hayfield Groundwater Storage Program Website accessed March 03, 2009. http://www.mwdh2o.com/mwdh2o/pages/yourwater/supply/conjunctive/hayfield.html

3 Metropolitan Water District of Southern California. Hayfield Groundwater Storage Program Website accessed March 03, 2009. http://www.mwdh2o.com/mwdh2o/pages/yourwater/supply/conjunctive/hayfield.html

1.1.1.2. Salton Sea Restoration Transfer

State legislation passed in 2003 requires the development of a plan to restore the Salton Sea. The Resources Secretary submitted to the Legislature a plan that identified eight alternatives, including two "no project" alternatives in fall 2006.. Implementation of the plan is funded from the Salton Sea Restoration Fund (Restoration Fund). Part of the income to the Restoration Fund would include the proceeds from a DWR-facilitated transfer of IID conserved water to Metropolitan.

This transfer would consist of up to 1.6 million acre-feet of water that would be conserved by IID and made available to Metropolitan with the net proceeds being placed in the Restoration Fund. DWR is to help facilitate the transfer. This potential transfer is composed of two blocks of water: (1) 800,000 acre-feet new water to be conserved by IID; and (2) 800,000 acre-feet of water presently scheduled to be conserved by IID under the QSA to provide salinity management water for the Salton Sea. restoration of the Salton Sea is ongoing in early 2007, the Resources Agency indicated that implementation of the Early Start Habitat program would facilitate transfer of the 800,000 acre-feet of IID conserved water. If restoration efforts are successful, Metropolitan expects to call on this water in the medium term, but does not expect to rely on it in the long term.

Supplies under development related to the CRA are quantified in Table 7-1 below.

Table 1-1: Colorado River Aqueduct Supplies Under Development, 2030 (acre-feet/year)

Programs Under Development	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
Hayfield Storage Program	0	100,000	100,000
Lower Coachella Storage Program	0	150,000	150,000
Chuckwalla Storage Program	0	150,000	150,000
Salton Sea Restoration Transfer	0	0	0
Total Supplies Under Development	**0**	**400,000**	**400,000**

Source: Metropolitan Water District of Southern California. *Regional Urban Water Management Plan.* 2005. p. A.3-38.

1.1.2 California Aqueduct

There are also supplies under development for the California Aqueduct, which are based upon the Delta Improvements Package, Central Valley transfers, the Mojave Program, among others.

1.1.2.1. Delta Improvements

Delta Improvements Package is a key component of Metropolitan's approach for increasing SWP supply reliability. The Delta Improvement Package is a set of linked actions designed to allow the SWP to operate the Banks Pumping Plant in the Delta at 8,500 cfs, provided all regulatory standards are met and water is available for export. The Banks Pumping Plant is currently limited by a Corps of Engineers permit to operate at 6,680 cfs, with provision to pump at higher levels only under very limited hydrologic conditions. Increasing pumping capacity would increase SWP supplies significantly.

Metropolitan also has been working with Bay-Delta watershed users toward settlement on how all Bay-Delta water users would bear some of the responsibility of meeting flow requirements. In December 2002, all of the parties signed a settlement agreement known as "The Sacramento Valley Water Management Agreement" or "Phase 8 Settlement Agreement." The agreement resulted from the SWRCB Bay-Delta Water Rights Phase 8 proceedings. It includes work plans to develop and manage water resources to meet Sacramento Valley in-basin needs, environmental needs under the SWRCB's Water Quality Control Plan, and export supply needs for both water demands and water quality. The agreement specifies about 60 water supply and system improvement projects by 16 different entities in the Sacramento Valley. Its various conjunctive use projects will yield approximately 185,000 acre-feet per year in the Sacramento Valley, and approximately 55,000 acre-feet of this water would come to Metropolitan through its SWP allocation. The Agreement specifies a supply breakdown of 110,000 acre-feet (60 percent) to the SWP and 75,000 acre-feet (40 percent) to the CVP. Based on the work plans for CALFED's Bay-Delta Program and the Sacramento Valley Management Agreement, potential annual and dry-year supply capabilities are projected to be 55,000 acre-feet in 2010, 55,000 acre-feet in 2015, and 110,000 acre-feet beyond 2015.

Through conversations with Metropolitan staff, it has become apparent that these numbers are somewhat outdated and that negotiations and discussions of improvements are still underway. Metropolitan staff have stated that published values are likely an underestimation of actual supply increases following implementation of the Delta Improvements Package. However, for lack of better technical data available, the published values are used in this analysis and are considered to be conservative estimates.

1.1.2.2. Market Transfer Options

Metropolitan pursues market transfer options on an as needed basis. The most reasonably available data indicates that supplies of 150,000 acre-feet are anticipated in 2010. No transfers have been negotiated past 2010.

1.1.2.3. Central Valley Transfers/Purchases

Metropolitan pursues Central Valley water transfers on an as needed basis.

Metropolitan expects to secure Central Valley water transfer supplies via spot markets and option contracts to meet its dry-year resource targets when necessary. Hydrologic and market conditions will determine the amount of water transfer activity occurring in any year. Transfer market activity in 2003 and 2005 provide examples of how Metropolitan has used water transfer options as a resource to fill anticipated supply shortfalls needed to meet Metropolitan's service area demands.

In 2003, Metropolitan secured options to purchase approximately 145,000 acre-feet of water from willing sellers in the Sacramento Valley during the irrigation season. These options protected against potential shortages of up to 650,000 acre-feet within Metropolitan's service area that might arise from a decrease in Colorado River supply or as a result of drier-than-expected hydrologic conditions. Using these options, Metropolitan purchased approximately 125,000 acre-feet of water for delivery to the California Aqueduct.

In 2005 (year of most recent data), Metropolitan, in partnership with seven other State Water Contractors, secured options to purchase approximately 130,000 acre-feet of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was 113,000 acre-feet. Metropolitan also had the right to assume the options of the other State Water Contractors if they chose not to purchase the transfer water. Due to improved hydrologic conditions, Metropolitan and the other State Water Contractors did not purchase these options.

Metropolitan's water transfer activities in 2003 and 2005 have demonstrated Metropolitan's ability to develop and negotiate water transfer agreements working directly with the agricultural districts who are selling the water. In critically dry-years or periods of prolonged drought, Metropolitan also anticipates working closely with DWR, the U.S. Bureau of Reclamation (USBR), and other water users to implement statewide programs similar to the Drought Water Banks operated by DWR in the early 1990s. Such statewide programs have a potential to secure large volumes of transfer water. For example, in 1991 DWR's Drought

Water Bank secured more than 800,000 acre-feet of water transfer supplies within a short period from a limited group of sellers. Because of the complexity of cross-Delta transfers and the need to optimize the use of both CVP and SWP facilities, DWR and USBR are critical players in the water transfer process, especially when shortage conditions increase the general level of demand for transfers and amplify ecosystem and water quality issues associated with through-Delta conveyance of water. Therefore, Metropolitan views state-led programs to facilitate voluntary, market-based exchanges and sales of water as important parts of its overall water transfer strategy.

While the amount of water supply obtained through short-term transfer and storage programs is expected to vary year-to-year, Metropolitan's planning models indicate that on average these programs will yield about 125,000 acre-feet for single and multiple dry-year scenarios.

1.1.2.4. Mojave Program

Mojave Water Agency (MWA) entered into a water banking demonstration project with Metropolitan for the delivery of up to 75,000 acre-feet of their entitlement water from the SWP for storage in the Mojave Basin. The program will store SWP supply delivered in wet years for subsequent withdrawal during dry years. Metropolitan has five years to take return delivery of the water, through exchange of MWA entitlement from the SWP for delivery to Metropolitan. About 25,000 acre-feet was delivered in November and December of 2003. Another 20,000 acre-feet was delivered in November and December of 2005. Metropolitan took back 26,000 acre-feet in 2007 and as stipulated (five year period ending in 2008) will continue to take back water in 2008.

1.1.2.5. IRP SWP Target

In 1999, Metropolitan's Board of Directors set new goals for the SWP with the adoption its CALFED Policy Principles. These goals committed Metropolitan to water quality objectives, the development of a 650,000 acre-feet minimum dry-year supply from the SWP by 2020 and average annual deliveries of 1.5 million acre-feet (excluding transfers and storage programs along the SWP). To achieve these goals while minimizing impacts to the Bay-Delta ecosystem, Metropolitan would maximize deliveries to storage programs during wetter years. It would also work with others to implement a number of source water quality and supply reliability improvements in the Delta, remove operational conflicts with the Central Valley Project (CVP), and better coordinate planning and operations between the SWP and CVP.

Supplies under development related to the SWP are quantified in Table 7-2 below.

Table 1-2: California Aqueduct Supplies Under Development , 2030 (acre-feet/year)

Programs Under Development	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
Delta Improvements	240,000	110,000	110,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	0	125,000	125,000
Mojave Program	0	35,000	35,000
IRP SWP Target	0	80,000	29,000
Total Supplies Under Development	**240,000**	**350,000**	**299,000**

Source: Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan. p. A.3-43

1.1.3 In-Basin Storage

In-basin storage activities provide additional dry year supplies and supply reliability. Typically, supplies are stored in average and above-average rainfall years for use in dry years when imported supplies are reduced. The specific programs under development are discussed below. Table 7-3 quantifies the results of these programs.

Table 1-3: In-Basin Storage Supplies Under Development, 2030 (acre-feet/year)

Programs Under Development	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
Raymond Basin	0	22,000	22,000
Prop 13 Storage Programs	0	1,000	1,000
Additional Programs	0	80,000	80,000
Total Supplies Under Development	**0**	**103,000**	**103,000**

Source: Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan. p. A.3-48.

1.1.3.1. Raymond Basin

Metropolitan is currently working with member agencies and the Raymond Basin Management Board to develop an additional conjunctive use agreement in Raymond Basin. In January 2000, the Metropolitan Board authorized entering into agreements with the City of Pasadena and Foothill Metropolitan Water District to implement the groundwater storage program contingent upon satisfactorily completing all necessary environmental documentation. The Board also appropriated funds to conduct initial environmental, engineering, and planning studies. The best available information states that this program is expected to yield 22,000 acre-feet/year and could be accessible by 2010.

1.1.3.2. Proposition 13 Storage Programs

In 2000, the Department of Water Resources (DWR) made available local assistance grant funds that were provided under Proposition 13. Metropolitan was selected to receive $45 million from the disbursement to help fund the Southern California Water Supply Reliability Projects Program. Metropolitan is using that $45 million for groundwater conjunctive use projects within its service area. These projects will allow storage of imported water in wet years for use in dry years. Metropolitan's RUWMP describes these projects. At the time Metropolitan's RUWMP was prepared, some of these conjunctive use programs were still in the design and construction phases, while others have already been completed. Upon completion, the remaining Proposition 13 funded projects are expected to provide between 1,000 and 3,000 acre-feet of additional dry year supply.

1.1.3.3. Additional Programs

Metropolitan continues to discuss opportunities to expand groundwater conjunctive use storage programs throughout its service area. The use of the supplemental storage program in 2005 provides one example of these opportunities. The state's wet winter of 2004-05 provided Metropolitan with abundant water supplies. To encourage maximized storage in the region, Metropolitan is offering discount rates to its member agencies to store more water than previously planned. The water would be available at Metropolitan's call for up to six years. This and other potential programs will help to meet the groundwater storage IRP targets. Identified potential programs include:

- Chino Basin Storage Program Expansion,
- Orange County Basin Storage Program Expansion,
- North Las Posas Phase 3,
- Central Basin Storage Program,
- West Basin Storage Program,
- San Fernando Basin Storage Program,
- San Jacinto Basin Storage Program, and
- City of San Diego Storage Program.

These additional programs include both new programs and the expansion of existing programs. Described in Metropolitan's RUWMP, these additional programs are expected to provide at least 80,000 acre-feet per year of dry year supply by 2030.

1.1.4 Total Metropolitan Supplies – Currently Existing and Supplies Under Development

Upon implementation of Metropolitan's programs under development, total supplies would be as follows (see Table 7-4):

Table 1-4: In-Basin Storage Supplies Under Development, 2030 (acre-feet/year)

Supplies	Average Year (1922-2004)	Single Dry Year (1977)	Multiple Dry Years (1990-1992)
Currently Existing			
In-Basin Storage	0	1,017,000	470,000
California Aqueduct	1,589,925	742,054	734,494
Colorado River Aqueduct	642,000	664,000	664,000
Programs Under Development			
In-Basin Storage	0	103,000	103,000
California Aqueduct	240,000	350,000	299,000
Colorado River Aqueduct	0	400,000	400,000
Total Projected Supplies	**2,471,925**	**3,276,054**	**2,670,494**

Source: Metropolitan Water District of Southern California. 2005. Regional Urban Water Management Plan. p. A.3-48.

1.2 Orange County Water District – Long Term Facilities Plan

In 2003, the District began a collaborative process with the producers to evaluate potential projects and programs that could cost-effectively increase the yield of the basin and protect groundwater quality. This process resulted in the preparation of the LTFP. As stated previously, 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. The purpose of the LTFP identified and evaluated projects that could:

- Increase the sustainable yield of the basin in a cost-effective manner to the highest possible amount. This is generally referred to as "optimizing the basin's yield", and is achieved through:
  - Maximizing recharge into the basin;
  - Minimizing Santa Ana River (SAR) surface outflow to the ocean;
  - Minimizing subsurface outflow from the basin; and
  - Minimizing areas of low or depressed groundwater levels.
- Protect and enhance groundwater quality in the basin.

- Protect the coastal portion of the basin.

Increasing the basin's sustainable yield and protecting groundwater quality are often interconnected, since projects that change groundwater levels in the basin need to be evaluated with respect to their impact on seawater intrusion and other water quality issues. A particular BPP has not been set as a target. Instead, the LTFP develops a list of potential projects to consider implementing in the future to maximize the basin's yield. Without these projects, as total water demands increase, the BPP will slowly have to decrease.

The District and the producers have an interest in maximizing the sustainable basin yield, provided that it is done in a cost-effective manner. The phrase 'sustainable basin yield' means the annual amount of production that can be maintained on a long-term basis (for example, five to ten years) without overdrafting or harming the basin. This requires that total production from the basin be essentially the same as total recharge on a long-term basis. The LTFP cannot bind the District to implementation of any project. The District Act requires the completion and approval of a formal Engineers Report by the Board of Directors for any project before it can be constructed. Rather, the LTFP presents a menu of projects the District may choose to implement through 2025. Six LTFP projects are currently being implemented. The projects are summarized in the LTFP (Appendix A).

The purpose of the LTFP is to provide a range of projects that will allow the District to meet its mandate to manage the basin effectively, and provide creative solutions to manage the sustainable yield and protect the water quality of the basin through 2025. The LTFP will provide a roadmap for potential future projects that the District may choose to pursue to meet its basin management objectives through 2025. The LTFP provides an evaluation of the proposed projects, including an evaluation as to the cost, feasibility, and benefit of each project, as well as an outline of an implementation program for the recommended projects. The LTFP describes a total of 50 projects, which involves five categories of proposed projects: recharge facilities, water supply facilities, basin management facilities, water quality facilities, and operational improvement opportunities. The evaluation included in the LTFP further refined this list, noting that some projects would not be feasible, either due to technical constraints, cost considerations, lack of institutional support, and/or functional feasibility. The most obvious categories of project, which can address the sustainable yield of the basin are those dealing directly with recharge facilities, either through the expansion of existing recharge facilities or the development of new recharge facilities. However, the LTFP is not focused on recharge projects alone, but a broad range of projects that will enable the District to manage the sustainable yield and water quality of the basin.

Appendix G: Discussion of Supplies under Development

The LTFP provides a list of proposed projects that could be implemented to (1) increase the basin's annual sustainable yield, and therefore accommodate additional pumping, and (2) protect water quality in the basin. Alternatively, if the basin's yield is not increased, the BPP will gradually decline over time and the region will become more reliant upon imported water supplies.

As the GWR System is implemented, the sustainable yield of the basin is ultimately projected to increase by approximately 78,000 acre-feet/year (70 mgd). If all of the projects in the LTFP were implemented as OCWD anticipates, there would be potentially be a total increase in annual recharge of roughly 145,000 acre-feet/year by 2025 for a total recharge potential of approximately 533,000 acre-feet/year.

APPENDIX H

OCWD Long-Term Facilities Plan

Orange County Water District

Draft Long-Term Facilities Plan

September 30, 2005

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ACRONYMS AND ABBREVIATIONS

$/af	dollars per acre-foot
$M/yr	million dollars per year
µg/L	microgram per liter
ABP	Alamitos Barrier Project
ACOE	Army Corps of Engineers
af	acre-feet
af/day	acre-feet per day
afy	acre-feet per year
AL	action level
AMP	Allen McColloch Pipeline
AOP	advanced oxidation processes
APZ	Airport Protection Zone
AWPF	advanced water purification facility
B/C	benefit/cost ratio
Basin	Orange County groundwater basin
Basin model	OCWD basinwide groundwater flow model
BCV	Basin Cleaning Vehicle
BEA	Basin Equity Assessment
BMPs	best management practices
BPP	Basin Production Percentage
BPTP	Basin Pumping Transfer Program
CCC	California Coastal Commission
CDM	Camp Dresser & McKee, Inc.
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CIP	Capital Improvement Program
COP	Certificates of Participation
CPTP	Coastal Pumping Transfer Program
CRA	Colorado River Aqueduct
crf	Capital Recovery Factor
cu yd	cubic yard
CWD	County Water District
DATS	Deep Aquifer Treatment System
DEIR	Draft Environmental Impact Report
DHS	California Department of Health Services
dia.	diameter
District	Orange County Water District
DRWF	IRWD Dyer Road Wellfield
DWRRP	Dry Weather Runoff Recharge Project
EDTA	diamine tetraacetic acid
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EOCF	East Orange County Feeder
EOI	Expressions of Interest
EPA	United States Environmental Protection Agency
ET	evapotranspiration

ACRONYMS AND ABBREVIATIONS

fps	feet per second
FRL	Field Research Laboratory
ftbgs	feet below ground surface
FTE	full time equivalent
FV	Fountain Valley
FY	fiscal year
FYE	fiscal year ending
GAP	Green Acres Project
gpm	gallons per minute
GWMP	Groundwater Management Plan
GWR	Groundwater Replenishment
HB	Huntington Beach
hp	horsepower
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resource Plan
IRWD	Irvine Ranch Water District
kWh	kilowatt hours
LACDPW	Los Angeles County Department of Public Works
LTFP	Long-Term Facilities Plan
M	million
M/yr	million per year
MBI	mid-basin injection
MCWD	Mesa Consolidated Water District
mergence zones	zones of hydraulic connection
Metropolitan	Metropolitan Water District of Southern California
MF	microfiltration
mg/L	milligrams per liter
mgd	million gallons per day
MND	mitigated negative declaration
MOU	Memorandum of Understanding
MWC	Mutual Water Company
MWDOC	Municipal Water District of Orange County
NOC	North Orange County
NTP	Notice to Proceed
NWB	northwest barrier
NWRI	National Water Research Institute
O&M	operations and maintenance
OCFCD	Orange County Flood Control District
OCSD	Orange County Sanitation District
OCTA	Orange County Transit Authority
OCWD	Orange County Water District
ODC	other direct costs
OWDP	ocean water desalination plant
PCS	Process Control System
PEIR	Program Environmental Impact Report
PHG	public health goal
POTW	Publicly Owned Treatment Works

ACRONYMS AND ABBREVIATIONS

producers	Orange County groundwater producers
psi	per square inch
PUF	project utilization factor
PV	present value
PWG	Producers Working Group
R&R	replacement and refurbishment
R/W	right-of-way
RA	replenishment assessment
RDMD	County of Orange Resources and Development Management Department, Flood Control Division
RFP	Requests for Proposals
RIX	Rapid Infiltration/Extraction
RO	reverse osmosis
ROV	remotely operated vehicle
RWQCB	Regional Water Quality Control Board
SAR	Santa Ana River
SARI	Santa Ana River Interceptor
SARWQH	Santa Ana River Water Quality Health Study
SAWPA	Santa Ana Water Project Authority
SBNWS	Seal Beach Naval Weapons Station
SBVMWD	San Bernardino Valley Municipal Water District
SCADA	Supervisory Control and Data Acquisition
SCB	south-central barrier
SCWC	Southern California Water Company
SEB	southeast barrier
SLF	Second Lower Feeder
SOC	South Orange County
sq ft	square foot
SRF	State Revolving Fund
SWD	Serrano Water District
SWP	State Water Project
TDS	total dissolved solids
UF	ultrafiltration
ULFT	ultra low flush toilet
USFWS	U.S. Fish and Wildlife Service
UV	ultraviolet light
Western	Western Water Company
WF-21	Water Factory 21
WFP	water facility plant
WMWD	Western Municipal Water District
WOC	West Orange County
WOCWB	West Orange County Water Board
WRD	Water Replenishment District of Southern California
WSM	Metropolitan's Water Supply Management Program
WTP	water treatment plant
WY	Water Year
YLWD	Yorba Linda Water District

EXECUTIVE SUMMARY

ES-1 INTRODUCTION

The Orange County Water District (OCWD, District) manages the Orange County Groundwater Basin (basin). The basin is a vital water supply source for 2.2 million District residents in north-central Orange County, and has played a key role in meeting local water needs for over 100 years.

OCWD was formed in 1933 for the purpose of managing and protecting the basin. The District's mission statement provides a concise description of OCWD's work:

> *It is the mission of the Orange County Water District to provide local water retailers with a reliable, adequate, high-quality local water supply at the lowest reasonable cost and in an environmentally responsible manner.*

Pumping from the basin has been managed historically through the annual setting of the Basin Production Percentage (BPP). The BPP is generally defined as the ratio of basin pumping that pays the Replenishment Assessment (RA) to total water demands. In the last three years, the District has implemented a new management approach to determine the amount of pumping the basin can sustain. The management approach looks at several factors, but is primarily based upon the amount of water that has been recently recharged into the basin. The current amount of pumping from the basin, also referred to as the basin's yield, is approximately 318,000 acre-feet per year (afy). This corresponds to a BPP of 64 percent in FY 05-06. With the construction of the Groundwater Replenishment (GWR) System and average local hydrology, basin pumping is expected to increase to approximately 390,000 afy in the next few years.

Water users within the OCWD service territory (generally referred to as groundwater producers or producers) benefit from access to the basin because groundwater supplies are less expensive than alternative water supplies, which are primarily from the Metropolitan Water District of Southern California (Metropolitan). As water demands rise in the future, maximizing the basin's yield will become increasingly important.

Total water demands within the District are currently 491,000 afy and are expected to grow to 568,000 afy by the year 2025 without annexations. The Long-Term Facilities Plan (LTFP) provides projects that could be implemented to: (1) accommodate these additional water demands by increasing the basin's annual yield, and (2) to protect water quality in the basin. Alternatively, if the basin's annual yield is not increased, the BPP will gradually decline over time and the District's customers will become more reliant upon imported water supplies.

The purpose of the LTFP is to identify and evaluate projects that could:

1. Increase the sustainable yield of the basin in a cost-effective manner to the highest possible amount. This is generally referred to as "optimizing the basin's yield", and is achieved through:
   a. Maximizing recharge into the basin;
   b. Minimizing Santa Ana River (SAR) surface outflow to the ocean;
   c. Minimizing subsurface outflow from the basin;
   d. Minimizing areas of low or depressed groundwater levels.
2. Protect and enhance groundwater quality in the basin
3. Protect the coastal portion of the basin

Increasing the basin's sustainable yield and protecting groundwater quality are often interconnected, since projects that change groundwater levels in the basin need to be evaluated with respect to their impact on seawater intrusion and other water quality issues.

The following is a list of policy principles to guide implementation of the LTFP projects:

- The costs and benefits of the project must be well understood.
  - Capital, operations and maintenance, and replacement and refurbishment costs are well defined.
  - All projects may not be amenable to calculating a benefit/cost ratio; some projects may be determined to be beneficial and worthy of implementation based on qualitative factors.
- For recharge projects:
  - The District will first maximize all potential Metropolitan in-lieu deliveries. In-lieu water will be received, whenever it is available from Metropolitan, within budget constraints.
  - Sufficient recharge water should be available to support the project. The water supply should come first, then the recharge project. This new supply must also be sustainable for the foreseeable future.
  - The cost-effectiveness of the proposed project should be evaluated relative to other recharge methods.
  - Operation of the District's existing recharge basins has been optimized
- The technology used to implement the project is well defined and proven. Some experimental projects with less proven technology may be implemented, but these would be relatively small-scale projects.
- Potential risks entailed in the project are well defined.
- The project is coordinated with other water districts, Municipal Water District of Orange County (MWDOC), and producers' projects. Potential conflicts with other projects have been evaluated to avoid unintended consequences.

- The project has been evaluated with respect to Metropolitan water supply issues. In some cases, Metropolitan water supply issues may drive decisions regarding project timing.

Development of each preferred project will require separate activities for planning, Engineers/Geologists Report, CEQA compliance, preliminary and final design, construction, startup and initial operations. Certain projects will require additional activities unique to their implementation, which are listed in Chapter 8.

The LTFP contains the following:

- Outlines the purpose of the LTFP;
- Provides a summary of water demands and resources;
- Delineates the various categories and individual potential projects that could be developed in the future;
- Describes the analysis and ranking of the potential LTFP projects;
- Outlines how the preferred projects have been ranked and grouped within five groups of projects called 'portfolios';
- Summarizes the various elements of the LTFP financing program;
- Describes policy guidelines to guide implementation of projects; and
- Recommends six LTFP projects to consider implementing in the next five years.

The LTFP cannot bind the District to implementation of any project. The District Act requires the completion and approval of a formal Engineers Report by the Board of Directors for any project before it can be constructed. Rather, the LTFP presents a menu of projects the District may choose to implement through 2025. Six LTFP projects are recommended for implementation in the next five years. The projects are summarized below in Table ES-1.

Collectively these projects will accomplish the following:

- Increase the District's recharge capacity by 40 cubic feet per second (cfs);
- Enhance the District's ability to effectively clean existing recharge basins.
- Remove 80 tons per year of nitrogen from the Santa Ana River

TABLE ES-1
LTFP RECOMMENDED PROGRAM – STAGE 1 (2005-2010)

Project	Capital ($M)	Annual O&M Cost ($M/yr)	Total (a) ($M/yr)
Recharge Portfolio			
R-5 Santiago Creek Enhanced Recharge	2.6	0.2	0.3
S-3 Mid-basin Injection (GWR System Phase 1)	17.9	0.9	1.8
R-4 Multi-Lateral Recharge Well - Radial type - Ball Basin (GWR System Phase 1)	4.3	0.1	0.4
Subtotal	**24.8**	**1.2**	**2.5**
Water Quality Management Portfolio			
Q-3 Chino Creek Wetlands	8.7	1.1	1.6
Subtotal	**8.7**	**1.1**	**1.6**
Operational Improvement Portfolio			
O-1 Basin Rehabilitation Program	0.8	0.5	0.6
O-2 Burris Pit Recontouring	1.8	0.1	0.2
Subtotal	**2.6**	**0.6**	**0.8**
Total	**36.1**	**2.9**	**4.9**

(a) Total includes debt service for capital cost and annual O&M expenses.

The LTFP will be closely monitored and updated every five years to accommodate necessary changes such as:

- Are SAR flows increasing as expected?
- Is the current expansion of the Talbert barrier preventing seawater intrusion?
- Has additional source water become available from Orange County Sanitation District (OCSD) for reclamation purposes?
- Are new recharge techniques available to implement, etc.?

As necessary the LTFP will be readjusted to improve the basin's management.

The approach to preparing the LTFP was:

1. Update the expected baseflow rates of future SAR flows, while considering possible increases in upstream recycling activities.
2. Update the expected future levels of secondary-treated wastewater from OCSD available for the GWR System's future phases.
3. Identify potential cost-effective projects to maximize the basin's yield.
4. Evaluate the potential projects and rank them according to technical, economic, and developmental feasibility criteria.

5. Assemble the viable projects into portfolios with progressively increasing unit cost ($/af) to support an increased sustainable basin yield.
6. Confirm the technical viability of the portfolios with groundwater model runs that estimate groundwater elevations with and without the portfolios.
7. Develop other portfolios of various operational programs to either optimize basin management or protect and enhance water quality.
8. Confirm the economic viability of the supply and operational portfolios with estimated RA rates.
9. Identify operations and maintenance costs of the projects.
10. Develop an example financing program for the suggested portfolios.
11. Provide the basis for a Program Environmental Impact Report (PEIR) that will be prepared for the LTFP to comply with the California Environmental Quality Act (CEQA) and provide an environmental review of the District's prospective projects.
12. Working closely with the producers to review and analyze all of the technical information used in the LTFP.

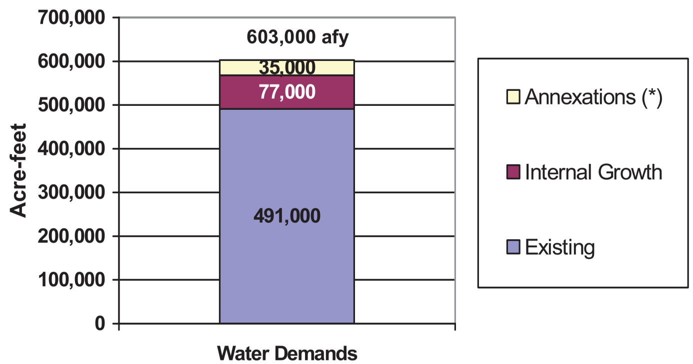
The LTFP provides expected water demands for internal growth (growth within the District's existing boundary) and potential annexations that have been requested. The requested annexations, if approved, would extend the District's boundary to include additional areas that either overlie or drain into the groundwater basin. Evaluation of the requested annexations is included in the PEIR. Projects within the LTFP could be implemented with or without approval of the requested annexations.

The PEIR addresses all viable projects that are included in the LTFP portfolios. When preparing a PEIR, CEQA guidelines dictate evaluating the widest range of potential projects and evaluating the largest possible basin yield. Accordingly, the LTFP and associated PEIR assess a broad range of potential projects.

ES-2 WATER DEMANDS SUMMARY

Total water demands within the District's boundary for FY 2003-04 were approximately 491,000 afy. Based on the OCWD producers' projections, demands within the District's current boundary are expected to reach 568,000 afy in 2025. Including projected demands with potential annexation areas in the City of Anaheim and Irvine Ranch Water District (IRWD) of about 45,000 afy (approximately 10,000 af of reclaimed water is expected to be produced by IRWD to partially meet these demands), the total demands in the year 2025 would be approximately 603,000 afy. Figure ES-1 graphically provides this information. Unless the yield of the basin is increased or other local supplies are developed, greater amounts of imported Metropolitan water will need to be annually purchased. Droughts would further exacerbate the need for imported water as water demands generally increase and local supply sources, primarily the SAR, tend to decrease during these periods.

FIGURE ES-1
EXPECTED 2025 TOTAL WATER DEMANDS



* Total annexation area water demands are estimated at 45,000 afy. IRWD expects to partially meet these demands by expanding their reclaimed water system to serve approximately 10,000 afy. Future allowable pumping from the groundwater basin would be based upon the 35,000 afy figure.

ES-3 POTENTIAL PROJECTS

The various projects considered in the LTFP are grouped within the following five categories:

- Recharge Facilities
- New Water Supply Facilities
- Basin Management Facilities
- Water Quality Management Facilities
- Operational Improvement Facilities

ES-4 ANALYSIS APPROACH

At the onset of work on the LTFP, several criteria (provided in Chapter 4) were developed and used to evaluate the 50 potential projects that were initially identified. These criteria were grouped as follows:

- Technical feasibility
- Cost
- Institutional support
- Functional feasibility

A standardized set of economic analysis criteria was also developed and utilized in the LTFP.

Because of the difficulty in predicting the yield (afy) of recharge projects under all hydrologic conditions, the cost-effectiveness of recharge projects was evaluated separately using a new factor. This factor uses the average increased percolation rate (in cfs), divided by the annual cost of capital recovery plus operations and maintenance (O&M) (cfs/$M/yr). The larger this factor is, the more cost effective the recharge method is. For water quality management and operational improvement facilities categories, a unit cost criterion was not appropriate since the projects do not produce additional water or allow increased groundwater pumping. Rather, these projects result in improvement to water quality or operational effectiveness. The benefits of such projects are in some cases better expressed in terms of costs that would be avoided if the project(s) were implemented.

ES-5 PROJECT ALTERNATIVES ANALYSIS

Each of the potential projects was described according to a standardized format covering the following topics:

- Project Identification
- Project Description
- Project Operations
- Environmental Issues
- Cost Estimates
- Implementation Schedule
- Advantages and Disadvantages

Each of the projects are summarized in Chapter 5 and are more fully described in Appendix A. Evaluation and screening of the potential projects showed that certain projects did not warrant further consideration in the LTFP at this time, either because they are being separately implemented by OCWD or other agencies, or were determined to be infeasible. The remaining projects that were carried forward in the LTFP are listed in Table ES-2.

TABLE ES-2
POTENTIAL LTFP PROJECTS REMAINING AFTER SCREENING

Project No.	Project Title	Project No.	Project Title
Recharge Facilities		***Water Quality Management Facilities***	
R-3	Deep Water Basin Cleaning Vehicles	Q-2	Temescal Creek Wetlands
R-4	Multi-Lateral Recharge Well (Radial type) *	Q-3	Chino Creek Wetlands *
R-5	Santiago Creek Enhanced Recharge *	Q-5	River Road Wetlands
R-6	New Recharge Basins – Viable Priority Sites	Q-6	Mill Creek Wetlands
R-10	Fletcher Basin Vadose Zone Recharge Wells	***Operational Improvement Facilities***	
R-11	Subsurface Recharge	O-1	Basin Rehabilitation Program *
R-14	Desilting Improvement Programs	O-2	Burris Pit Recontouring *
New Water Supply Facilities		O-3	Lakeview Pipeline
S-2	Irrigation/Industrial Service (GWR System)	O-4	Intake Structure Modification - Olive Pit
S-3	Mid-basin Injection (GWR System) *	O-5	Placentia/Raymond Basins Improvements
S-5	Off Stream Stormwater Storage	O-6	Silt Disposal Program
S-6	Prado Pool Stormwater Enhancement		
Basin Management Facilities			
M-1	Shallow Aquifer Development		
M-2	Colored Water Development		
M-3	Basin Pumping Transfer Program		
M-5	Talbert Injection Barrier Future Expansion		
M-6	Alamitos Barrier Improvement		
M-7	Bolsa - Sunset Injection Barrier and Supply		

* Recommended for consideration to implement in five years

ES-6 PREFERRED PROJECT PORTFOLIOS

This section summarizes the five groups of projects, called 'portfolios'. Five portfolios were developed based on the project evaluations and rankings within the different project categories. The portfolios show a general progression of projects, which could be implemented over the 20-year planning horizon, subject to needs, availability of funding, and availability of recharge water.

Recharge Portfolio

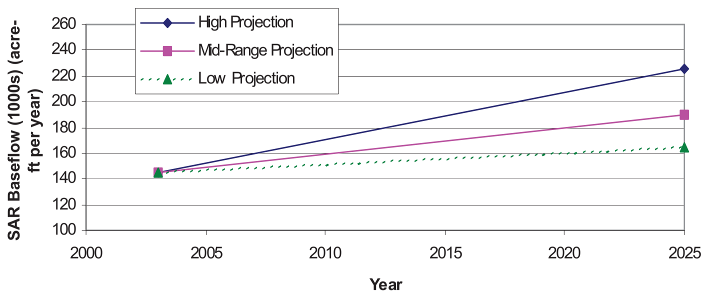
The Recharge portfolio provides possible projects that could capture increasing SAR flows to recharge the basin. The District also recharges the basin by annually purchasing large blocks of Metropolitan replenishment water. The District has been working very closely with MWDOC and the producers to increase the amount of capacity the producers have in receiving Metropolitan in-lieu replenishment water when it is available. The capacity to receive approximately 150,000 afy of in-lieu water has been developed if it is available from Metropolitan. This effort also directly benefits the District's recharge operations in Anaheim. Lesser amounts of Metropolitan replenishment water would have to be purchased and directly recharged. The District budgets to purchase approximately 65,000 af of Metropolitan replenishment water on average each year and it is very likely that most if not all of this water would be taken via the in-lieu program. In the past roughly half of this water was received via the in-lieu program and half was directly recharged. The in-lieu program will be the foundation or cornerstone of future Metropolitan replenishment water deliveries to the District.

To develop new techniques and efficiencies in recharging water the District previously established a Recharge Enhancement Group (REWG). The REWG group consists of District engineers, scientist and operators. Additionally, experts from other agencies attend REWG meetings to provide their experiences and methods to recharge water. Funding to build demonstration-type projects was previously discontinued, but will be recommended for inclusion in the FY 06-07 budget. Many of the recommended projects in the Recharge Portfolio have been developed by the REWG and would be implemented under its technical direction.

Recharging the basin through direct spreading of SAR water has historically been one of the District's core functions. The primary source of recharge water for the basin is the SAR. On average, the District currently recharges essentially all of the baseflow (about 155,000 afy) and 50,000 afy of stormflow from the river in the District's facilities in Anaheim and Orange. Any surplus recharge capacity is normally used to recharge Metropolitan direct replenishment water if it is available. In most years, the District's recharge system has limited excess or unused recharge capacity, as shown in Chapter 5.

In order to increase production from the basin, the District must find new ways to increase its recharge capabilities. Additional recharge could be achieved if baseflow rates increase or the District increases its ability to capture stormwater. Long-term projections of the future amount of baseflow in the SAR above Prado Dam have been recently made by the Santa Ana Watershed Project Authority (SAWPA, 2004). District staff used SAWPA's projection, which account for planned water recycling upstream of Prado Dam, to estimate the mid-range projection of river baseflow shown in Figure ES-2. By accounting for potential additional recycling above Prado Dam that was not included in SAWPA's projection, the low projection in Figure ES-2 was developed. The high projection in Figure ES-2 is the same as the mid-range projection except that it includes water savings from the removal of the invasive plant species *Arundo Donax* and it also includes treated wastewater discharges by three dischargers that were not included in SAWPA's estimate.

FIGURE ES-2
PROJECTED AVAILABILITY OF SAR BASEFLOW



The LTFP Recharge Portfolio was formulated to be implemented if the high baseflow projection is realized. If the mid-range or low projection occurs, then only a portion of the Recharge Portfolio projects should be considered for implementation. Additional recharge projects would not be built until it was determined that sufficient SAR flows were available to supply the new recharge facilities. Staff proposes to annually review the availability of SAR flows, changes in the last year, and tabulate new proposed recycling projects in the upper SAR watershed. This review will provide information for the District to determine when new recharge facilities could be built and to update the LTFP. If insufficient baseflow exists in the future to provide water for recharge, then SAR stormflow could be utilized to achieve some increased recharge, provided that sufficient storage capacity exists to store the stormwater for later recharge.

Approximately 50,000 afy of stormflow is also lost to the ocean on average. In some wet years, over 100,000 afy of stormflow flows past the District's recharge facilities and is lost to the ocean. This water is lost to the ocean because the District is unable to divert high flows out of the river and because the District's existing recharge system is often at its maximum capacity during wet winter months. As described in Chapter 6, an analysis was conducted to estimate how much additional SAR stormflow could be recharged if the District's recharge capacity was increased. This analysis, which included daily river flow data and accounted for storage at Prado Dam, indicated that in approximately one-half of the years, there is enough stormflow to recharge an additional 7,000 afy if the recharge capacity is increased by 200 af/day (or 100 cubic feet per second [cfs]). In very dry years, little to no additional recharge would be achieved with the 200 af/day recharge capacity increase. In very wet years, there is enough stormflow to recharge an additional 30,000 afy.

The Recharge Portfolio is shown graphically in Figure ES-3. Implementation of the Recharge Portfolio over the next 20 years would increase the average

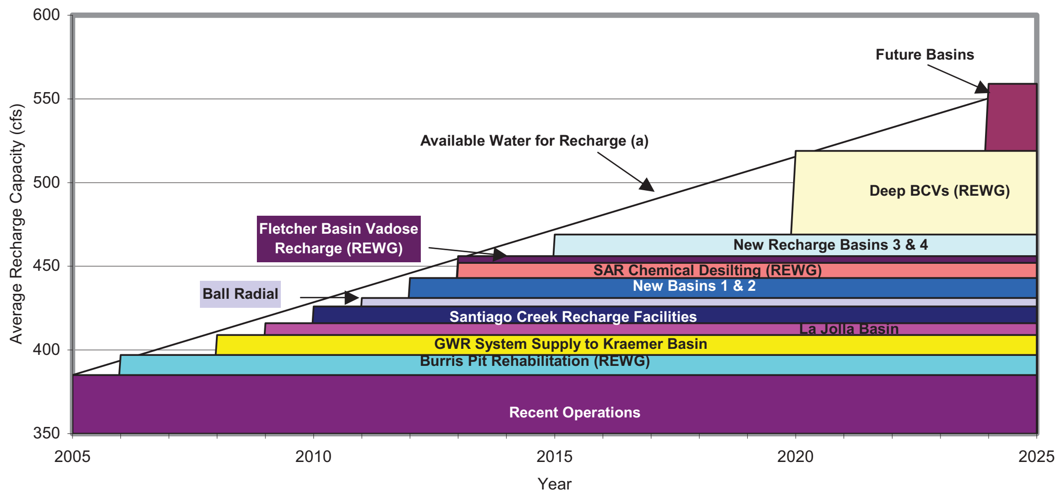
recharge system capacity by approximately 170 cfs. Some of the potential projects shown in Figure ES-3 may not be feasible when they are further evaluated prior to project approval, or there may not be sufficient river flow to justify some of the projects. The intent of assembling the projects as shown in Figure ES-3 is to evaluate the maximum extent of projects if the high SAR baseflow projection occurs in the next 20 years.

Several projects in the Recharge Portfolio can utilize either SAR baseflow or stormflow for recharge. Other recharge projects, such as radial injection wells that could be constructed at Ball Road Basin in Anaheim, have water quality requirements that dictate the use of GWR System water.

New Water Supply Portfolio

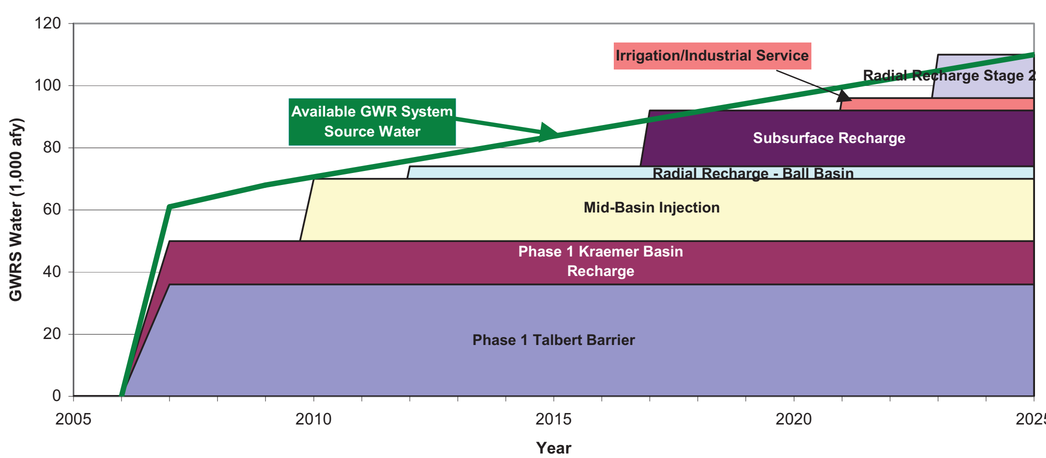
The New Water Supply Portfolio is shown on Figure ES-4 and is primarily based upon the possible expansion of the GWR System. The portfolio is shown for current and future GWR System phases, with the maximum project size being 110,000 afy, based on consideration of several factors. One of the key factors for future phases of the GWR System is the availability of sufficient secondary treated wastewater flows from OCSD. Based on projections from OCSD, it is estimated that there will be sufficient flow available from OCSD in 2025 for a total of 110,000 afy of product water from the GWR System. The allocation shown in Figure ES-4 is based on 20,000 afy of Phase 1 flows being allotted to injection through new injection wells in the interior or middle of the basin. This project, referred to as 'Mid-Basin Injection', would provide the benefit of recharging water in an area of low groundwater levels near south Santa Ana and north Costa Mesa. Additionally, 3,600 afy of GWR System Phase 1 flows would supply the Ball Road Basin radial recharge project. Subsequent potential projects shown on Figure ES-4 would be supplied with GWR System Phase 2 flows.

FIGURE ES-3
PREFERRED RECHARGE PORTFOLIO



(a) Includes SAR baseflow and stormflow; assumes high SAR baseflow projections; some projects at end of planning period would have to be deferred if mid-range or low SAR baseflow projections are experienced.

FIGURE ES-4
NEW WATER SUPPLY FACILITIES – GWR SYSTEM PORTFOLIO



Basin Management Portfolio

There are three project categories in the Basin Management Facilities Portfolio, which are summarized in Table ES-3. The three categories are control of subsurface outflow from the basin, seawater intrusion control, and water conservation.

TABLE ES-3
BASIN MANAGEMENT PROJECTS

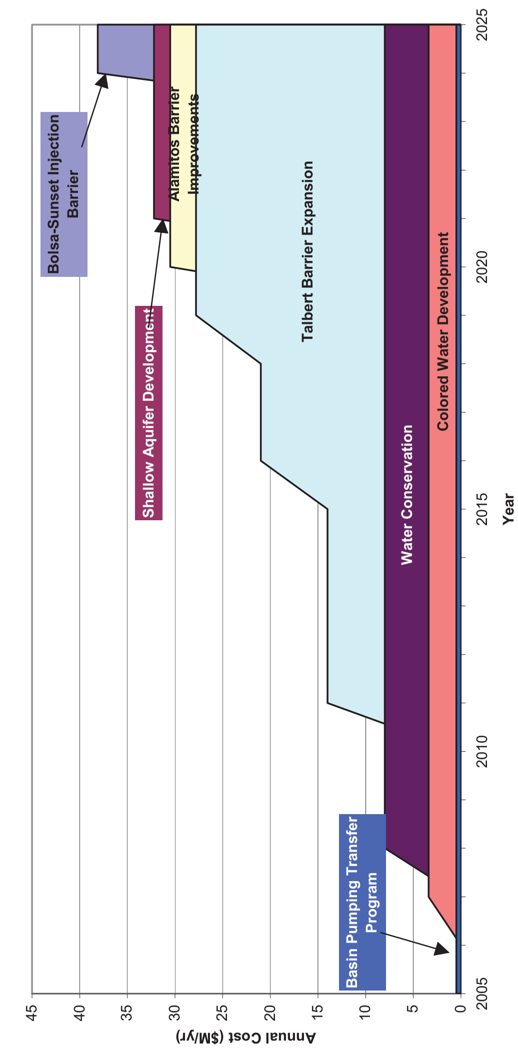
CATEGORY	PROJECT NO.	PROJECT TITLE
West Orange County (WOC) Subsurface Outflow Control	M-1	Shallow Aquifer Development
	M-2	Colored Water Development
	M-3	Basin Pumping Transfer Program
Seawater Intrusion Control	M-5	Talbert Barrier Expansion
	M-6	Alamitos Barrier Improvement
	M-7	Bolsa/Sunset Injection Barrier
Water Conservation	S-11	Residential ET Smart Controllers

The Basin Management Facilities Portfolio is depicted on Figure ES-5. The benefits of this portfolio are threefold: (1) increased basin yield resulting from a reduction in subsurface outflow losses to Los Angeles County; (2) long-term protection of the groundwater basin from potential seawater intrusion; and (3) water demand reduction from conservation. Additional monitoring and evaluations would be conducted prior to consideration of the projects to expand the seawater intrusion barriers.

The Talbert Barrier Expansion project consists of additional injection wells beyond those under construction in phase 1 of the GWR System. The District will be closely monitoring the effectiveness of the GWR System Phase 1 Talbert barrier improvements, which includes the construction of four new injection wells along the westerly side of the SAR at Adams Avenue and four new injection wells at the westerly end of the barrier near Beach Boulevard. These facilities were primarily designed to prevent seawater from traveling around the ends of the existing barrier. If seawater were to continue traveling around the easterly end of the Talbert Barrier, the District may need to construct additional injection wells along Adams Avenue east of the SAR. This project could be phased with a few injection wells constructed initially, with additional wells being built later as needed. If and when this easterly expansion of the barrier would be needed is not known, but it is shown conceptually in the LTFP as occurring in 2011.

In the LTFP, water conservation is considered as a new water supply, rather than a water demand reduction technique. It is envisioned that MWDOC would be the lead agency for implementing water conservation programs, and OCWD could potentially provide financial support.

FIGURE ES-5
BASIN MANAGEMENT FACILITIES



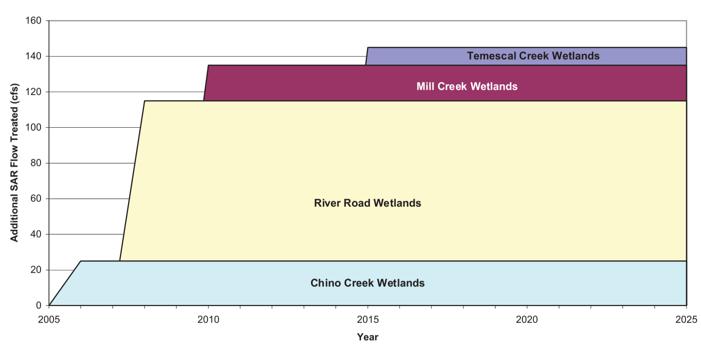
Water Quality Management Portfolio

The District has an active and progressive water quality program to protect the basin. The basin is closely monitored to ensure water quality and to detect possible contaminants early. The District has a multifaceted program to protect the basin. Examples of this approach include:

- Using wetlands to treat SAR flows
- Working with producers to pump and treat contaminated groundwater
- Closely monitoring the SAR quality
- Proactively bringing legal action against entities contaminating the shallow portion of the basin before the contamination reaches the main aquifer
- Constructing projects to remove contaminants in groundwater near the District's recharge facilities

New water quality projects in the LTFP relate to expanding the existing wetlands behind Prado Dam. The District currently operates the Prado Wetlands to remove nitrogen from SAR flows, although other water quality benefits are realized. Approximately one-half of the baseflow in the SAR is treated with the Prado Wetlands. The principal projects in the Water Quality Management portfolio are the following wetlands: Temescal Creek, Chino Creek, River Road, and Mill Creek. Temescal Creek, Chino Creek, and Mill Creek are tributaries to the SAR in the Prado Basin that currently do not receive wetlands treatment. The proposed wetlands portfolio is based on the District's wetlands policy, which has the long-term goal of providing wetlands treatment for baseflow in each of the tributaries in the Prado Basin. Figure ES-6 illustrates an example schedule for construction of the additional wetlands, and the additional flow that is tributary to the SAR that would be treated.

FIGURE ES-6
WATER QUALITY MANAGEMENT PORTFOLIO



Operational Improvements Portfolio

The operational Improvements Portfolio consists of projects in two categories:

1. Projects that are extensions of current District operational activities, such as rehabilitating and improving the intake structures at existing recharge basins.
2. Previously planned projects that were originally included in the 2004-05 Capital Improvement Program (CIP), but were deferred due to budgetary constraints. These projects are carried forward in the LTFP.

The Operational Improvement projects portfolio is shown in Table ES-4.

TABLE ES-4
OPERATIONAL IMPROVEMENTS PROJECTS

PURPOSE	PROJECT NO.	PROJECT TITLE
Extension of current operational activities	O-1	Recharge Basin Rehabilitation Program
	O-4	Intake Structure Modification – Olive Pit
	O-5	Placentia/Raymond Basin Improvements
	O-6	Silt Disposal Program
Projects from 2004-05 CIP carried forward in LTFP	O-2	Burris Pit Recontouring
	O-3	Lakeview Pipeline

ES-7 SUMMARY OF RECOMMENDED PORTFOLIOS

The five recommended LTFP portfolios are summarized on Table ES-5. The LTFP considers 29 potential projects among the five portfolios that could produce as much as 125,000 afy of new water and corresponding similar increase in groundwater pumping over the next 20 years. Additionally these projects result in basin management, water quality, and operational improvements.

Sixteen of the 29 projects within the LTFP create new water, subject to the availability of sufficient recharge water. The capital cost of these projects is $311 million. They have a total annual cost of $60 million, which includes O&M and debt service. Their estimated unit cost is $480/af. These estimated costs, which are based on year 2005 costs, do not include any grant funding, which, if received, would lower the cost.

Thirteen of the 29 projects are within the seawater intrusion control, water quality management, and operational improvement categories. Calculation of a simple unit cost per acre-foot is not possible for these projects.

If all 29 projects were constructed, capital costs for all projects would total $432 million with related O&M costs at about $64 million per year. Total annual costs are estimated at $89 million per year.

TABLE ES-5
SUMMARY OF RECOMMENDED PORTFOLIOS

Portfolio	No. of Projects	Maximum					Unit Cost ($/af)
		Max. Capacity (afy)	Capital Cost ($M)	O&M Cost ($M/yr)	Annual Cost ($M/yr)		
Recharge	7 (a)	93,000 (b)(c)	124	14.3	21.5		-
New Water Supply	6 (a)	22,000 (d)	150	24.7	33.4		-
Basin Management - WOC Outflow Control Component	3	10,000 (e)	37	3.0	5.1		-
Subtotal - New Water Component	**16**	**125,000**	**311**	**42**	**60**		**480**
Basin Management - Seawater Intrusion Control Component	3	-	90.0	18.1	23.3		-
Water Quality Management	4	-	22.5	2.8	4.1		-
Operational Improvements	6	-	8.8	1.3	1.9		-
Total - All Projects	**29**	**125,000**	**432**	**64**	**89**		**-**

a. Mid-basin Injection included in New Water Supply Portfolio
b. Equivalent to 128 cfs additional percolation
c. Includes: Santiago Creek Recharge, Four New Recharge Basins (4), Desilting Facility, Vadose Recharge - Fletcher Basin, 5 BCVs - Deep Basins, and Future Basins (See Table 6-4)
d. 23,600 afy of GWR System Phase 1 flows for Mid-Basin Injection and Radial Recharge - Ball Basin, not included. Subsurface Recharge (7 sites) (See Table 6-7)
e. Includes: Shallow Aquifer Development, Colored Water Development, BPTP (See Table 6-9)

Basin Production Percentage

In the *2010 Rate Plan* published in November 2004 it was predicted that annual basin pumping would increase to approximately 390,000 afy in 2010, which equates to a BPP in the area of 75 percent.

If annual basin pumping is maintained at 390,000 afy going forward from 2010, the BPP will slowly decline to approximately 65 percent in 2025 if the total water demand increases as projected. Under this scenario the groundwater producers would primarily rely upon Metropolitan to meet increasing water demands. At the opposite end of the spectrum, if all of the projects in the LTFP were determined to be economical, feasible, and successfully implemented, the BPP would ultimately increase to approximately 88 percent. The LTFP provides a menu of options (projects) that the OCWD Board of Directors can select to decide the target volume of groundwater the basin should provide assuming average hydrology.

ES-8 FINANCING PROGRAM AND IMPACTS

The principal revenue sources to fund implementation of projects in the LTFP would be:

- Long-term debt and a "Pay-As-You-Go" program supported by the Replenishment Assessment (RA)
- State and federal grants

Six projects are recommended for implementation in the next five years as previously shown on Table ES-1. The total capital cost of these projects is $36.1 million. Assuming the District decides to construct the projects and long-term debt is used to fund their construction, the District would incur annual debt payments of approximately $2.0 million for 30 years. Some grant funding is available to offset a small portion of this cost. The annual O&M cost of the facilities is estimated at $2.9 million. Thus, the total cost of the six new projects is $4.9 million annually. If annual basin pumping is 390,000 afy by the year 2010 as previously projected, the RA would need to increase $13/af to support this new expense.

Offsetting this expense is the benefits the six new projects would bring to the District's residents, which primarily include:

- Increasing the District's recharge capacity, which would allow for recharging additional SAR flows and recharging increased amounts of Metropolitan replenishment water. Thus a higher BPP could be maintained; and
- Improved SAR water quality

LTFP Financial Benefits

The LTFP has identified projects that could provide for approximately 125,000 afy of additional groundwater production, and water quality and basin management improvements. The 16 projects within the LTFP that create new water have a total annual capital recovery and O&M cost of $60 million in current dollars. Including the producers' energy costs to pump the water, the cost to produce the additional 125,000 af of water is approximately $66 million per year.

The most likely alternative water supply to groundwater to meet increased future water demands in the District's service territory would be Tier II Metropolitan water. The cost of this water is currently $579/af. Using the current Tier II cost of $579/af, the cost to buy the 125,000 af from Metropolitan instead of producing it from the basin is $72 million per year.

Comparing the 16 projects in the LTFP that create new water supplies with Metropolitan Tier II rates is a broad and simplistic comparison that is only meant to give an initial indication that the projects could be economically feasible. Each project in the LTFP would have to be reviewed in greater detail via the preparation of an Engineers Report before the District could decide to construct the project.

1 INTRODUCTION

This chapter outlines the purpose of the Long-Term Facilities Plan (LTFP); summarizes the findings of two previous companion documents (*Recharge Study* and *Groundwater Management Plan*), and provides the basis for the companion environmental analysis document (Program Environmental Impact Report [PEIR]).

1.1 BACKGROUND

OCWD is the manager of the Orange County Groundwater Basin (basin). The basin is a vital water supply source for north-central Orange County, and has played a key role in meeting the water needs for over 100 years within the District.

OCWD was formed in 1933 for the purpose of managing and protecting the basin. The District's mission statement provides a concise description of OCWD's work:

> *It is the mission of the Orange County Water District to provide local water retailers with a reliable, adequate, high-quality local water supply at the lowest reasonable cost and in an environmentally responsible manner.*

The current 2005 amount of pumping from the basin, also referred to as the basin's yield, is approximately 318,000 acre-feet per year (afy). With completion of Phase 1 of the Groundwater Replenishment (GWR) System and average local hydrology, the yield will increase to approximately 390,000 afy.

Estimated demands within the District's boundary are currently 491,000 afy, and in 2025 are estimated to be approximately 568,000 acre-feet per year (afy) within the existing District boundary, and approximately 613,000 afy with potential annexations requested by the City of Anaheim and Irvine Ranch Water District (IRWD).

Water users in the basin, generally referred to as groundwater producers or producers, benefit from access to the basin because groundwater supplies from the basin are less expensive than the alternative water supply, which is primarily from the Metropolitan Water District of Southern California (Metropolitan). The entire southern California region also benefits from the basin because the basin's natural yield represents water that does not have to be imported from outside the watershed, such as from the Colorado River or Sierra Nevada watersheds. Provided that the basin's yield is enhanced in a cost-effective manner, the producers benefit from greater access to lower priced groundwater.

1.2 PURPOSE OF LONG-TERM FACILITIES PLAN

In 2003, the District began a collaborative process with the producers to evaluate potential projects and programs that could cost-effectively increase the yield of

the basin and protect groundwater quality. This process resulted in the preparation of the Long-Term Facilities Plan (LTFP).

The purpose of the LTFP is to identify and evaluate projects that could:

1. Increase the sustainable yield of the basin in a cost-effective manner to the highest possible amount. This is generally referred to as "optimizing the basin's yield", and is achieved through:
   a. Maximizing recharge into the basin;
   b. Minimizing Santa Ana River (SAR) surface outflow to the ocean;
   c. Minimizing subsurface outflow from the basin;
   d. Minimizing areas of low or depressed groundwater levels.
2. Protect and enhance groundwater quality in the basin.
3. Protect the coastal portion of the basin.

Increasing the basin's sustainable yield and protecting groundwater quality are often interconnected, since projects that change groundwater levels in the basin need to be evaluated with respect to their impact on seawater intrusion and other water quality issues.

A particular basin Production Percentage (BPP) has not been set as a target. Instead the LTFP develops a list of potential projects to consider implementing in the future to maximize the basin's yield. Without these projects, as total water demands increase, the BPP will slowly have to decrease.

The District and the producers have an interest in maximizing the sustainable basin yield, provided that it is done in a cost-effective manner. The phrase 'sustainable basin yield' means the annual amount of production that can be maintained on a long-term basis (for example, five to ten years) without overdrafting or harming the basin. This requires that total production from the basin be essentially the same as total recharge on a long-term basis. The LTFP does not bind the District to implementation of any project. Each project identified in the LTFP could be considered for construction in the future with the completion of a detailed *Engineers Report* as required by the *District's Act*.

Approach

The District has historically maintained a Replenishment Assessment (RA) that is sufficiently below the rate of treated, full service water from Metropolitan such that the cost of groundwater is significantly less than Metropolitan water, after accounting for the producers' energy, operations and maintenance costs. This framework is maintained in the LTFP.

The approach to preparing the LTFP was:

1. Update the expected baseflow rates of future Santa Ana River (SAR) flows, while considering possible increases in upstream recycling activities.

2. Update the expected future levels of secondary-treated wastewater from Orange County Sanitation District (OCSD) available for the GWR System's future phases.
3. Identify potential cost-effective projects to maximize the basin's yield.
4. Evaluate the potential projects and rank them according to technical, economic, and developmental feasibility criteria.
5. Assemble the viable projects into portfolios of projects with progressively increasing unit cost ($/af) to support an increased sustainable basin yield.
6. Confirm the technical viability of the portfolios with groundwater model runs that estimate groundwater elevations with and without the portfolios.
7. Develop other portfolios of various operational programs to either optimize basin management or protect and enhance water quality.
8. Confirm the economic viability of the supply and operational portfolios with estimated RA rates.
9. Identify operations and maintenance costs of the projects.
10. Develop an example financing program for the suggested portfolios.
11. Provide the basis for a Program Environmental Impact Report (PEIR) that will be prepared for the LTFP to comply with the California Environmental Quality Act (CEQA) and provide an environmental review of the District's prospective projects.
12. Working closely with the producers to review and analyze all of the technical information used in the LTFP.

The LTFP provides expected water demands for internal growth (growth within the District's existing boundary) and potential annexations that have been requested. The requested annexations, if approved, would extend the District's boundary to include additional areas that either overlie or generally drain into the basin. Evaluation of the requested annexations is included in the PEIR. Projects within the LTFP could be implemented with or without approval of the requested annexations.

From June 2004 to August 2005, monthly meetings were held with a working group of the producers (Producers Working Group, or PWG) and OCWD staff. These meetings were conducted to evaluate potential projects and programs in the LTFP, and also evaluate the potential groundwater level changes that could result from the requested annexations.

1.3 Findings of Recharge Study

Maximizing the ability to replenish the basin is crucial to optimizing water utilization in the District's service area. A *Recharge Study* was prepared by District staff and published in December 2003 to assess existing recharge operations, constraints and opportunities, and determine future recharge needs.

Several programs were identified in the *Recharge Study* that warranted additional evaluation in the LTFP. These programs are summarized in Table 1-1.

Table 1-1
Potential Programs for Expanding and Enhancing Recharge Capabilities as Described in the 2003 Recharge Study

Program	Description
Research (Modular Wetlands, Percolation Studies, Limnological Database)	Studies to (1) determine the ability of small wetlands to "polish" surface water prior to groundwater recharge, (2) evaluate effectiveness of a commercial processor in enhancing percolation, and (3) improving knowledge of water quality at point of recharge
Sand Wash Plant	Evaluation of feasibility of replacing current plant with more up-do-date plant.
Burris Pit Recontouring	Proposal to excavate and reshape the basin to increase efficiency.
Recharge Trench	Trenches excavated to overcome existing clay layers
Basin Cleaning Vehicles (BCV)	Development of BCVs for both shallow and deep basins.
Recharge Galleries	Subsurface recharge system similar to leach fields
GWR System (Ball Road Basin, Mid-Basin Injection, Infiltration Galleries)	Explore potential alternatives for utilizing GWR System supplies to increase percolation.
Enhanced Recharge at Santiago Creek	Expand existing project that utilizes controlled releases to optimize recharge.
Fletcher Basin Vadose Zone Recharge Well	Evaluate using vadose zone recharge well to recharge SAR and GWR water.
Land Acquisition	Evaluate feasibility of buying small (<5 acres) and large (>5 acres) parcels for recharge.
Huntington Beach Recharge	Dry season urban runoff could potentially be captured in the shallow drinking water aquifer.
In-situ Filtration (SCARS)	Concept utilizing upper stretches of river to serves as a filtering system to improve water quality.
Water Quality (Desilting)	Remove silt to improve quality of water and improve percolation rates.

1.4 Findings of Groundwater Management Plan

A Groundwater Management Plan (GWMP) was prepared by District staff and published in March 2004. The policy and management objectives articulated in the GWMP were utilized as basic assumptions in the preparation of the LTFP. Several recommendations were included in the GWMP, which are summarized in Table 1-2, and further evaluated in the LTFP.

Table 1-2
Groundwater Management Plan Recommendations

Program/Activity	Protect/Enhance Water Quality	Protect/Increase Sustainable Yield
Monitoring		
Monitor quality of recharge water sources	Yes	Yes
Monitor groundwater quality using District's wells and selected wells owned by others	Yes	
Monitor water management and recycling plans in watershed for impact on SAR flow rates and SAR quality	Yes	Yes
Conduct groundwater level and hydrogeologic evaluations to provide information to manage the basin	Yes	Yes
Recharge Supply Management		
Protect District's interest in management of flow in SAR		Yes
Monitor water management and recycling plans in the watershed for their potential impact upon future SAR flows		Yes
Evaluate feasibility of new recharge water supplies (e.g., GWR System, water transfers)		Yes
Evaluate feasibility of additional conjunctive use or storage projects		Yes
Evaluate projects to increase the District's capacity to recharge water (e.g., Metropolitan in-lieu water)		Yes
Evaluate projects to maintain the recharge rate in the SAR riverbed		Yes
Locate future recharge projects to maximize benefits to the basin and address areas of low groundwater levels to the extent feasible (e.g., Mid-Basin Injection	Yes	Yes
Manage natural resources in the watershed to sustain natural resources and a secure water supply	Yes	Yes
Groundwater Quality Management		
Prevent seawater intrusion	Yes	Yes
Evaluate emerging contaminants	Yes	Yes
Prevent future contamination through coordinated efforts with regulatory agencies and watershed stakeholders	Yes	
Evaluate projects to control vertical movement of poor quality water	Yes	Yes
Groundwater Improvement Projects		
Evaluate and pursue projects to address existing areas of contamination	Yes	
Integrated Demand and Supply Management		
Evaluate projects to maximize basin's ability to respond to and recover from droughts		Yes
Evaluate projects to control groundwater losses		Yes
Evaluate projects to reduce water demand through conservation and water use efficiency		Yes

1.5 Basis for Program EIR

The LTFP provides the basis for a PEIR that will be prepared for the LTFP to comply with CEQA and provide an environmental review of the District's prospective projects. The PEIR addresses all viable projects that could be included in the LTFP portfolios. When preparing a PEIR, CEQA guidelines dictate evaluating the widest range of potential projects and evaluating the largest possible basin yield. Accordingly, the LTFP and associated PEIR assess a broad range of potential projects.

2 WATER RESOURCES SUMMARY

This chapter provides an estimate of current and future projected water demands, a listing of current water sources, and recent estimates of Metropolitan water supply cost. As water demands increase within OCWD, the producers will have to purchase greater amounts of Metropolitan Tier II water supplies unless new local water supplies are developed.

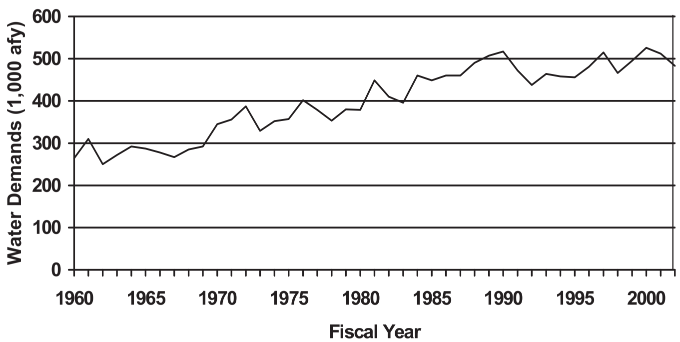
2.1 WATER DEMANDS

Numerous factors impact future demands such as population growth, economic conditions, conservation programs, and hydrologic conditions. Estimates of future demands are therefore subject to some uncertainty and should be updated on a periodic basis. Projections were obtained from the individual retail water producers within the existing District boundaries and from regional projections from MWDOC. Projections were also obtained for areas outside the District that have the potential to annex into the District.

2.1.1 Current Water Demands

Total water demands within the District's boundary in 2004 were approximately 491,000 afy. Figure 2-1 provides historical water demands in the District, which were obtained from the District's annual *Engineers Reports.* Total demands have increased approximately 200,000 afy in the last 40 years.

FIGURE 2-1
HISTORIC TOTAL DISTRICT WATER DEMANDS



Source: OCWD Engineers Reports

2.1.2 Projected Water Demands

Estimating projected water demands is necessary for the planning of future water development projects and portfolios. OCWD strives to provide a reliable and economical source of water for the groundwater producers, while protecting the groundwater basin. The magnitude of estimated demands must be quantified as accurately as possible because the amount of water needed will help determine future courses of action. Future water demands from possible annexation areas have been estimated in addition to demands within the existing District boundary.

2.1.2.1 Demands Within Existing District Boundary

Estimates of future total water demands from internal growth were available from two sources:

- Estimates prepared by each producer
- Estimates made from a computer model developed by Metropolitan

Projected water demands were estimated by the individual producers within the District and submitted by the producers to MWDOC in 2004. MWDOC provided these estimates to the District. These figures were compiled and redistributed to the producers for their review.

Water demand projections are also available from demand modeling conducted by Metropolitan. As part of its Integrated Resources Plan, Metropolitan developed a detailed model of water demands (MWD-MAIN) that accounts for population growth, economic factors, water conservation, and other important water demand considerations. The model is particularly useful because it can evaluate the sensitivity of future water demands to changing conditions, such as drought and population changes. Upon request, Metropolitan staff ran a version of this model (OC-MAIN) using specific demographic and census data for Orange County.

The OC-MAIN model is a software package that (1) translates demographic, housing, and business statistics into estimates of existing water demands; (2) uses projections of population, housing, and employment to devise baseline forecasts of water use; and (3) accounts for both active and passive conservation. MWD-MAIN has been the primary demand forecasting tool used by Metropolitan in recent years. Future annual water demands will fluctuate, primarily due to factors such as weather and economic conditions. The MWD-MAIN model estimates that annual demands may increase or decrease as much as eight percent annually above or below the estimated average demand due to the occurrence of wet/dry periods and economic factors.

Based on the OC-MAIN model, the total water demand within the existing District boundary is projected to increase to approximately 557,000 afy in the year 2025. For comparison purposes, the estimates provided by the producers to the MWDOC are that 2025 demands in the current District boundary will be approximately 568,000 afy, which is within two percent of the total demand estimated by OC-MAIN. During meetings of the Producers Working Group, the producers indicated that they had more confidence in their estimates of future demands, and desired that their estimated demands provided to MWDOC in 2004 be used instead of the OC-MAIN estimates. District staff concurred with the producers' request and used their estimates of future water demands in the LTFP.

The estimated increase in demand from 491,000 afy in 2004 to approximately 568,000 afy in 2025 is an annual growth rate of approximately 0.7 percent, assuming the increased demand occurs at a uniform annual rate.

TABLE 2-1
AGGREGATION OF ESTIMATED FUTURE WATER DEMANDS WITHIN EXISTING OCWD BOUNDARY

Agency/City	WaterDemands (afy)			
	OC-Main (a)		2004 Producer Survey (b)	
	CY 2010	CY 2025	CY 2010	CY 2025
Anaheim (c)	82,461	92,180	92,060	93,615
Buena Park	18,854	25,063	18,911	23,669
East Orange County Water District (d)	16,400	17,666	16,656	16,680
Fountain Valley	13,110	15,650	12,751	12,990
Fullerton	31,855	34,639	37,921	40,443
Garden Grove	29,220	30,875	34,152	36,726
Huntington Beach	35,626	36,973	34,728	35,780
Irvine Ranch Water District (c)	58,404	71,082	70,895	79,149
La Palma	2,734	3,005	2,726	2,873
Mesa Consolidated Water District	23,473	25,777	21,929	22,211
Newport Beach	19,081	20,198	21,479	21,725
Orange	32,105	34,814	35,156	35,156
Santa Ana	49,485	56,291	49,553	57,210
Santiago County Water District	2,713	6,949	2,016	3,600 (e)
Seal Beach	3,757	3,870	4,622	4,880
Serrano Water District	3,409	3,611	3,408	3,464
Southern California Water Co.	30,861	34,205	30,842	32,934
Westminster	14,779	17,408	15,139	16,943
Yorba Linda Water District (c)	17,538	18,790	18,851	19,801
Non-agencies	7,700	7,700	7,700	7,700
Total - OCWD Area	**493,565**	**556,746**	**531,495**	**567,549**

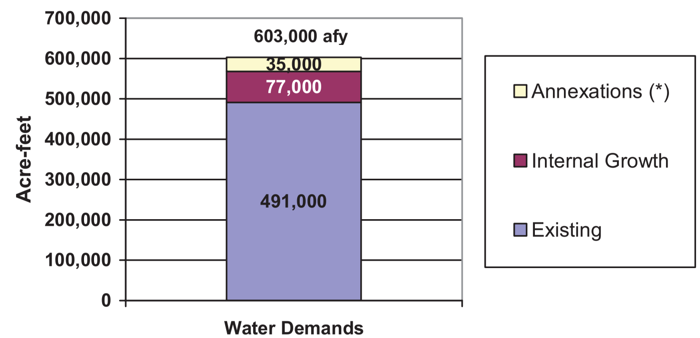
(a) Source: MWDOC
(b) Source: Producers, as submitted to MWDOC (2004)
(c) Excludes potential annexation areas
(d) Includes Orange Park Acres MWC and portions of City of Tustin
(e) Updated from personal communication with Henry Mediema-Psomas (consultant to Santiago CWD.)

2.1.2.2 Demands Within Possible Annexation Areas

The District's current boundaries encompass an area of approximately 229,000 acres. The District has a history and policy of annexing new lands that are within the SAR watershed that receive imported water from Metropolitan, and that are considered qualified for annexation. In 1933, when the District was formed, its size was 162,676 acres, which is 30 percent smaller than today's size.

In 2003, the City of Anaheim, IRWD, and Yorba Linda Water District (YLWD) requested that the District annex additional lands to the District. In 2004 the City of Anaheim and IRWD each executed a Memorandum of Understanding (MOU) with OCWD regarding their proposed annexations. Future total water demands, including the estimated demands from the potential Anaheim and IRWD annexation areas, are shown on Figure 2-2. IRWD has an aggressive water recycling program and projects to serve approximately 10,000 afy of reclaimed water to the new annexation areas. Table 2-2 provides more specific water demand projections for IRWD and the City of Anaheim.

FIGURE 2-2
EXPECTED 2025 TOTAL WATER DEMANDS



* Total annexation area water demands are estimated at 45,000 afy. IRWD expects to partially meet these demands by expanding their reclaimed water system to serve approximately 10,000 afy. Future allowable pumping from the groundwater basin would be based upon the 35,000 afy figure

TABLE 2-2
ESTIMATED 2025 TOTAL WATER DEMANDS FOR POTENTIAL ANNEXING AGENCIES [a]

AGENCY	ESTIMATED ANNUAL DEMAND IN YEAR 2025 (AFY) [b]		DIFFERENCE (WITH/WITHOUT ANNEXATION) (AFY) [b]
	WITHOUT ANNEXATION	WITH ANNEXATION	
City of Anaheim	93,615	96,400	2,785
IRWD	79,149	122,153	43,004
Total			**45,789**

(a) Does not include potential YLWD annexation
(b) Producer projections provided to MWDOC

Future demand projections should continue to be reviewed on a regular basis, so that the most up-to-date information is used and that any changes in estimated future demands are accounted for in future planning efforts.

2.2 CURRENT WATER SUPPLIES

Retail water agencies within the District pump groundwater and utilize direct deliveries of Metropolitan firm treated water to meet total water demands. IRWD and the District also provide direct recycled water to various customers, and Serrano Water District treats and serves the local water from Santiago Creek. The actual FY 2005-06 water supply mix to meet water demands in the District is summarized in Table 2-3.

TABLE 2-3
FY 2005-06 WATER SUPPLY MIX (AF)

Component	Groundwater Basin Recharge Supply	Drinking Water Supply
Groundwater Basin Recharge Component		
SAR base and stormflows	194,000	
Natural incidental recharge	60,000	
Metropolitan replenishment water [a]	**50,000**	
Seawater barrier injection	12,000	
Arlington Desalter	2,000	
Subtotal	318,000	
Basin Pumping @ 64% BPP		318,000
Basin pumping above 64% BPP for water quality projects		14,000
Other local supplies (reclamation and Santiago Creek flows treated by Serrano Water District)		18,000
Metropolitan treated firm purchases by producers		**141,000**
Total Water Supply		491,000
Total Water Demands		491,000

Notes:

(a) Does not include 15,000 af of Metropolitan replenishment water purchased to refill the groundwater basin.

Metropolitan purchases shown in bold

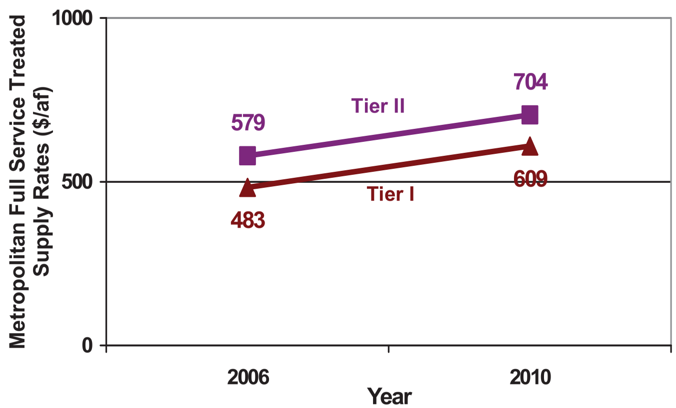
As shown in Table 2-3, 191,000 afy of imported Metropolitan firm treated and replenishment supplies will be purchased in FY 2005-06 to meet the total water demands within the District's service territory. If no additional local water supplies were developed, the amount of necessary Metropolitan purchases would increase by 122,000 afy or up to approximately 313,000 afy by 2025 (assuming annexations occur). As previously mentioned, IRWD is planning to create 10,000 afy of reclaimed water supplies to serve their annexation areas. Additionally, the GWR System will create approximately 72,000 afy of new local water supplies.

These two projects would decrease the amount of necessary Metropolitan purchases down to approximately 231,000 afy. However, the need to annually purchase Metropolitan imported water supplies will grow in the future (231,000 afy versus 191,000 afy). The LTFP provides a number of projects that could reduce the growing dependency upon imported water supplies to meet annual water demands.

2.3 Future Metropolitan Supply Rates

The groundwater producers will have to purchase additional Metropolitan full service treated water to meet increased demands if new local projects are not developed. Recent Metropolitan rate projections are shown in Figure 2-3.

Figure 2-3
Future Metropolitan Supply Rates [(a)]



(a) Source: Metropolitan; includes Readiness to Serve Charge and Capacity Charge

The projected Metropolitan rates will be used as the benchmark to determine if the unit cost of local projects identified in Chapter 3 are cost competitive. If additional cost-effective local water supply sources are not developed, water supply costs in the basin will increase due to increasing Metropolitan rates.

3 IDENTIFICATION OF POTENTIAL PROJECTS

This chapter delineates the various categories of potential projects that OCWD could choose to implement and provides a master list of all potential projects evaluated in the LTFP.

3.1 Program and Project Categories

The various projects considered in the LTFP are grouped within the following five categories:

- Recharge Facilities
- New Water Supply Facilities
- Basin Management Facilities
- Water Quality Management Facilities
- Operational Improvements Facilities

3.1.1 Recharge Facilities

The Recharge Facilities component of the LTFP includes potential projects that were identified in the 2003 *Recharge Study*, several new potential projects that have been subsequently identified, plus certain potential projects that have been evaluated previously, but not implemented. The recharge projects could utilize one or more of the following water supplies:

- GWR System – Phase 1
- GWR System – Phase 2
- Metropolitan Replenishment Water
- SAR baseflow
- SAR stormflow

Each of the projects was evaluated on the assumption that the project would have sufficient water supply from one or more of the above sources. However, the time when a project might be implemented is contingent on the availability of recharge water. This issue is further discussed in Chapter 6.

The recharge projects considered in the LTFP are listed in Table 3-1.

TABLE 3-1
POTENTIAL RECHARGE FACILITIES

P N	P T
R-1	Optimization of Warner Basin
R-2	Shallow Water Basin Cleaning Vehicles
R-3	Deep Water Basin Cleaning Vehicles
R-4	Multi-Lateral Recharge Well (Radial type)
R-5	Santiago Creek Enhanced Recharge
R-6	New Recharge Basins – Viable Priority Sites
R-7	New Recharge Basins – All Sites
R-8	Basin Rehabilitation Program
R-9	Storm Runoff Detention - Noble Pit
R-10	Fletcher Basin Vadose Zone Recharge Wells
R-11	Subsurface Recharge
R-12	Olive Pit Recharge Trenches
R-13	Recharge Research
R-14	Desilting Improvement Programs

Projects R-8 and R-12 that were originally developed within the recharge portfolio have been transferred to the Operational Improvements portfolio and will be discussed later. The remaining recharge projects will be defined in Chapter 6, and a complete project description of each is included in Appendix A.

3.1.2 New Water Supply Facilities

Water supply facilities refers to projects that provide a new supply of recharge water. In most cases, the new water produced from these projects comes from future phases of the GWR System or storing and subsequently recharging Santa Ana River stormwater that would otherwise be lost to the ocean. The Water Supply Facilities component of the LTFP includes potential projects that were identified in the previous GWMP, and several new potential projects that could utilize water supplies other than assumed for the recharge portfolio (e.g., GWR System Phase 2). The Water Supply projects that have been considered in the LTFP are listed in Table 3-2.

TABLE 3-2
POTENTIAL WATER SUPPLY FACILITIES

P N	P T
S-1	GWR System Phase 1 Staff Integration
S-2	Irrigation/Industrial Service
S-3	Mid-basin Injection
S-4	Education Center
S-5	Off Stream Storage
S-6	Prado Pool Enhancement
S-7	Conjunctive Use
S-8	Imported Water Replenishment Supply
S-9	Ocean Water Desalination Program
S-10	Water Transfers
S-11	Water Conservation
S-12	Stormwater Pump Station
S-13	Injection of Treated Stormwater
S-14	Mid-basin Injection with Imported Water

Water Supply projects will be defined in Chapter 6, and a complete project description of each is also included in Appendix A.

3.1.3 Basin Management Facilities

In the Basin Management component, consideration is given to potential development of aquifers not presently utilized or that are under-utilized (shallow aquifer, deep colored aquifer), various potential seawater intrusion control barriers, and other potential basin management projects. Each project is defined in Chapter 6, described in Appendix A, and listed below.

TABLE 3-3
BASIN MANAGEMENT FACILITIES

P N	Project Title
M-1	Shallow Aquifer Development
M-2	Colored Water Development
M-3	Basin Pumping Transfer Program
M-4	Groundwater Emergency Service and Coastal Shift Pumping
M-5	Talbert Injection Barrier Future Expansion
M-6	Alamitos Barrier Improvement
M-7	Bolsa - Sunset Injection Barrier and Supply
M-8	Regional Interconnector
M-9	West Orange County Wellfield
M-10	Dry Weather Runoff Recharge

3.1.4 Water Quality Management Facilities

In this LTFP component, various projects that could enhance basin water quality management are addressed. Projects include particular wetlands development programs and other possible projects. Each of these projects are also defined in Chapter 6, described in Appendix A, and listed in Table 3-4.

TABLE 3-4
POTENTIAL WATER QUALITY MANAGEMENT FACILITIES

P N	P T
Q-1	New Laboratory
Q-2	Temescal Creek Wetlands
Q-3	Chino Creek Wetlands
Q-4	GAP Modifications
Q-5	River Road Wetlands
Q-6	Mill Creek Wetlands

3.1.5 Operational Improvement Facilities

The last LTFP Component, Operational Improvements facilities, includes potential projects that could increase the efficiency of or enhance District operations. These projects are also defined in Chapter 6, described in Appendix A, and listed in Table 3-5.

TABLE 3-5
POTENTIAL OPERATIONAL IMPROVEMENT PROJECTS

P N	P T
O-1	Basin Rehabilitation Program
O-2	Burris Pit Recontouring
O-3	Lakeview Pipeline
O-4	intake Structure Modification - Olive Pit
O-5	Placentia/Raymond Basins Rehabilitation
O-6	Reactiate Mini-dredge

4 ANALYSIS APPROACH

The overall approach used to analyze LTFP alternatives is presented in this chapter, together with the corresponding approaches for program environmental analysis, financing, and implementation.

4.1 ANALYSIS OF PROPOSED PROJECTS

At the outset of work on the LTFP, several criteria were developed and used to evaluate the 50 projects identified in Chapter 3. These criteria are shown in Table 4-1.

TABLE 4-1
EVALUATION CRITERIA FOR PROPOSED PROJECTS

1. Technical Feasibility
a. Feasibility established b. Probably feasible c. Technical constraints
2. Cost
a. High unit cost b. Moderate to high unit cost c. Low to moderate unit cost d. Salvage value (land) e. Recharge Cost-effectiveness f. Benefit/cost (B/C ratio) g. Payback Period h. Avoided costs (Water Quality/Operational Improvement categories)
3. Institutional Support
a. Producer support (strong, moderate, weak) b. Support from regulatory agencies (strong, moderate, weak) c. Public and stakeholder acceptance (strong, moderate, weak)
4. Functional Feasibility
a. Reliability (high, moderate, low) b. Implementation period: 1-2, 3-5, 6-10 years c. Independence (high, medium, low) d. Water volume (significant , average, limited) e. Flexibility (high, average, constrained) f. Physical compatibility with location within basin (high, medium, low) g. Capability to use various water sources

Numerical evaluations were made by District staff for technical feasibility and cost criteria. Members of the Producers Working Group provided evaluations for the institutional support and functional feasibility categories.

4.1.1 Technical Feasibility

Each of the potential projects were evaluated in terms of technical feasibility, with consideration whether a project's technical feasibility is already established, if it is probably feasible, or if there are current technical constraints which would need to be overcome to attain technical feasibility.

4.1.2 Cost

Evaluating projects to determine their costs and economic feasibility is necessary to prioritize the various alternative projects. A standardized set of economic analysis criteria was developed for this purpose, as shown in Table 4-2.

TABLE 4-2
ECONOMIC ANALYSIS CRITERIA

CRITERIA	FACTOR
1. Construction Cost ($)	Current estimated costs at mid-point of construction period; excludes escalation
2. Capital Cost ($)	Construction cost plus 40% for engineering and construction contingencies
3. Land Cost ($)	$1 million/acre ($2M/acre in Forebay area)
4. Capital Recovery Factor (crf) ($/year)	♦ 4% (based on recent fixed Certificates of Participation [COP] issue) ♦ 20-30 yrs, depending on facility type ♦ 30 yrs for land purchase
5. O&M Cost ($/yr)	♦ Current levels; includes OCWD labor and fringe costs (129% of labor); excludes escalation ♦ Power cost at 10¢ per kilowatt per hour (kWh)
6. Annual Cost ($/yr)	Capital recovery plus O&M
7. Project Yield (afy) (a)	Projected yield /supply at full capacity
8. Project Utilization Factor (PUF) (%)	♦ 90% for known online facilities ♦ 50-90% for projected online facilities
9. Operating Yield (afy) (a)	Project Yield x PUF
10. Project Unit Cost ($/af) (a)	Annual Cost ÷ Operating Yield
11. Benefit ($/af) (a)	♦ Unit value of alternative imported water source ♦ Firm supply (MWD full service treated water rate at $600/af) (2008)
12. Benefit/Cost (B/C) Ratio (a)	Benefit Unit Value ÷ Project Unit Cost
13. Payback Period (years) (a)	Capital Cost ÷ (Operating Yield x Project Unit Cost)
14. Recharge cost-effectiveness (b)	Average percolation (cfs) ÷ Annual Cost ($M/yr)

(a) Not applied to recharge projects
(b) Only applied to recharge projects

Projects were rated according to cost categories as follows:

- High unit cost (> $600/af)
- Moderate - high unit cost ($330-600/af)
- Low - moderate unit cost ($100-300/af)

Because of the difficulty in predicting the yield (afy) of recharge projects under all hydrologic conditions, the cost-effectiveness of recharge projects was evaluated separately using a new factor. This factor uses the average increased percolation (in cubic feet per second (cfs)), divided by annual cost of capital recovery plus operations and maintenance (O&M) [cfs/$M/yr]. The larger this factor is, the more cost effective the recharge method is.

For Water Quality Management and Operational Improvement Facilities categories, a unit cost criterion is not appropriate since the projects do not produce additional water or allow increased groundwater pumping. Rather, these projects result in improvement to water quality or operational effectiveness. The benefit of such projects can be better expressed in terms of costs that would be avoided if the project(s) were implemented. For example, implementation of a future wetlands project could avoid alternative treatment costs to remove a comparable amount of nitrogen from the SAR.

4.1.3 Institutional Support

Acceptance by impacted stakeholders is typically necessary for project success. Projects are evaluated in terms of strong, moderate or weak levels of support from the groundwater producers, regulatory agencies, the public, and other stakeholders. Following discussions of the scope of the potential projects and review of the project descriptions during several meetings held with District staff during June 2004 to August 2005, these evaluations were made by members of the Producers Working Group. Summaries of these meetings can be found in Appendix B.

4.1.4 Functional Feasibility

Functional feasibility of alternative projects covers a broad range of factors such as:

- Reliability (high, moderate, or low expectation that a project will reliably result in expected water or benefits)
- Implementation period: 1-2, 3-5, or 6-10 years to plan, design, construct, and initiate operation of the project
- Independence (high, medium, or low ability to implement the project without simultaneous implementation of other project[s])
- Water volume (significant, average, or limited amount of new water made available)
- Flexibility (high, average, or constrained ability to respond to changing conditions during project life)

- Physical compatibility with and location within basin (high, medium, or low rating based on hydrogeologic criteria)
- Capability to use various water sources (e.g., SAR water, GWR System water)

Following discussions of the scope of the projects, these evaluations were made by members of the Producers Working Group.

Rankings in each of the four categories are presented in Chapter 5.

4.2 Environmental Impact Analysis

A PEIR will be prepared to address the environmental impacts for the potential LTFP projects.

The 50 LTFP potential projects have been grouped into four environmental analysis categories as tabulated in Table 4-3. The four categories are:

- PEIR Analysis – these are projects that are carried forward in the LTFP and will have program-level analysis in the PEIR
- Related Projects – these projects are being considered or implemented by other agencies and are discussed because they are related to the overall water supply within the District. They will have an overview discussion in the PEIR for the purposes of providing the background and setting in the PEIR, and also for discussion, as needed, in the cumulative impacts section of the EIR.
- Excluded Projects – these projects were (1) determined to be not feasible at this time, or (2) previously went through environmental review and approval but project implementation was put on hold, or (3) are being implemented separately. Therefore, these projects are not analyzed in the PEIR.
- Operational Improvements – these projects are relatively minor improvements to existing facilities or enhancements to current District operational activities. Therefore, these projects are not analyzed in the PEIR.

The Lakeview Pipeline and Mill Creek Wetlands Projects are included in the LTFP, but are categorized as excluded projects with respect to environmental analysis in Table 4-3 because CEQA compliance has already been completed for these projects. They are therefore not analyzed in the PEIR, but are included in the LTFP as projects for potential implementation.

Table 4-3
Environmental Analysis Categories

P N	T	E A C			
		PEIR A	R P	E P	O I
Recharge Facilities					
R-1	Optimization of Warner Basin			•	
R-2	Shallow Water Basin Cleaning Vehicles			•	
R-3	Deep Water Basin Cleaning Vehicles	•			
R-4	Multi-Lateral Recharge Well (radial type)	•			
R-5	Santiago Creek Enhanced Recharge	•			
R-6	New Recharge Basins – Viable Priority Sites	•			
R-7	New Recharge Basins – All Sites			•	
R-8	See Project O-1	–	–	–	–
R-9	Storm Runoff Detention - Noble Pit			•	
R-10	Fletcher Basin Vadose Zone Recharge Wells	•			
R-11	Subsurface Recharge	•			
R-12	See Project O-4	–	–	–	–
R-13	Recharge Research			•	
R-14	Desilting Improvement Programs	•			
Water Supply Facilities					
S-1	GWRS System Phase 1 Staff Integration			•	
S-2	GWR System Irrigation/Industrial Service	•			
S-3	GWR System Mid-Basin Injection	•			
S-4	Education Center			•	
S-5	Off Stream Stormwater Storage	•			
S-6	Prado Pool Stormwater Enhancement	•			
S-7	Conjunctive Use			•	
S-8	Imported Water Replenishment Supply	•			
S-9	Ocean Water Desalination Program		•		
S-10	Water Transfers			•	
S-11	Water Conservation		•		
S-12	Stormwater Pump Station			•	
S-13	Injection of Treated Stormwater			•	
S-14	Mid-basin Injection with Imported Water			•	

(a) Program level analysis in the PEIR
(b) Lead by another agency; overview discussion in the PEIR
(c) Projects that are: (1) being implemented separately; (2) previously went through environmental analysis and approval but implementation was put on hold; or (3) projects determined to be not feasible at this time; no analysis in PEIR
(d) Continuation of district operational activities; no analysis in PEIR

TABLE 4-3
ENVIRONMENTAL ANALYSIS CATEGORIES (CONTINUED)

Project		E		A	C
N	T	PEIR A	R P	E P	O I
Basin Management Facilities					
M-1	Shallow Aquifer Development	•			
M-2	Colored Water Development	•			
M-3	Basin Pumping Transfer Program	•			
M-4	Groundwater Emergency Service		•		
M-5	Talbert Injection Barrier Future Expansion	•			
M-6	Alamitos Barrier Improvement	•			
M-7	Bolsa - Sunset Injection Barrier and Supply	•			
M-8	Regional Interconnector		•		
M-9	West Orange County Wellfield			•	
M-10	Dry Weather Runoff Recharge		•		
Water Quality Management Facilities					
Q-1	New Laboratory			•	
Q-2	Temescal Creek Wetlands	•			
Q-3	Chino Creek Wetlands	•			
Q-4	GAP Modifications	•			
Q-5	River Road Wetlands	•			
Q-6	Mill Creek Wetlands			•	
Operational Improvement Facilities					
O-1	Basin Rehabilitation Program				•
O-2	Burris Pit Recontouring	•			
O-3	Lakeview Pipeline			•	
O-4	Intake Structure Modification - Olive Pit				•
O-5	Placentia/Raymond Basins Improvements	•			
O-6	Silt Removal Program				•

(a) Program level analysis in the PEIR
(b) Lead by another agency; overview discussion in the PEIR
(c) Projects that are: (1) being implemented separately; (2) previously went through environmental analysis and approval but implementation was put on hold; or (3) projects determined to be not feasible at this time; no analysis in PEIR
(d) Continuation of district operational activities; no analysis in PEIR

4.3 IMPLEMENTATION PROGRAM

Several other factors have been assessed to evaluate the potential for actual implementation of each potential project, including:

1. Project/program development schedule;
2. Staffing requirements;
3. Program management needs;
4. Physical space needs; and

5. Capital Improvement Program (CIP) budgeting.

Project/program scheduling considers the availability and timing of source water for projects (e.g., SAR baseflow and stormflow for recharge projects, GWR System for certain recharge and supply projects), and the relative cost-effectiveness for various projects within a portfolio. Typically, the more cost-effective projects would be scheduled for earlier implementation than others. Staffing needs for projects/programs will be estimated in terms of required personnel full time equivalents (FTE), or alternately use of program management and/or contract operation approaches. Space needs to implement the projects will also be identified as necessary. These factors are further addressed in Chapters 5 and 7.

5 PROJECT ALTERNATIVES ANALYSIS

Analyses of the potential LTFP projects are described in this chapter, together with development of the preferred program portfolios (Recharge, New Water Supply, Basin Management, Water Quality Management, and Operational Improvement portfolios).

5.1 Description of Projects

Each of the projects has been developed and described according to the following standardized format:

Project Description Format

1. Project Identification	General description, project purpose, key map
2. Project Description	Significant elements of the project, estimated percolation/yield, facilities location/layout
3. Project Operations	How the project would be operated; regulatory requirements
4. Environmental Issues	Brief overview of significant issues
5. Cost Estimates	Updated or new estimate of capital, annual, unit costs, and cost-effectiveness (standardized economic analysis protocol)
6. Implementation Schedule	Estimated duration, operational targets, constraints
7. Advantages and Disadvantages	Bulleted list of project pros and cons (input to alternatives evaluation)

Each of the 50 potential LTFP projects have been defined using the above format, and are shown in a detailed Project Description (PD) in Appendix A. Shown below is a summary of the various projects.

5.1.1 Recharge Facilities

R-1 Optimization of Warner Basin

Because of institutional constraints described in the PD in Appendix A, this project is deemed non-viable and will not be included in the LTFP.

R-2 Shallow Water Basin Cleaning Vehicles

This project is being implemented separately, and therefore is not included in the LTFP.

R-3 Deep Water Basin Cleaning Vehicles

This PD includes the concept, design, capital and O&M costs, and benefits of the potential deep-water Basin Cleaning Vehicles (BCVs). The District has recently installed four shallow-water BCVs in the following recharge basins: Miller Basin (BCV-4), Upper Five Coves Basin (BCV-5), Lower Five Coves Basin (BCV-6), and Desilting Pond No. 3 (BCV-7). The four new BCVs would be a next-generation style. A different type of BCV will be required for deeper basins where water depth can reach 80 feet. In addition, the deep recharge basins have substantial sloped sides, which increase cleaning difficulties.

R-4 Multi-Lateral Recharge Well (Radial-type)

This PD includes the concept, design, construction, operation, and benefits of the implementation of multi-lateral (radial-type) recharge wells. These promising and innovative wells are significantly larger in diameter and have more well screen/aquifer contact area than conventional vertical wells. Due to the completed depth constraint of 150 to 200 feet, the wells would be located in the general Forebay area of the basin. A prioritized well site location has been selected at the District's Ball Road Basin. Another potential site is in the Kraemer Boulevard/Mira Loma Street area of Anaheim. Sites that may be limited in size for a recharge basin could be potential locations for the recharge wells.

R-5 Santiago Creek Enhanced Recharge

The Santiago Creek Enhanced Recharge Project would result in more recharge in Santiago Creek and more water in the groundwater basin.

Since 2000, the District has operated the Santiago Creek Recharge Project. Using controlled releases into the creek, a maximum of 15 cfs (30 acre-feet per day [af/day]) is recharged between the District's Santiago Pits and Hart Park in the City of Orange. Because of the success of that project, the Santiago Creek Enhanced Recharge Project has been proposed and two expansion options are being considered.

One option is to construct a recharge basin near Grijalva Park in northeast Orange. Another option, which could also be implemented, is to construct a conveyance channel through Hart Park in Orange, to deliver water for recharge to Santiago Creek downstream of Hart Park.

R-6 New Recharge Basins – All Sites

As part of the work conducted on the LTFP, a comprehensive survey of numerous potential sites for future recharge basins has been conducted. A field survey of 38 sites was conducted. These sites include the four viable sites discussed in Project R-7, together with all the other identified sites, which were deemed to be non-viable, because they are too small for development, have limited recharge potential, or have specific site constraints.

R-7 New Recharge Basins – Viable Priority Sites

Of the 38 sites outlined in Project R-6, 22 were determined to be non-viable, 12 are considered in other potential projects, and four are viable priority sites described below.

1. North Lakeview Avenue Site (Site M)

This site includes an industrial and construction equipment storage warehouse located on North Lakeview Avenue south of Orangethorpe Avenue in the City of Placentia. This property is surrounded by the Atwood Sales Inc. (a masonry, landscape and irrigation supplies corporation) to the south and the railroad to the north. The property is in a hydrogeologically preferred area, which makes it an ideal site for a recharge basin. The area of this property is approximately seven acres.

2. South Van Buren Agricultural Field (Site N)

This site is a fenced strawberry field located at approximately 800 South Van Buren between Sierra Madre Circle and Sierra Vista Avenue in the City of Placentia. The property is located in an industrial area and surrounded by the East Anaheim Business Center (to the south), the Roofing Wholesale Company, Inc. (to the north) and Sierra Madre and Van Buren Business Parks (to the east). The estimated area of this property is approximately eight acres, and it is located in a hydrogeologically preferred area.

3. East Miraloma Avenue Site (Site P)

This site is a nine-acre parcel south of Kraemer Basin and located in an industrial area in the City of Anaheim. The industrial building property is located near the southeast corner of East Miraloma Avenue and North Kraemer Boulevard. There is a 144,000 square foot (sq ft) industrial building located on the property site. The building was constructed in the 1960's by Kilroy Realty and rehabilitated in 1991. It includes a concrete tilt-up industrial building and has 500 parking spaces. It is used for office and warehouse space. The parcel is located in a preferred recharge zone based on hydrogeologic characteristics.

4. Kimberly-Clark Agricultural Field (Site KK)

This site is a fenced orange field owned by Kimberly-Clark Corporation located on North State College Boulevard between Cypress Way and Kimberly Avenue in the City of Fullerton. This property is located adjacent to an industrial office building (to the south) and the Kimberly-Clark shipping and receiving warehouse area (to the north). The estimated area of the orange field is seven acres.

R-8 See Project O-1

R-9 Storm Runoff Detention — Noble Pit

The R.J. Noble Company has owned an estimated 70 acres of property in the area bounded by the SAR, Lincoln Avenue and Glassell Street. Historically, the property was used for the mining of sand and gravel for a number of years. The

resulting pit may have been in the range of 70 feet deep before mining stopped. For the last 15 years, the pit has been used as a Class 3 landfill, receiving dirt and concrete debris. The company is interested in liquidating the property and has completed the process of changing the property zoning to residential use. Property redevelopment has recently been approved by the City of Orange. The project description outlines potential storm runoff detention that was previously possible before the pit was filled and rezoned for development.

R-10 Fletcher Basin Vadose Zone Recharge Wells

Vadose zone recharge wells are similar to injection wells except they are usually shallower, and recharge water into the vadose or unsaturated zone usually by gravity. Because the depth to water in the basin is typically less than 100 feet, the depth of vadose wells would be shallow and, therefore, relatively inexpensive to construct as compared to a deep injection well. Vadose wells are suited for areas such as Fletcher Basin, where shallow fine-grained sediments restrict or preclude percolation of water by surface spreading.

R-11 Subsurface Recharge

Several techniques have been previously investigated by OCWD to increase groundwater recharge rates. One of the more innovative approaches is the use of subsurface recharge galleries, which could be constructed beneath areas with existing improvements, such as parks or school athletic fields.

The source water would be the GWR System or treated imported water. The gallery would consist of perforated pipe buried in a gravel-filled trench. Clusters of potential sites have been identified in both Anaheim and Orange, and include existing parks, schools, and a golf driving range. A separate distribution system would need to be constructed from the GWR Pipeline to the sites.

R-12 See Project O-4

R-13 Research

Several projects are planned whose focus is to research methodologies for enhancing percolation in the SAR and forebay recharge basins. These studies will be coordinated by the OCWD Field Research Laboratory (FRL).

The objectives of the FRL are to test and develop methods for improving SAR water quality and groundwater recharge and to develop a baseline of water quality data on the various bodies of water in the Forebay region. The approaches taken at the lab include evaluating physical, chemical and biological processes that could be utilized to lessen the nutrient and particulate content of the SAR water prior to groundwater recharge.

R-14 Desilting Improvement Programs

The removal of silt carried by the SAR has been identified as one of the most effective mechanisms for improving the recharge capacity of the Forebay recharge facilities. Two methodologies are proposed under the desilting improvement program. The first component involves velocity control in the main riverbed of the SAR downstream of Imperial Highway by utilizing the Imperial rubber dam to provide sufficient backwater for effective sedimentation, and new inlet baffling to eliminate current basin short-circuiting. The second component involves chemical treatment of SAR water, specifically the use of polymers to augment and expedite the clarification of silt in the existing desilting basins. Silt disposal is covered in Project O-6.

5.1.2 Water Supply Facilities

S-1 GWR System Phase 1 Staff Integration

This project is being implemented separately and will not be included in the LTFP.

S-2 Irrigation / Industrial Service

The GWR System is an indirect potable reuse project that will provide high quality water for groundwater recharge and injection in the basin. Currently, the GWR System is providing water for indirect use only. Direct industrial non-potable reuse can also be considered due to the high quality water available. Some industries could find a benefit of using this water compared to groundwater. Potential customers' needs were evaluated based on water demand and proximity to the GWR Pipeline route. Several implementation constraints are also identified.

S-3 Mid-Basin Injection (MBI)

As the GWR System approaches completion, mid-basin injection (MBI) within the basin will be possible. A preferred wellfield has been identified adjacent to the SAR between Willowick Golf Course and Centennial Park in Santa Ana. Computer simulated models by OCWD have demonstrated that this could significantly help improve groundwater levels in the central portion of the basin.

An initial capacity of 20,000 afy (28 cfs) has been identified, which could be supplied from Phase 1 or Phase 2 of the GWR System. Extensive regulatory compliance and other technical investigations would need to be conducted, and sufficient treated wastewater from OCSD needs to be available prior to implementation.

S-4 Education Center

This project is being developed separately, and will not be included in the LTFP.

S-5 Off-Stream Stormwater Reservoir

The Off-Stream Stormwater Storage project considers constructing a surface water reservoir to store SAR stormflow that would be subsequently recharged into the basin. Previous studies have focused on potential sites in Aliso Canyon, Coal Canyon, and Gypsum Canyon, all downstream of Prado Dam. Since extensive environmental constraints exist in Coal and Gypsum Canyons, further

studies were done in Aliso Canyon. These studies showed a large dam and reservoir could be constructed, but costs would be exorbitant.

A refined investigation of a smaller project in Aliso Canyon was conducted as part of the LTFP, which shows more realistic cost estimates. The operational strategy would be to divert, pump and store fall and winter runoff in the reservoir, and provide spring and summer releases for downstream recharge and environmental enhancement. Extensive negotiations would be required with environmental and park management agencies to allow project implementation.

S-6 Prado Pool Stormwater Enhancement

The Prado Pool Stormwater Enhancement project proposes to increase the amount of water the District can store behind Prado Dam for subsequent recharge. The District can currently store water to elevation 494 feet in the winter and 505 feet in the spring. The proposed project is to raise the winter pool elevation to 505 feet and the post-March pool elevation to 514 feet.

S-7 Conjunctive Use

Conjunctive use refers to combined or joint use of surface water and groundwater supplies. For example, conjunctive use includes recharging excess surface water, when available, and storing the water in a groundwater basin for later extraction and use. Conjunctive use projects are sometimes referred to as groundwater storage projects.

S-8 Imported Water Replenishment Supply

Investigations are underway to identify near-term opportunities to increase in-lieu replenishment water deliveries from Metropolitan. District staff have been working actively along with MWDOC to increase the producers' capacity to receive in-lieu water when it is available. Within the next few years, several imported water supply and water quality improvements will be completed and available to facilitate increased replenishment water deliveries to OCWD.

S-9 Ocean Water Desalination Program

An Ocean Water Desalination Program (OWDP) concept paper was prepared in October 2003 by OCWD staff to provide the OCWD and MWDOC Boards with additional information on potentially developing an ocean water desalter at the AES electrical generation site in Huntington Beach.

OCWD has decided to defer additional detailed planning activities on an OWDP, but coordinate with activities by MWDOC. The potential project is considered a Related Project Action, and therefore an overview discussion will be included in the PEIR. The project could also be considered as an alternative dry period supply.

S-10 Water Transfers

Water transfers are a potential tool to increase the supply of recharge water available to the District. In concept, transfers could supply additional supplies of recharge water through buying water in areas outside the watershed and transferring the water into the SAR watershed through an existing water distribution system. Alternatively, water transfers could be developed in a framework where the water is not physically transferred from the source to the District's recharge facilities, but instead, the District received the additional recharge water through an exchange. Such an exchange could take the form where the District purchases the water, and receives the water through an exchange with another water agency in the SAR watershed.

S-11 Water Conservation

The approach, costs and benefits of one or more strategies to expand the ongoing water conservation program are presented. In the LTFP, water conservation is developed as a new water supply, rather than a water demand reduction technique. This approach facilitates comparison of the cost-effectiveness of water conservation with all the other supplies developed herein, and avoids confusion with different water demand projections, with and without water conservation being included.

The project is considered a Related Project Action (MWDOC as lead agency), and therefore an overview discussion will be included in the PEIR.

S-12 Stormwater Pump Station

This project considers increasing the stormflow capture to about 500 cfs (an increase of 400 cfs over the current capture capability when the Imperial inflatable dam is deflated).

Disadvantages of this project are as follows:

- Provisions would be required to maintain the pump station free of silt and sand accumulation.
- Basin storage must be available for diverted runoff (e.g., Santiago Basin)
- Limited SAR flow depths for effective diversion/intake.

New operating conditions recently provided by County of Orange allows partial inflation of the inflatable dam, which is more cost-effective than a new facility. Because of the above technical constraints, the project is determined to be non-viable and will not be included in the LTFP.

S-13 Injection of Treated Stormwater

Because of technical and cost constraints, this project is deemed non-viable and will not be included in the LTFP.

S-14 Mid-Basin Injection with Imported Water

Providing GWR System water supply for the MBI project has been outlined in the description for Project S-3. Early implementation of Project S-3 is constrained by the following:

- Need to conduct extensive regulatory compliance and other technical investigations
- Limited OCSD treated wastewater flows

Project S-14 considers an optional interim water supply for MBI to offset these constraints.

5.1.3 Basin Management Facilities

M-1 Shallow Aquifer Development

A vast amount of fresh water is stored within the basin, although only a fraction of this amount can practically be removed without causing physical damage such as seawater intrusion or increasing the potential for land subsidence. The shallow aquifer is not extensively used for domestic use because of water quality limitations, but well yields can be high (the shallow aquifer used to be the main production zone). The water quality of the shallow aquifer is generally suitable for irrigation purposes.

Clusters of potential irrigation water users have been identified. A system could be constructed to extract the shallow groundwater and deliver it for irrigation supplies. Benefits would include:

- New supply of water
- Reduces subsurface outflow in West Orange County (WOC)
- Reduces nitrate leakage into the Principal aquifer

M-2 Colored Water Development

Utilization of colored groundwater has been previously discussed in the *Groundwater Management Plan*, including:

- Occurrence of colored water in the basin;
- Implications of colored groundwater production;
- Treatment process options and selection for colored water;
- Potential for additional colored groundwater development;
- Cost estimates for developing a colored water resource; and
- Project development issues.

While analyzing seawater intrusion control programs, it has been determined that if there is a need for new barrier facilities to control seawater intrusion in the Sunset and Bolsa Gaps, then this project could effectively provide the source water needed. This is further described in Project M-7.

Developing a colored water supply for the Sunset/Bolsa Barrier will also be a beneficial component of the WOC outflow control program, and result in increased net incidental recharge rates (reduced subsurface outflow). Alternatively, treated colored water could be used as a direct, potable supply for Huntington Beach, Seal Beach, and Westminster, or potentially as an alternative dry period supply.

M-3 Basin Pumping Transfer Program (BPTP)

The BPTP project consists of shifting groundwater production from the more heavily stressed southeastern portions of the main basin to the northwest/central portions of the basin. Only a geographical shift in pumping would occur, without any net change in the total amount of basin pumping. The major objectives of shifting pumping inland and northwestward in the basin are as follows:

- Raise groundwater levels in the coastal area to reduce seawater intrusion potential
- Raise groundwater levels in the IRWD Dyer Road Well Field (DRWF) and Mesa Consolidated Water District (MCWD) areas to help mitigate pumping depressions and upwelling of colored water into the Principal Aquifer.
- Reduce underflow lost from the basin in WOC

M-4 Groundwater Emergency Service

Development of new central inland area wells could provide water to local distribution systems for pumping and conveyance in the Metropolitan East Orange County Feeder No. 2 (EOCF#2) to serve coastal pumpers under normal operations. The project could also provide the capability to improve system operational flexibility, and to bolster emergency service capacity to central and south Orange County.

This multiple-purpose project could provide both supply protection to central and south Orange County during planned shutdowns and emergency outages, and coastal groundwater basin water level and water quality protection benefits during the summer months.

Because MWDOC would be the lead agency for this project, it will not be included in the LTFP. However, it is considered a Related Project Action, so an overview will be included in the PEIR.

M-5 Talbert Injection Barrier Future Expansion

The potential project described herein considers future expansion beyond what will be supplied by Phase 1 of the GWR System. District monitoring will assess seawater intrusion and if additional expansion is needed after GWR Phase 1, then a portion of this project would be considered. An additional 26 wells may be necessary for complete intrusion control.

M-6 Alamitos Barrier Improvements

The potential project consists of the construction of the following facilities:

- Three injection wells east of the San Gabriel River
- Eight pairs of injection wells between Westminster Boulevard and the Seal Beach Fault
- Eight monitoring wells to assess the performance and effectiveness of the barrier on the southern end
- Replace 7,000 feet of existing pipeline to provide adequate flow to the southern end of the barrier
- Extend the existing barrier pipeline by constructing 4,500 feet of 16-inch diameter pipeline to provide flow to the proposed southern barrier wells south of Westminster Boulevard

M-7 Bolsa-Sunset Injection Barrier and Supply

This potential project includes a preliminary alignment of injection wells to prevent seawater intrusion under the Bolsa Chica Mesa and Sunset Gap area, collectively referred to herein as the Bolsa-Sunset Barrier, if monitoring indicates such a system is needed. The Sunset Gap area includes the Huntington Harbour Marina and the Seal Beach Naval Weapons Station (SBNWS). Additional monitoring is needed to evaluate and determine the scope of potential seawater intrusion.

The primary objective of this project would be to halt and prevent seawater intrusion in the Bolsa-Sunset area, if needed, and thereby protect potable drinking water wells in the coastal communities of Huntington Beach, Seal Beach, Los Alamitos, Garden Grove, and Westminster. A secondary objective of the project is to develop the deep aquifer for injection supply, thereby using a currently under-utilized resource. (See Project M-2)

M-8 Regional Interconnector (Orange County Cross Feeder)

Metropolitan, at the request of MWDOC, has initiated preliminary engineering work on this project. This project would provide improved operational flexibility to supply Orange County with treated water from the Jensen Filtration Plant. This pipeline would be constructed in two phases to connect the Second Lower Feeder (SLF) to the EOCF#2, and later to the Allen McColloch Pipeline (AMP). This project will provide significant Orange County supply benefits during planned and emergency outages of the Diemer Filtration Plant.

Because Metropolitan will be the lead agency for this project, it will not be included in the LTFP. However, it is considered a Related Project Action, so an overview discussion will be included in the PEIR.

M-9 West Orange County Wellfield

Development of a new wellfield in west Orange County near Los Alamitos could provide an additional 11,000 afy of groundwater that could be utilized by coastal producers such as Huntington Beach and Fountain Valley, and conveyed to south Orange County during emergencies. Water produced from the proposed inland wellfield would be conveyed using the West Orange County Water Board Feeders Nos. 1 and 2. Huntington Beach's proposed transmission system improvements would need to be extended so the water could be wheeled to south Orange County through the MWD-OC-44 connection.

M-10 Dry Weather Runoff Recharge

The City of Huntington Beach is considering a project entitled the "Talbert Lake Diversion Project", which would divert dry weather runoff from the East Garden Grove Wintersburg flood control channel and provide wetlands treatment prior to reuse for lake restoration. The project consists of three phases:

Phase 1: Channel diversion, wetlands treatment in Central Park, and Talbert Lake restoration.

Phase II: Extend project to Shipley Nature Center and Huntington Lake

Phase III: Advanced treatment and groundwater recharge by injection

Huntington Beach is pursuing development of Phases I and II and has requested OCWD to evaluate the amount of recharge from the lakes, if any, that could result from Phases I and II. This project considers the potential future implementation of Phase III of the Huntington Beach project.

Because Huntington Beach will be the lead agency for the project, it will not be included in the LTFP. However, it is considered a Related Project Action, and an overview discussion will be included in the PEIR.

5.1.4 Water Quality Management Facilities

Q-1 New Laboratory

This project is being implemented separately, and therefore is not included in the LTFP.

Q-2 Temescal Creek Wetlands

The potential project is a wetlands to treat a portion of Temescal Creek near the City of Corona. The project involves using the old City of Corona wastewater disposal ponds near the Corona Airport. The purpose of the project is to improve the quality of Temescal Creek baseflow, and perhaps a portion of stormflow. The project may also provide environmental habitat. The project is one of the components of achieving the District's goal to provide wetlands treatment for baseflow on all the tributaries to the SAR.

Q-3 Chino Creek Wetlands

The project is to build a wetlands adjacent to Chino Creek to improve the quality of Chino Creek and provide environmental habitat enhancements. The project would treat a portion of Chino Creek flows with wetlands treatment, using a

wetlands design similar to the District's existing Prado Wetlands. Environmental habitat enhancement would be integrated into the project.

Q-4 Green Acres Modifications

Operation and maintenance of the Green Acres Project (GAP) continues to involve a high degree of staff time and O&M expenses to maintain effective production of recycled water. The average hydraulic capacity of the GAP water treatment plant (WTP) is 7.5 million gallons per day (mgd), but flow levels can change up to 11 mgd. Two options available to staff are:

1. Reduce flows (and recycled water use levels) to meet the product water quality objectives; or
2. Maintain flows and produce water at risk of reduced performance and quality levels.

Another option to this performance dilemma is to replace the current multi-media filtration system with a microfiltration (MF) treatment system. The GWR System design has included facilities to convey 4 mgd of MF filtrate from GWR System – Phase 1 facilities to the GAP system to increase its performance. To provide total MF treatment capacity for GAP mean flows, a 7 mgd facility would need to be provided. This capacity could be included in a GWR System Phase 2 program.

Q-5 River Road Wetlands

The project considers building a wetlands adjacent to the SAR upstream of the River Road crossing near Norco to improve the quality of the SAR and provide environmental habitat enhancements. OCWD has received approximately $1.2 million in Proposition 13 grant funding for the project.

The District has established a goal that 100 percent of the dry weather flows of the SAR at Prado Dam be treated by natural wetlands. The District has operated the Prado Wetlands for many years, which treats approximately one-half of the river at its point of diversion just downstream of River Road. Constructing the River Road Wetlands is one of the key remaining projects to achieve the District's goal of treating dry weather SAR flows with wetlands.

Q-6 Mill Creek Wetlands

This project considers reactivating construction of a diversion on Mill Creek to convey a portion of Mill Creek flows into the District's Prado Wetlands and the Splatter "S" Wetlands. Mill Creek flows through the Prado Basin to Chino Creek, a tributary to the SAR, and currently does not receive wetlands treatment. In May 2004, the Board approved award of a construction contract to build the project for $1.6 million. Construction on the project was begun, but halted in October 2004 due to flooding caused by unseasonable heavy rains in October. The construction contract to build the project was terminated in June 2005.

5.1.5 Operational Improvement Facilities

O-1 Basin Rehabilitation Program

All of the District's recharge basins are subject to clogging due the accumulation of sediments contained in the recharge water. This clogging causes the percolation rate of the basins to decline over time. To mitigate the clogging and restore percolation rates, the basins are periodically drained, allowed to dry, and then mechanically cleaned using heavy equipment such as bulldozers, motor graders, and scrapers. Every year, this process removes large quantities of sediment that includes the clogging material and native sand from the basins. As a result, the basins are getting progressively deeper, making it more difficult to drain the basins.

Another important aspect of the mechanical cleaning process is that it is incomplete. The heavy equipment is not able to completely remove the clogging layer throughout the basins during each cleaning cycle. This results in the accumulation of fine-grained clogging material in the upper several feet of sediments in the basins. Fine-grained clogging material can also accumulate through migration and filtration in the upper several feet of basin-bottom sediments. This process results in the gradual decline in overall basin percolation capacities. Even with repeated cleanings, fine-grained sediments will continue to accumulate in the basins and degrade percolation rates.

The basin rehabilitation program is comprised of two components:

1. Cleaning sand removed during typical basin maintenance, and
2. Periodic over-excavation of the basins to clean basin bottom sediments.

There are two ways the District can approach basin rehabilitation. The first approach is to remove, export, and sell the silty sand it removes and then import clean sand to replace the exported sand. This approach would generally be very costly and thus is not considered further. The second approach is to clean the silty sand removed from the basins and then return it. This approach has been used in the past by washing sand with a portable sand wash plant. The trailer-mounted plant was purchased by the District in 1989. This plant capacity is insufficient for the volume of sand generated from the recharge basins during typical cleanings and would not be able to address the volume required to clean over-excavated material from the basins. This project considers utilizing a new sand wash plant which is much more efficient, generating more clean sand using less energy and water than plants available 15 years ago.

O-2 Burris Pit Recontouring

Recontouring the basin would include removing the clayey deposits in the shallow shelf areas while flattening the basin sides to allow regular maintenance and draining. Redistributing excess shelf material and lessening slope steepness will help increase percolation capacity of this basin. Recontouring and reconfiguration of the basin would allow District staff to clean the basin with

existing equipment as well as accommodate a future deep basin cleaning vehicle.

O-3 Lakeview Pipeline

The proposed Lakeview Pipeline project consists of a 66-inch pipeline in Lakeview Avenue from Mills Pond to the Atwood Channel, a 7-foot high inflatable rubber dam and discharge line, a 42-inch bypass metering facility, and a 72-inch transfer line.

The new proposed pipeline and ancillary facilities would provide OCWD with redundancy to help ensure continuous recharge reliability for Anaheim Lake in the event the Anaheim Lake Pipeline became inoperable, and also allow OCWD to have in place an important facility that would afford staff the opportunity to capture additional stormflows.

O-4 Olive Pit Intake Structure Modification

The existing intake structure for Olive Pit is not located at the base of the adjacent SAR Off-River System or the base of the Olive Pit. Modifying the intake structure to Olive Pit so that water drains into the deepest part of the pit would reduce erosion and clogging of the pit as it fills, thus increasing the recharge capacity of the pit. A new intake structure would include flow-measuring capabilities, which would allow the District to measure the recharge capacity of the pit and determine when maintenance is needed.

O-5 Placentia/Raymond Basin Improvements

Placentia and Raymond Basins are two flood-retarding basins owned and operated by the County of Orange Resources and Development Management Department (RDMD), Flood Control Division. The basins are located in the City of Anaheim adjacent to Carbon Creek. In recent years, the District has worked cooperatively with the RDMD to use the basins to recharge both imported water and SAR water. In exchange for their use, the District conducts periodic maintenance of the basins.

To better utilize Placentia and Raymond Basins, several improvements are proposed.

- In channel diversion structures (e.g. rubber dams)
- Intake structure modifications
- Flow-measure and water-level measuring stations
- Control systems

O-6 Silt Disposal Program

To address the silt-loading problem, a silt removal program with the following components is proposed:

1. Evaluate the shape and configuration of the Desilting Basin system to assess whether or not they are optimally designed to remove silt within the typical range of flow rates through the system.
2. Evaluate potential changes or modifications to the system that would enhance silt removal.
3. Evaluate methods to remove and dispose of the silt removed from the Desilting Basins, such as dredging and excavation.

Chemical treatment to enhance silt precipitation is covered in Project R-14.

5.2 Analysis and Ranking of Alternatives

As indicated in the earlier Analysis Approach section, the various potential projects were evaluated and ranked according to the standardized evaluation criteria protocol.

5.2.1 Capacity of Existing Recharge Facilities

In order to determine the potential for additional recharge facilities, the existing forebay system was analyzed. The current recharge facilities have been described in both the *Recharge Study* (December 2003) and the *Groundwater Management Plan* (March 2004). The characteristics of each of the principal recharge basins are shown in Table 5-1.

Table 5-1
Characteristics of OCWD Spreading Facilities [(a)]

Facility	Basin Invert	Max. Water Surface Elev.	Surface Area (Acres)	Max Storage (AF)
Weir Pond 1	258	263	6	28
Weir Pond 2	254	259	9	42
Weir Pond 3	247	259	14	160
Weir Pond 4	250	256	4	22
Foster-Huckleberry	210	246	21	630
Conrock	193	244	25	1,070
Warner	187	239	70	2,620
Little Warner	205	239	11	225
Anaheim Lake	175	224	72	2,260
Miller	204	220	25	294
Kraemer	164	220	31	1,045
Placentia	177	192	9	132
Raymond	158	166	19	162
Five Coves	170	201	29	690
Lincoln	183	190	10	60
River View	176	184	4	32
Burris Pit	90	175	125	2,980
Santiago (N)	190	286	79	5,020
Santiago (S)	150	286	86	8,380
Smith Pit	260	286	22	320
Total			**671**	**26,200**

[(a)] Source: Chris McConaughy, OCWD

In most years, the District's recharge system has limited excess or unused recharge capacity. The near-term capacity of the existing forebay recharge facilities has been documented, and is shown in Table 5-2. As shown, the utilization rate of the facilities (defined as the recent operational percolation rate [cfs] compared to the maximum short-term percolation rates) is about 53 percent. The operational constraints of the existing facilities have been described in the Recharge Study and GWMP. Due to recharge basin clogging, the 53 percent utilization rate is near the maximum utilization rate that can be achieved with the current recharge system. Improved cleaning methods or other improvements would be needed to significantly increase the utilization rate above 53 percent.

These constraints include operational and institutional constraints. They are summarized below.

- Accumulation of inorganic silts and clays
- SAR channel armoring
- Multiple uses of recharge facilities
- Chemical precipitation layers
- Compaction and particle sorting
- Microbial processes in the sediment
- Primary productivity in the water column

The goal of the recharge component of the LTFP is to define system improvements and new projects necessary to optimize the recharge system utilization rate, and to outline projects necessary to attain the capacity targets defined in the Recharge Study (summer capacity of 400 cfs; winter capacity of 700 cfs).

TABLE 5-2
NEAR-TERM CAPACITY OF RECHARGE FACILITIES [f]

	Annual Percolation						Average Percolation (cfs)				Utilization Rate (%) (f)	
Existing Forebay Recharge Facilities	Recent Operations (afy)	Shallow BCV Increase		Other Increases		2010 Potential (afy) (d)	Recent Operations	System Improvement Increase (d)	2010 Potential	Maximum (Short-Term) (e)	Recent Operations	2010 Projected
		(cfs)	(afy)	(cfs)	(afy)							
Anaheim Lake	35,000					35,000	48	0	48	80	60	60
Burris Pit (a)	11,000			12	9,000	20,000	15	12	27	42	40	64
Desilting Basins	500	7	5,000			5,500	1	7	8	10	10	80
Five Coves Basin	500	14	10,000			10,500	1	14	15	20	5	75
Kraemer Basin (b)	33,000			12	9,000	42,000	45	12	57	100	50	60
La Jolla Basin (c)	0			7	5,000	5,000	0	7	7	12	-	60
Miller Basin	10,000	7	5,000			15,000	14	7	21	40	35	55
Mini-Anaheim Lake	9,000					9,000	12	0	12	20	60	60
Off-channel SAR	4,500					4,500	6	0	6	15	40	40
Olive Pit	500					500	1	0	1	5	20	20
Placentia Basin	3,000					3,000	4	0	4	10	40	40
Raymond Basin	3,000					3,000	4	0	4	10	40	40
River In-channel	70,000					70,000	96	0	96	100	96	96
Warner Basins	18,000					18,000	25	0	25	70	40	40
Riverview Basin	3,400					3,400	5	0	5	6	80	80
Santiago Creek	6,600					6,600	9	0	9	35	30	30
Santiago Basins	50,000					50,000	69	0	69	100	70	70
Total:	**258,000**	**28**	**20,000**	**31**	**23,000**	**301,000**	**355**	**59**	**414**	**675**	**53%**	**60%**

(a) Recontour the basin and remove clay lenses
(b) Resulting from use of clean GWRS water (38,000 afy)
(c) Planned basin addition
(d) Current operational capacity plus increase from system improvements (Shallow BCVs and others)
(e) Recharge facilities update - Board presentation - January 5, 2005; expanded to include minor faciltiies
(f) Excludes potential new future projects; rounded

5.2.2 Cost of Alternatives

Estimated costs of the potential projects have been developed, utilizing the economic analysis criteria outlined in Table 4-2. The costs are broken down in each of the project descriptions (Appendix A), and summarized in Table 5-3.

5.2.3 Alternative Project Evaluations

Using the evaluation criteria identified in Table 4-1, the projects were evaluated by a team of District staff and members of the PWG. The relative weight of each evaluation category was determined by the PWG, with results shown in Table 5-4. The overall evaluation scores are tabulated in Table 5-5.

Table 5-3
Projects Economic Analysis Matrix

			Capital Cost ($M)					O&M Cost ($M/yr)				Annual Cost ($M/yr)				Unit Cost ($/af)		
No.	Title	Capacity (a)	Supply or Recharge Facilities	Treatment Facilities	Land		Total	Facilities	Treatment	Other	Total	Capital Recovery	O&M	Water Purchases	Total	Facilities	Treatment/ Water Purchases	Total (c)
	RECHARGE FACILITIES																	
R-3	BCV – Deep Basins (5)	50	$ 11.0	-	-		$ 11.0	$ 1.3	$ -	$ -	$ 1.3	$ 1.4	$ 1.3	$ -	$ 2.7	$ -	$ -	$ -
R-4	Multi-Lateral Recharge Well (Radial-type) (i)	5	$ 4.3	-	-		$ 4.3	$ 0.05	$ -	$ -	$ 0.05	$ 0.3	$ 0.1	$ -	$ 0.4	$ -	$ -	$ -
R-5	Santiago Creek Enhanced Recharge (i)	10	$ 2.6				$ 2.6	$ 0.2	$ -	$ -	$ 0.2	$ 0.2	$ 0.1	$ -	$ 0.3	$ -	$ -	$ -
R-6	New Recharge Basins – Viable Property Sites (4)	25	$ 6.1	-	$ 65.4	(g)	$ 71.5	$ 0.2	$ -	$ -	$ 0.2	$ 4.1	$ 0.2	$ -	$ 4.3	$ -	$ -	$ -
R-7	New Recharge Basins – All Sites	-					$ -									$ -		
R-9	Storm Runoff Detention (Noble Pit)	6	$ 35.0	-	$ 40.0		$ 75.0	$ 0.1	$ -	$ -	$ 0.1	$ 4.0	$ 0.1	$ -	$ 4.1	$ -	$ -	$ -
R-10	Fletcher Basin Vadose Zone Recharge Wells	4	$ 1.3	-			$ 1.3	$ 0.4	$ -	$ -	$ 0.4	$ 0.1	$ 0.4	$ -	$ 0.5	$ -	$ -	$ -
R-11	Subsurface Recharge (7 sites)	25	$ 33.1	-			$ 33.1	$ 10.5	$ -	$ -	$ 10.5	$ 1.9	$ 10.5	$ -	$ 12.4	$ -	$ -	$ -
R-14	Desilting Facility	9	$ 0.5	-			$ 0.5	$ -	$ 1.67	$ 0.05 (p)	$ 1.7	$ 0.01	$ 1.7	$ -	$ 1.71	$ -	$ -	$ -
	SOURCE FACILITIES																	
	GWR System Phase 2																	$ -
S-2	Irrigation/Industrial Service	4,100	$ 11.8	$ 7.2 (j)	$ -		$ 19.0 (j)	$ 0.1	$ 1.20	$ -	$ 1.3	$ 1.1	$ 1.3	$ -	$ 2.4 (j)	$ 585	$ 440 (b)	$ 1,025
S-3	Mid-Basin Injection	20,000	$ 12.4	$ 56.3	$ 0.6		$ 69.3 (j)	$ 0.9	$ 6.60	$ -	$ 7.5	$ 4.0	$ 7.5	$ -	$ 11.5 (j)	$ 575	$ 494 (b)	$ 1,069
S-5	Offstream Stormwater Storage (k)	3,500 (l)	$ 18.3 (m)	$ -			$ 18.3	$ 0.4	$ -	$ -	$ 0.4	$ 1.1	$ 0.4	$ -	$ 1.5	$ 429	$ -	$ 429
S-6	Prado Pool Stormwater Enhancement	3,000	$ 15.0	$ -	$ -		$ 15.0	$ 0.3	$ -	$ -	$ 0.3	$ 0.9	$ 0.3	$ -	$ 1.2	$ 400	$ -	$ 400
S-9	Ocean Water Desalination (o)	50,000	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
S-11	Water Conservation (o)	10,000	-	$ -			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ - (d)	$ -	$ -
S-12	Stormwater Pump Station	3,300	$ 3.5	$ -			$ 3.5	$ 0.1	$ -	$ -	$ 0.1	$ 0.2	$ 0.1	$ -	$ 0.3	$ 91	$ -	$ 91
S-14	Mid-basin injection with Imported Water	3,200	$ 16.5	$ -			$ 16.5	$ 0.8	$ -	$ -	$ 0.8	$ 1.0	$ 0.8	$ 1.8	$ 3.6	$ 546	$ 563	$ 1,109
	BASIN MANAGEMENT																	
M-1	Shallow Aquifer Development	3,400	$ 13.9	$ -	$ -		$ 13.9	$ 0.9	$ -	$ -	$ 0.90	$ 0.75	$ 0.9	$ -	$ 1.7	$ 485	$ -	$ 485
M-2	Colored Water Aquifer Development (f)	18,000	$ -	$ -	$ -		$ -	$ 3.6	$ -	$ -	$ 3.60	$ 5.2	$ 3.6	$ -	$ 8.8	$ 489	$ -	$ 489
M-3	Basin Pumping Transfer Program	7,500	$ -	$ -	$ -		$ -	$ -	$ -	$ 0.5 (e)	$ 0.50	$ -	$ 0.5	$ -	$ 0.5	$ 67	$ 96 (e)	$ 163
M-4	Inland Wellfield (o)	11,000	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	SWIC Enhancement -																	
M-5	Talbert Barrier	26,000	$ 47.3	$ -	$ -		$ 47.3	$ 2.0	$ -	$ -	$ 2.0	$ 2.7	$ 2.0	$ 16.2	$ 20.9	$ 804	$ -	$ 804
M-6	Alamitos Barrier	2,600	$ 13.4	$ -	$ -		$ 13.4	$ 2.4	$ -	$ -	$ 2.44	$ 0.8	$ 2.4	$ 1.6	$ 4.8	$ 1,851	$ -	$ 1,851
M-7	Sunset/Bolsa Barrier	15,000	$ 58.6	$ 35.2	$ 5.8		$ 99.6	$ 1.4	$ 2.18	$ -	$ 3.55	$ 5.2	$ 3.6	$ -	$ 8.8	$ 583	$ -	$ 583
M-8	Regional Pipeline Interconnector (o)	-					$ -				$ -		$ -		$ -	-		$ -
M-9	West Orange County Wellfield	10,000	$ 28.7	$ -	$ 1.5		$ 30.2	$ 1.00	$ -	$ -	$ 1.00	$ 1.8	$ 1.0	$ -	$ 2.8	$ 275	$ -	$ 275
M-10	Dry Weather Runoff Recharge	3,000	$ 5.2 (n)	$ 7.9	$ 0.7		$ 13.8	$ 0.2	$ 1.26	$ -	$ 1.50	$ 0.9	$ 1.5	$ -	$ 2.4	$ 800	$ -	$ 800
	WATER QUALITY MANAGEMENT																	
Q-2	Temescal Creek Wetlands	-	$ 3.0	$ -	$ -		$ 3.0	$ 0.40	-	$ -	$ 0.40	$ 0.2	$ 0.40	$ -	$ 0.60	$ -	$ -	$ -
Q-3	Chino Creek Wetlands	-	$ 8.7	$ -	$ -		$ 8.7	$ 1.1	$ -	$ -	$ 1.10	$ 0.5	$ 1.10	$ -	$ 1.60	$ -	$ -	$ -
Q-4	GAP Modifications	1,500	$ 1.8	$ 5.8	$ -		$ 7.6	$ 0.06	$ (0.4)	$ -	$ (0.34)	$ 2.0	$ (0.4)	$ -	$ 1.60	$ 1,067	$ -	$ 1,067
Q-5	River Road Wetlands	-	$ 9.0	$ -	$ -		$ 9.0	$ 1.10	$ -	$ -	$ 1.10	$ 0.5	$ 1.1	$ -	$ 1.60	$ -	$ -	$ -
Q-6	Mill Creek Wetlands	-	$ 1.8	$ -	$ -		$ 1.8	$ 0.20	$ -	$ -	$ 0.20	$ 0.1	$ 0.2	$ -	$ 0.30	$ -	$ -	$ -
	OPERATIONAL IMPROVEMENTS																	
O-1	Basin Rehabilitation Program	-	$ 0.8	$ -	$ -		$ 0.8	$ 0.22	$ -	$ 0.3 (p)	$ 0.55	$ 0.05	$ 0.55	$ -	$ 0.60	$ -	$ -	$ -
O-2	Burris Pit Recontouring	-	$ 1.6	$ -	$ -		$ 1.6	$ 0.05	$ -	$ -	$ 0.05	$ 0.1	$ 0.05	$ -	$ 0.15	$ -	$ -	$ -
O-3	Lakeview Pipeline	-	$ 5.7	$ -	$ -		$ 5.7	$ 0.18	$ -	$ -	$ 0.18	$ 0.3	$ 0.18	$ -	$ 0.48	$ -	$ -	$ -
O-4	Olive Pit Intake Structure Modification	-	$ 0.1	$ -	$ -		$ 0.1	$ 0.06	$ -	$ -	$ 0.06	$ 0.1	$ 0.06	$ -	$ 0.16	$ -	$ -	$ -
O-5	Placentia/Raymond Basin Improvements	-	$ 1.2	$ -	$ -		$ 1.2	$ 0.05	$ -	$ -	$ 0.05	$ 0.07	$ 0.05	$ -	$ 0.12	$ -	$ -	$ -
O-6	Silt Disposal Program	-	$ 0.1	$ -	$ -		$ 0.1	$ 0.50	$ -	$ -	$ 0.50	$ -	$ 0.50	$ -	$ 0.50	$ -	$ -	$ -

(a) Average percolation rate (cfs) for Recharge projects; average yield (afy) for other projects
(b) GWR System - Phase 2 supply
(c) Excludes Producer pumping costs and projects project RA
(d) To be funded by MWDOC
(e) Net BEA costs
(f) Project economics included in Project M-7 (Sunset/Bolsa Barrier)
(g) $2M/acre in the forebay area
(h) Mitigation costs to be determined
(i) Phase 1 and 2
(j) Includes credit for potential USBR grant
(k) Aliso Canyon Site
(l) 4,000 af reservoir storage
(m) Excludes land
(n) Portion of project M-5 facilities
(o) Agency lead by others
(p) Silt disposal

TABLE 5-4
OVERALL EVALUATION CRITERIA WEIGHTING FACTORS

Project/Program Evaluation Criteria		Overall Weighting Factors (%) (a)
I.	Technical Feasibility	21%
II.	Unit Cost	34%
III.	Institutional Support	24%
IV.	Functional Feasibility	21%
	Total	100%

(a) Based on PWG evaluations

TABLE 5-5
PROJECT EVALUATION SCORES (a)

Project		Team Scores										Overall Scores (c)
No.	Title	Buena Park	Huntington Beach	MCWD	Fountain Valley	Westminster	Anaheim	So CA Water Co.	IRWD	Garden Grove	Santa Ana	
	RADIAL RECHARGE FACILITIES											
R-2	BCV – Shallow Basins	9	9	8	8	9	8	6	9	9	9	8
R-3	BCV – Deep Basins	8	7	7	6	7	5	4	8	7	5	6
R-4	Ranney Recharge (Ball Basin)	6	5	6	6	7	6	4	6	6	5	6
R-5	Santiago Creek Recharge	8	7	8	9	8	8	8	8	8	9	8
R-6	New Recharge Basins (4)	8	8	8	8	8	8	5	8	9	8	8
R-7	New Recharge Basins – Non-Viable	4	6	4	4	3	5	2	5	5	3	4
R-8	Recharge - Sandwash Plant (d)	10	10	10	10	10	9	8	10	10	8	9
R-9	Storm Runoff Detention (Noble Pit)	4	4	4	4	4	6	5	4	5	4	4
R-10	Vadose Recharge (Fletcher Basin)	7	7	7	7	7	6	5	7	7	5	6
R-11	Subsurface Recharge	5	4	6	5	6	5	7	5	6	5	5
R-12	Recharge Trenches (e)	7	6	6	6	5	7	7	6	6	7	6
R-14	Desilting Facility	8	9	8	8	8	8	8	8	9	9	8
	SUPPLY FACILITIES											
	GWR System Phase 2											
S-2	Industrial/Irrigation	4	4	4	3	4	4	4	4	3	4	4
S-3	Mid-basin Injection	7	9	7	7	7	7	5	8	9	7	7
S-5	SAR Offstream Storage	3	5	4	4	4	4	3	4	4	3	4
S-6	Prado Pool Enhancement	6	5	7	6	6	7	6	6	6	7	6
S-7	Conjunctive Use	6	6	6	5	7	6	8	7	6	7	6
S-9	Ocean Water Desalination	4	4	4	4	5	6	4	3	4	5	4
S-10	Water Transfers	5	5	6	4	6	6	4	5	5	7	5
S-11	Water Conservation	7	8	7	6	8	7	8	7	8	7	7
S-12	Storm Runoff Diversion Pump Station	9	9	8	7	8	8	6	8	9	6	8
S-14	Mid-basin injection with imported water	4	6	5	5	5	5	6	6	6	5	5
	BASIN MANAGEMENT											
M-1	Shallow Aquifer Development	5	6	5	4	5	6	2	6	7	5	5
M-2	Colored Water Aquifer Development	6	7	6	5	6	7	4	6	7	4	6
M-3	Basin Pumping Transfer Program	9	6	8	8	9	8	8	7	7	7	8
M-4	Emergency Wellfield	6	5	7	6	7	N/A	5	8	8	5	6
	SWIC Enhancement -											
M-5	Talbert Barrier	6	5	6	6	7	6	8	7	5	7	6
M-6	Alamitos Barrier	5	4	5	5	6	6	8	5	4	7	6
M-7	Sunset/Bolsa Barrier	6	6	5	5	6	6	5	6	5	5	5
M-8	Regional Pipeline Interconnector	7	5	7	5	7	6	8	7	5	8	7
	WATER QUALITY MANAGEMENT											
Q-2	Temescal Creek Wetlands	6	6	7	6	7	7	5	6	6	4	6
Q-3	Chino Creek Wetlands	6	6	7	6	7	7	5	6	6	4	6
Q-4	GAP Modifications	5	5	6	5	6	6	4	5	5	3	5

(a) 10 Highest; 1 Lowest
(b) Technical feasibility and cost scores by District staff; institutional support and functional feasibility scores by Producers
(c) Average of team scores
(d) New Project O-1
(e) New Project O-4

5.2.4 Alternative Projects Screening

Evaluation and screening of the alternative potential projects has shown that certain projects do not warrant further consideration in the LTFP. These projects are categorized as follows:

- Related Project Actions
  - Lead agency will be an agency other than OCWD
  - Will not be included in the LTFP Capital Improvement Program (CIP)
  - Overview discussion will be included in the PEIR (Cumulative Impacts Analysis)
- Excluded Project Alternatives
  - These are projects that:
    - Previously went through environmental analysis and approval but project implementation was put on hold, or
    - Are being separately implemented by OCWD, or
    - Have been determined to be infeasible due to overriding constraints, as documented in the Project Descriptions
  - No analysis in the PEIR (CEQA compliance completed or to be done by others)

The Operational Improvement Projects are projects that continue OCWD operational activities and will be included in the LTFP CIP, but will not be analyzed in the PEIR because they are considered exempt from CEQA.

The related project actions are listed in Table 5-6.

TABLE 5-6
RELATED PROJECT ACTIONS

PROJECT		Category	ASSUMED LEAD AGENCY
NO.	TITLE		
S-9	Ocean Water Desalination	Supply Facilities	MWDOC
S-11	Water Conservation	Basin Management	MWDOC
M-4	Emergency Wellfield	Basin Management	MWDOC
M-8	Regional Pipeline Interconnector	Basin Management	Metropolitan
M-10	Dry Weather Runoff Recharge	Basin Management	Huntington Beach

Although Project S-11 (Water Conservation) is assumed to be implemented by MWDOC, it will also be included in the LTFP Basin Management portfolio to document increased conservation.

The excluded Projects are listed in Table 5-7.

TABLE 5-7
EXCLUDED PROJECTS

Project No.	Project Title	Category	Rationale
R-1	Optimization of Warner Basin	Recharge	Institutional Constraints
R-2	Shallow Water Basin Cleaning Vehicles	Recharge	Separate Implementation
S-10	Water Transfers	Basin Management	Cost & Institutional Constraints
R-7	New Recharge Basins – All Sites	Recharge	Site Constraints
R-9	Storm Runoff Detention - Noble Pit	Recharge	Cost & Land Constraints
R-13	Recharge Research	Recharge	Separate Implementation
S-1	GWR System Phase 1 Staff Integration	Source Facilities	Separate Implementation
S-4	Education Center	Basin Management	Separate Implementation
S-7	Conjunctive Use	Basin Management	Cost & Institutional Constraints
S-12	Stormwater Pump Station	Source/Recharge	Technical Constraints
S-13	Injection of Treated Stormwater	Source Facilities	Technical and Cost Constraints
S-14	Mid-basin Injection with Imported Water	Source Facilities	Cost Constraints
M-9	West Orange County Wellfield	Basin Management	Water Quality Constraints
Q-4	GAP Modifications	Water Quality Management	Cost Constraints

The LTFP project screening process started with a long list of 50 potential projects, all of which were evaluated. Some projects were not carried forward for various reasons, and other projects are planned to be implemented by others. The remaining projects that are further considered for inclusion in a LTFP program portfolio are delineated in Table 5-8.

TABLE 5-8
POTENTIAL LTFP PROJECTS REMAINING AFTER SCREENING

P N	T
Recharge Facilities	
R-3	Deep Water Basin Cleaning Vehicles
R-4	Multi-Lateral Recharge Well (Radial type)
R-5	Santiago Creek Enhanced Recharge
R-6	New Recharge Basins – Viable Priority Sites
R-10	Fletcher Basin Vadose Zone Recharge Wells
R-11	Subsurface Recharge
R-14	Desilting Improvement Program
Water Source Facilities	
S-2	GWR System Irrigation/Industrial Service
S-3	GWR System Mid-Basin Injection
S-5	Off-Stream Stormwater Reservoir
S-6	Prado Pool Stormwater Enhancement
S-8	Imported Water Replenishment Supply
Basin Management Facilities	
M-1	Shallow Aquifer Development
M-2	Colored Water Development
M-3	Basin Pumping Transfer Program
M-5	Talbert Injection Barrier Future Expansion
M-6	Alamitos Barrier Improvement
M-7	Bolsa - Sunset Injection Barrier and Supply
Water Quality Management Facilities	
Q-2	Temescal Creek Wetlands
Q-3	Chino Creek Wetlands
Q-4	GAP Modifications
Q-5	River Road Wetlands
Q-6	Mill Creek Wetlands
Operational Improvement Facilities	
O-1	Basin Rehabilitation Program
O-2	Burris Pit Recontouring
O-3	Lakeview Pipeline
O-4	Intake Structure Modification - Olive Pit
O-5	Placentia/Raymond Basins Improvements
O-6	Silt Disposal Program

6 PREFERRED PROJECT PORTFOLIOS

This chapter outlines how the preferred projects have been ranked and grouped into the following five facilities' portfolios.

(1) Recharge
(2) New Water Supply
(3) Basin Management
(4) Water Quality Management
(5) Operational Improvement

6.1 RECHARGE FACILITIES PORTFOLIO

Following is a discussion of the availability of SAR water for recharge, the rankings of the preferred recharge projects, and the composition of the Recharge Portfolio

6.1.1 Availability of SAR Water

The following preferred projects could utilize either SAR baseflow or SAR stormflow for recharge:

R-3 Five BCV - Deep Basins
R-5 Santiago Creek Recharge
R-6 Four New Recharge Basins
R-10 Vadose Zone Recharge – Fletcher Basin
R-14 Desilting Facility

The three other preferred recharge projects (R-4, Radial Recharge – Ball Basin; R-11, Subsurface Recharge [seven sites], and S-3, Mid-Basin Injection) all have water quality requirements that dictate the use of GWR System water, to avoid plugging of the recharge facility in these projects. The availability of GWR System water will be discussed in the next section.

Long-term projections of the future amount of treated wastewater discharged to the SAR above Prado Dam have been recently made by SAWPA. There are several variables involved, including: (1) amount of future treated wastewater generated by the numerous Publicly Owned Treatment Works (POTW) that discharge to the SAR; (2) projected amount of treated wastewater to be utilized by the upstream dischargers as recycled water; (3) projected levels of remaining POTW discharges and other discharges to SAR; and (4) other factors related to projected SAR flows, such as the amount of water savings from Arundo removal.

As described in SAWPA's 2004 report, SAWPA compiled extensive data from wastewater treatment agencies above Prado Dam regarding their planned wastewater production amounts, recycling projects, and discharge rates to the river. OCWD staff reviewed these data, and made selected modifications to estimate a low, mid-range, and high projection of the amount of SAR baseflow that will reach Prado Dam. The mid-range projection is based on SAWPA's estimate of treated wastewater discharged to the river. Additional features of the mid-range projection include:

- No water savings from Arundo removal are assumed
- All planned recycling projects in the area above Prado Dam are implemented

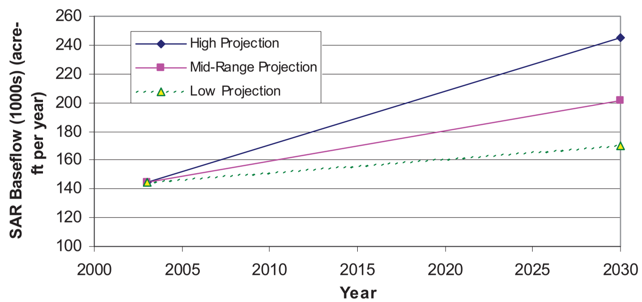
The low projection has the same features as the mid-projection, except that the low projection includes additional upstream recycling that was not accounted for in the SAWPA estimate. In particular, it includes 26,000 afy of recycling from the RIX facility that was not included in SAWPA estimate.

The high projection is similar to the mid-range projection, except that:

- It includes 25,000 afy of water savings from Arundo removal
- It accounts for wastewater discharge by the Eastern Municipal Water District and Elsinore Valley Municipal Water District (total of 5,000 afy of additional discharge)
- Wastewater discharge from the City of Corona was increased by 5,000 afy. The SAWPA estimate had Corona at essentially zero discharge, which is unlikely to occur.

These projections are shown on Figure 6-1.

FIGURE 6-1
AVAILABILITY OF SAR BASEFLOW



The LTFP Recharge portfolio was formulated to be implemented if the high SAR baseflow projection is realized. If the mid-range or low projection occurs, then only a portion of the LTFP portfolio projects would be considered for implementation. Additional recharge projects would not be built until it was determined that sufficient SAR flows were available to supply the new recharge

facilities. Staff proposes to annually review the availability of SAR flows, changes in the last year, and tabulate new proposed recycling projects in the upper SAR watershed. This review will provide information for the District to determine when new recharge facilities should be built. If insufficient baseflow exists in the future to provide water for recharge, then SAR stormflow could be utilized for recharge, provided that sufficient storage capacity exists to store the stormwater for later recharge.

6.1.2 Availability of SAR Stormflow for Recharge

Even in relatively dry years, the District's recharge system is not able to divert and recharge all the flows in the SAR and some water flows past the District's system to the Pacific Ocean. The District refers to water that flows past the recharge system as "lost" water.

The amount of water lost to the ocean was estimated in the Army Corps of Engineers' (ACOE's) Prado Water Conservation Feasibility Study (ACOE, 2004). In that study, the ACOE evaluated runoff and rainfall records since 1920. To determine a representative period of record, the study evaluated the cumulative departures from the mean for rainfall and runoff. Based on the smallest cumulative departure from the mean and other characteristics, it was determined that the period from 1950-1988 was a representative period. This time period includes an entire wet and dry cycle.

Using precipitation from the 1950-1988 period and adjusting to 2003 landuse, ACOE used a HEC-5 computer model to evaluate river flow rates into Prado Basin, storage at Prado Basin, the amount of recharge at OCWD's facilities, and water lost to the ocean. The model assumes that OCWD can always divert and recharge 500 cfs of SAR flow. For 2003 landuse conditions, with the precipitation that occurred in the 1950-1988 period, the average water lost to the ocean was 48,000 afy and the water recharged in the OCWD system was 238,000 afy.

With increased urbanization and a greater percentage of impervious surfaces, future runoff is estimated to be greater for the same amount of precipitation. When the ACOE model used 2053 estimated landuse with the 1950-1988 precipitation pattern, estimated water lost to the ocean was 68,000 afy.

These results from the ACOE's study indicate there is a significant amount of lost SAR flow that could be recharged by the District if the recharge system's capacity was increased. This section presents the results of an analysis of the amount of additional recharge estimated to occur if the District's recharge capacity was increased by 100 cfs (200 af per day).

The analysis used actual historical daily inflow rate data to Prado Basin and was completed for four separate years representing a range of dry to wet years. The four years included one dry year (Water Year (WY) 1998-99), one wet year (WY 1997-98), and two intermediate years (WY 1996-97 and WY 2002-03). Daily inflow data to Prado Basin were collected from the ACOE for each year. Using the daily inflow data, the additional recharge that would occur if the District's recharge capacity was increased by 100 cfs was calculated. This computation was performed by calculating recharge and water lost to the ocean, using daily Prado inflow, with a total recharge system capacity of 800 af per day, and then separately performing the same calculation assuming the recharge capacity was 1,000 af per day.

Figure 6-2 illustrates the computations for one of the four years. In Figure 6-2a, the water in storage at Prado Dam for WY 2002-03 with a recharge capacity of 800 af per day and 1,000 af per day (400 cfs, and 500 cfs respectively) is shown. With the higher recharge capacity, the amount of water in storage at Prado is reduced more quickly compared to the lower recharge capacity. This represents a faster draining of the water conservation pool due to the higher recharge rate. Increased recharge that occurs is reflected in the decrease in the water lost to the ocean in Figure 6-2b. Increased recharge does not occur each day of the year, but only when sufficient water is available. Increased recharge occurs when the release rate from Prado Dam can be increased from 400 cfs to 500 cfs without losing the water to the ocean. A significant benefit of the greater recharge capacity is that it allows for more rapid draining of the Prado storage pool, so that storage capacity is available to store water from future rainfall events.

The results of the computations are shown in Table 6-1. In an extremely dry year such as WY 1998-99, the increased recharge capacity results in no additional recharge. WY 1998-99 was one of the driest years on record. Table 6-1 also contains an estimate of the value of the additional recharge, assuming the additional recharge is valued at $250 per af.

The amount of inflow to Prado Basin estimated by ACOE was ranked from low to high and percentiles were calculated for the 1950-1988 period adjusted to 2003 landuse. These percentiles, expressed as a probability of exceedance, are shown in Figure 6-3a. The increased recharge calculated for the four years is plotted in Figure 6-3b using the probablility of exceedance from Figure 6-3a. As indicated in Figure 6-3b, there is a 50 percent probability of exceedance of recharging approximately 7,000 afy additional water if the recharge capacity is increased by 100 cfs. This suggests that, in general, approximately one-half of the years will have enough SAR flow to recharge an additional 7,000 af if the recharge capacity is increased by 100 cfs. There is a 30 percent probability of exceedance of recharging approximately 13,000 afy. In very wet years, there is enough stormflow to recharge an additional 30,000 afy.

TABLE 6-1
INCREASED RECHARGE FROM 200 AF/DAY (100 CFS) RECHARGE CAPACITY INCREASE

Condition	Year & Recharge Capacity	Total Flow (af)	Estimated Recharge (af)	Lost to Ocean (af)
Dry (100th percentile)	WY1998-99 Inflow, 800 af/d recharge capacity	186,754	186,754	0
	WY1998-99 Inflow, 1,000 af/d recharge capacity	186,754	186,754	0
85th percentile	WY1996-97 Inflow, 800 af/d recharge capacity	206,813	188,594	18,219
	WY1996-97 Inflow, 1,000 af/d recharge capacity	206,813	194,322	12,492
	Difference		5,728	**-5,728**
	Value of water at $250/af		$1,432,000	
35th percentile	WY2002-03 Inflow, 800 af/d recharge capacity	256,157	229,424	26,733
	WY2002-03 Inflow, 1,000 af/d recharge capacity	256,157	236,949	19,209
	Difference		7,525	**-7,525**
	Value of water at $250/af		$1,881,000	
Wet (10th percentile)	WY1997-98 Inflow, 800 af/d recharge capacity	432,506	261,343	171,270
	WY1997-98 Inflow, 1,000 af/d recharge capacity	432,506	292,705	139,908
	Difference		31,362	**-31,362**
	Value of water at $250/af		$7,840,000	

FIGURE 6-2A
CHANGE IN PRADO STORAGE WITH INCREASED RECHARGE CAPACITY

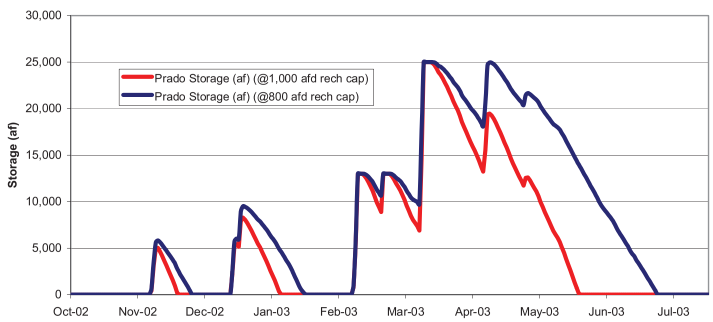
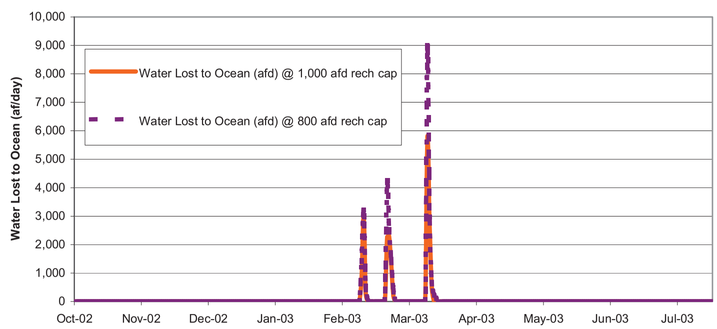


FIGURE 6-2B
CHANGE IN WATER LOST TO OCEAN WITH INCREASED RECHARGE CAPACITY



Note: Prado Inflow data from WY 10/1/2002 to 9/30/2003

FIGURE 6-3A
PRADO INFLOW CHARACTERIZATION

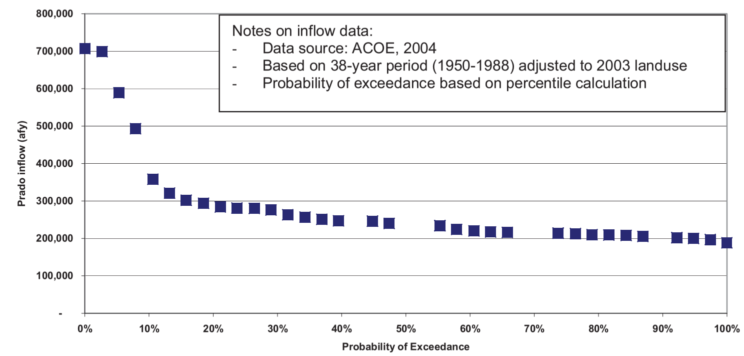
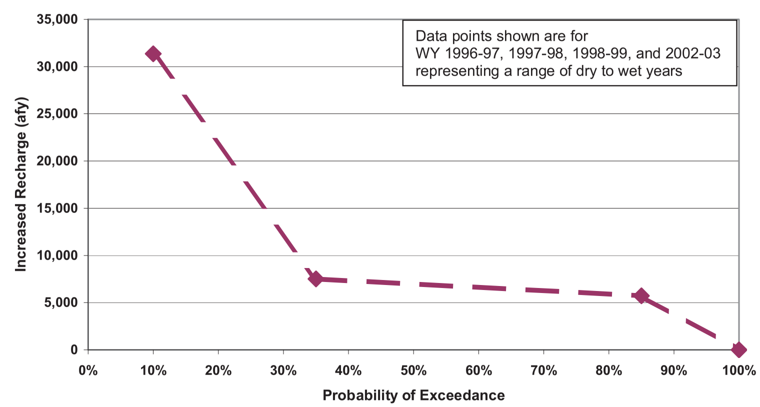


FIGURE 6-3B
INCREASED RECHARGE FROM 100 CFS GREATER RECHARGE CAPACITY



6.1.3 Recharge Projects Rankings

In order to determine overall recharge project effectiveness and rankings, all preferred projects have been evaluated together, not withstanding the fact that various source waters would be utilized. Recharge cost-effectiveness is determined by relating a project's estimated average percolation rate in cubic feet per second (cfs) to the total annual cost (capital recovery plus O&M [$M/yr]). The recharge facilities cost analysis is shown in Table 6-2. Potential projects are ranked according to recharge cost-effectiveness (cfs/$M/yr), with number one being the highest. In the analysis, it is assumed that GWR System Phase 1 costs are sunk (capital recovery expenses are separately covered in the existing GWR System budget) for those recharge projects that could receive this water supply.

TABLE 6-2
RECHARGE FACILITIES COST ANALYSIS

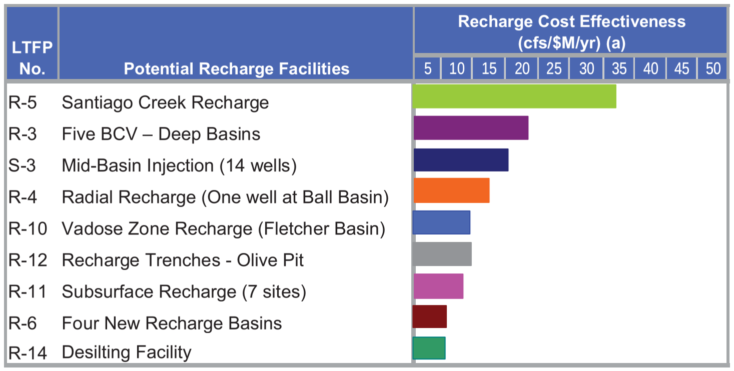
No.	Title	Assumed Average Percolation (cfs)	Annual Cost ($M/yr) Facilities	Treatment	Total	Unit Annual Cost ($M/yr/cfs) (a)	Recharge Cost - Effectiveness (cfs/$M/yr) (b)	Cost Ranking (h)
	RECHARGE FACILITIES (c)							
R-5	Santiago Creek Recharge	10	$ 0.3	$ -	$ 0.3	$ 0.03	33.3	1
R-3	Five BCV – Deep Basins	50	$ 2.6	$ -	$ 2.6	$ 0.05	19.2	2
S-3	Mid-Basin Injection (14 wells)	28	$ 1.8	$ - (f)(j)	$ 1.8	$ 0.06	15.6	3
R-4	Radial Recharge (1 well at Ball Basin)	5	$ 0.4	$ - (f)	$ 0.4	$ 0.08	12.5	4
R-10	Vadose Zone Recharge (Fletcher Basin)	4	$ 0.4	$ -	$ 0.4	$ 0.10	10.0	5
R-11	Subsurface Recharge (7 sites)	25	$ 3.0	$ - (f)	$ 3.0	$ 0.12	8.3	6
R-6	Four New Recharge Basins	25	$ 4.3	$ -	$ 4.3	$ 0.17	5.8	7
R-14	Desilting Facility	9	$ 0.1	$ 1.6 (g)	$ 1.7	$ 0.19	5.3	8
	Total - All Sites (d)	**156**	**$ 12.9**	**$ 1.6**	**$ 14.5**	**$ 0.09 (i)**	**10.8 (i)**	

(a) Total annual cost ($M/yr) divided by average percolation
(b) Average percolation (cfs) divided by total annual cost
(c) Ranked by recharge cost-effectiveness
(d) Excludes: Redundant Project R-9 (Storm Runoff Detention - Noble Pit); and Operational Improvement Projects: O-1 Basin Rehabilitation Program and O-4 Lakeview Pipeline

(f) Assume GWRS Phase 1 costs are sunk
(g) Chemicals and silt disposal
(h) 1 Highest; does not reflect overall ranking
(i) Average
(j) GWR System Phase 2 costs would be $6.6M

The recharge project cost-effectiveness rankings are also shown in Figure 6-4. These projects were further evaluated, considering all the factors outlined in Chapter 4. The results are shown in Table 6-3, with total score (10 highest). The final project rankings are shown in Table 6-4, together with the assumed water sources.

FIGURE 6-4
RECHARGE FACILITIES COST-EFFECTIVENESS



(a) Average percolation (cfs) divided by total annual cost ($M/yr)

TABLE 6-3
PROJECT EVALUATION SCORES [a]

No.	Title	SCORE (a)				Overall Weighted Score (a)
		Technical Feasibility	Cost-effectiveness (cfs/$M/yr)	Institutional Support	Functional Feasibility	
		21% (b)	34% (b)	24% (b)	21% (b)	
RECHARGE FACILITIES						
R-3	Five BCV – Deep Basins	5	8	6	5	6
R-4	Radial Recharge (One well at Ball Basin)	8	7	6	5	7
R-5	Santiago Creek Recharge	9	9	7	9	9
R-6	Four New Recharge Basins	9	5 (c)	8	8	7
R-10	Vadose Zone Recharge (Fletcher Basin)	7	6	7	7	7
R-11	Subsurface Recharge (7 sites)	7	5	5	6	6
R-12	Recharge Trenches - Olive Pit	4	6	6	6	5
R-14	Desilting Facility	8	5	8	8	7
S-3	Mid-basin Injection (14 wells)	8	7	8	8	8

(a) 10 Highest
(b) Weighting Factor
(c) Adjusted to reflect higher current land costs in the forebay area

TABLE 6-4
FINAL RANKINGS OF RECHARGE PROJECTS

No.	Recharge Facility	Average Percolation (cfs)	Ranking (a)(b)(c)	Water Source	
				SAR (d)	GWR System (e)
R-5	Santiago Creek Recharge	10	1	•	
S-3	Mid-basin Injection (14 wells)	28	2		•
R-4	Radial Recharge (One well at Ball Basin)	5	3		•
R-6	Four New Recharge Basins	25	4	•	
R-14	Desilting Facility	9	5	•	
R-10	Vadose Zone Recharge (Fletcher Basin)	4	6	•	
R-3	Five BCV – Deep Basins	50	7	•	
R-11	Subsurface Recharge (7 sites)	25	8		•
	Total	156			

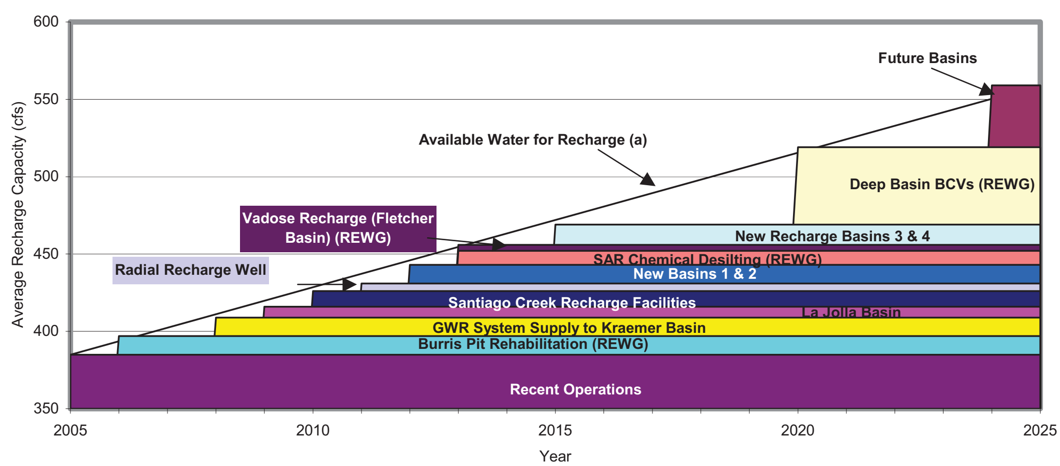
(a) 1 Highest
(b) Reflects refined cost-effectiveness analysis
(c) Includes consideration of technical feasibility, cost effectiveness, institutional support, and functional feasibility
(d) See Recharge Portfolio - Figure 6-5
(e) See GWR System Water Portfolio - Figure 6-8

6.1.4 Preferred Recharge Portfolio

The preferred recharge project mix (portfolio) is shown graphically on Figure 6-5, which depicts average percolation rates from: (1) recent operations (refer to Table 5-2); (2) planned near-term system improvements (Burris Pit Rehabilitation, GWR System Phase 1 supply to Kraemer, and La Jolla Basin); (3) the preferred recharge projects mix (refer to Table 6-4); and (4) potential future forebay recharge basins (assumed at 50 acres) that may become viable at the end of the LTFP planning horizon of 20 years. Mid-Basin Injection, Radial Re- Ball Basin, and Subsurface Recharge are included in the New Water Supply Portfolio (Figure 6-8), since they would be supplied by GWR System water.

The portfolio shows a general progression of implementing the various projects, subject to needs, budget, and available water supply.

FIGURE 6-5
RECHARGE FACILITIES PORTFOLIO



(a) Includes SAR baseflow and stormflow; assumes high SAR baseflow projection; some projects at end of planning period would have to be deferred if low SAR baseflow projections are experienced.

In most years, the District's recharge system has limited excess or unused recharge capacity. Implementation of the preferred recharge portfolio over the next 20 years will result in a progressively increasing recharge system utilization rate, increasing from the current utilization rate (53 percent) to an expected rate of 72 percent by the year 2015. The projected capacity of the recharge facilities is summarized in Table 6-5 as follows:

- Added improvements (competed by 2007)
- Near-term improvements (completed by 2010)
- Supplemental long-term improvements (completed by 2015)

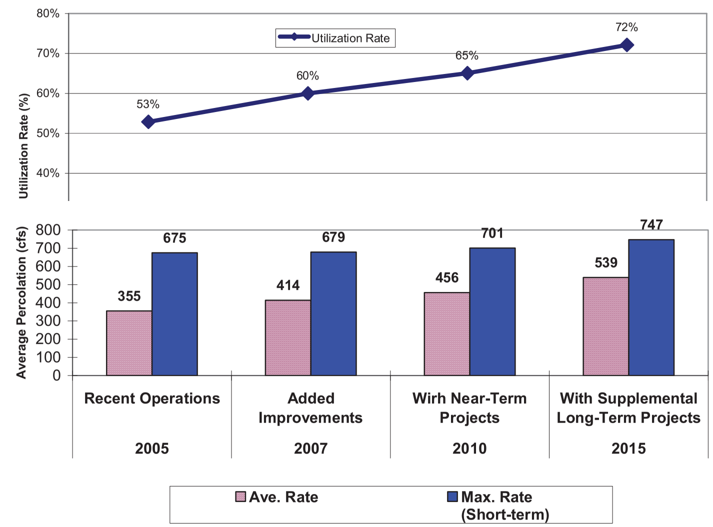
TABLE 6-5
PROJECTED CAPACITY OF RECHARGE FACILITIES

Scenario	Average Percolation (cfs)	Implementation Schedule 2007	2010	2015	Total Average Percolation (cfs) (c)	Max. Short-Term Percolation (cfs) (c)	Utilization Rate (%) (b)
Recent Operations (a)	**355**				**355**	**675**	**53%**
Added Improvements and Projects							
BCVs in existing shallow basins	28	●	●	●			
Burris Pit Rehabilitation	12	●	●	●			
GWR System supply to Kraemer Basin	12	●	●	●			
New La Jolla Basin	7	●	●	●			
Subtotal					**414**	**679**	**60%**
Supplemental Near-Term System Improvements							
Santiago Creek recharge enhancement - Phases 1 & 2	20		●	●			
New Recharge Basins 1 & 2	12		●	●			
Radial Recharge (Ball Basin) (1 well)	5		●	●			
SAR Chemical Desilting Program	9		●	●			
Potential recharge basins	10		●	●			
Subtotal					**456**	**701**	**65%**
Supplemental Long-Term Projects							
Vadose Zone Recharge (Fletcher Basin)	4			●			
Radial Recharge (Ball Basin, Coronado) (2 additional wells)	10			●			
BCVs in existing deep basins (5 units)	50			●			
Subsurface recharge (Orange, Anaheim)	25			●			
New recharge basins 3 & 4	13			●			
Potential recharge basins	20			●			
Total					**539**	**747**	**72%**

(a) See Table 5-2 for breakdown
(b) Average percolation divided by maximum percolation (rounded)
(c) New projects assumed to operate at 55% utilization rate

The effectiveness of the preferred recharge portfolio is depicted on Figure 6-6. As shown, the target of a 400 cfs summer recharge capacity (Recharge Study recommendation) could be met by 2007, and the recommendation of a winter capacity of 700 could be met by 2010, assuming the LTFP recharge projects portfolio is implemented.

FIGURE 6-6
RECHARGE PORTFOLIO EFFECTIVENESS



6.1.5 In-lieu Program Effect on Recharge Capacity

The District has been working very closely with MWDOC and the producers to increase the amount of capacity the producers have in receiving Metropolitan in-lieu water when it is available. This requires the producers to operate their systems in a manner that minimizes the amount of groundwater they serve to their customers.

When Metropolitan in-lieu water is available, much larger quantities can now be received than were previously received. Due to these efforts it is estimated that the District could take approximately 150,000 af annually if in-lieu water was constantly available every month. In July 2005 the producers were receiving between 200 to 230 cfs of in-lieu water which is the highest rate ever achieved. Efforts should continue to be poised to take advantage of in-lieu and other short-term water sales by Metropolitan.

This effort also directly benefits the District's spreading operations in Anaheim. Less amounts of Metropolitan replenishment water will now have to be purchased and directly recharged. The District purchases approximately 65,000 af of Metropolitan replenishment water on average each year and it is very likely that most if not all of this water will now be taken via the in-lieu program. In the past roughly half of this water was received via the in-lieu program and half was directly recharged. In some respects the in-lieu program has immediately created or "freed up" approximately another 30,000 to 35,000 afy (40-50 cfs) of recharge capacity.

However, in reality the District will always use available recharge capacity to purchase Metropolitan direct replenishment water whenever it is available to recharge the groundwater basin, as this is the most economical way to manage the groundwater basin. Unfortunately, in-lieu water is not always available, and may be zero in some years.

6.2 New Water Supply Facilities Portfolio

This section summarizes the availability of other water supplies (GWR System, Prado Pool Enhancement), the rankings of the preferred Water Supply facilities projects, and the composition of the Water Supply portfolio.

6.2.1 Availability of Other Water Supplies

The various Water Supply projects and their corresponding supplies are shown in Table 6-6.

Table 6-6
Preferred Water Supply Projects

Potential Projects		Water Supply	
No.	Title	GWR System	SAR Stormflow
S-2	Irrigation/Industrial Service	•	
S-3	Mid-Basin Injection	•	
S-5	Off-Stream Storage – Aliso Canyon		•
S-6	Prado Pool Enhancement		•

To evaluate the rankings of projects that utilize the GWR System, the following projects need to also be included and compared:

R-4 Radial Recharge – Ball Basin

R-11 Subsurface Recharge (seven sites)

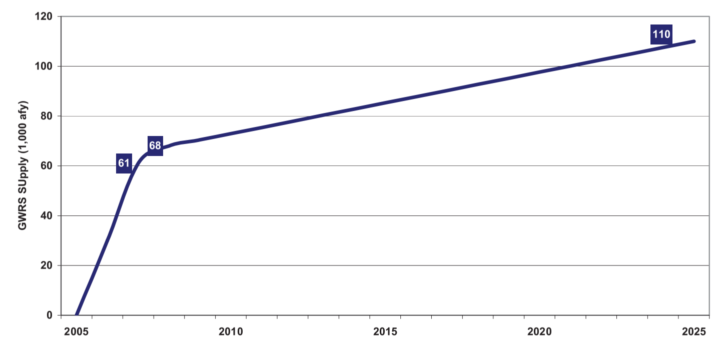
The availability of projected purified water flow from the GWR System has been evaluated, with consideration of several factors, including:

1. Reduction of GWR System Phase 1 flow during the initial year because of reduced available treated wastewater from OCSD's Plant No. 1 (now expected to be about 61,000 afy during 2007-08, and 68,000 afy in 2008-09);
2. Timing of construction completion of the OCSD Ellis Diversion project (a proposed project to divert flows now tributary to Plant No. 2 into Plant No. 1), which would provide flow to offset the initial year deficit;

3. Variables in predicting future quantities and schedule for GWR System Phase 2 flow; and
4. Challenge in predicting the availability of SARI flows for GWR System Phase 2.

The most current available estimate of GWR System flow projections is shown in Figure 6-7.

Figure 6-7
GWR System Flow Projections



If the Santa Ana River Interceptor (SARI) reseparation project being considered by SAWPA and OCSD is eventually implemented, Phase 3 of the GWR System could be implemented to provide a water source for the Talbert Barrier Expansion Project (M-5), if required, or other recharge or basin management projects.

6.2.2 Water Supply Facilities Rankings

The Water Supply Facilities cost analysis and rankings is shown in Table 6-7. As shown, the three GWR System-supplied projects that were ranked in the Recharge portfolio follow the same relative ranking as in the Water Supply portfolio. The following projects are ranked in the following priority order: S-3, Mid-Basin Injection; R-4, Radial Recharge (Ball Basin); R-11, Subsurface Recharge (seven sites); and S-2, Irrigation/Industrial Service.

The preferred GWR System-Water Supply Project portfolio is shown graphically in Figure 6-8 for GWR System Phases 1 and 2, up to a projected maximum of 110,000 afy. It is assumed that the Mid-Basin Injection (MBI) and Radial Recharge – Ball Basin would be supplied with GWR System Phase 1 water, because of the near-term need for these projects.

TABLE 6-7
ESTIMATED WATER SUPPLY FACILITIES RANKING

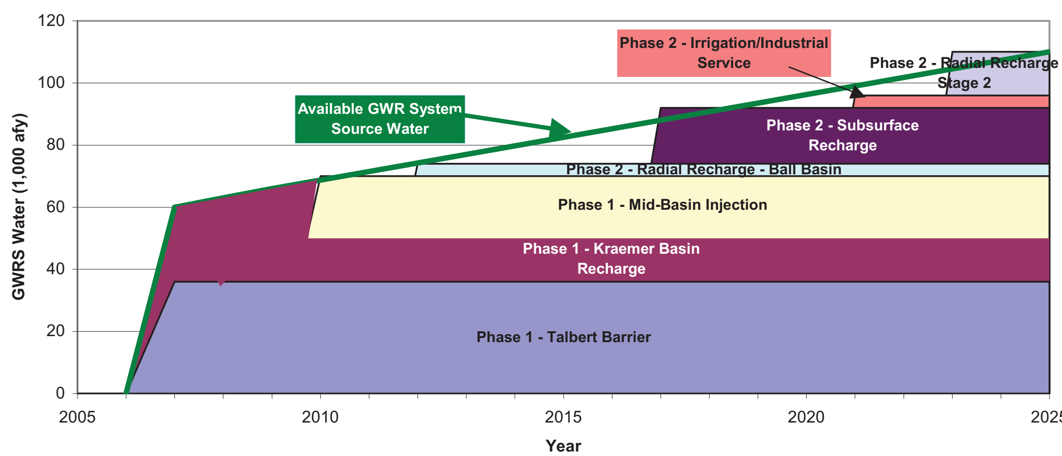
Water Supply Project No.	Title	Capacity (afy)		Capital Cost ($M)(c)		Annual Cost ($M/yr) (c)		Unit Cost ($/af)	Cost Ranking (d)	Overall Ranking (d) (g)
R-4	GWR System – Radial Recharge – Ball Basin	3,600	(a)	3.4	(e)	2.0	(e)(i)	645	5	4
R-11	GWR System-Subsurface Recharge – 7 sites	18,000	(b)	21.9	(e)	14.4	(e)	758	7	5
S-2	GWR System- Irrigation/Industrial Service	4,100		22.6	(e)	2.8	(e)	678	6	7
S-3	GWR System-Mid-Basin Injection	20,000		69.3	(e)	11.5	(e)(i)	575	4	2
	Subtotal-GWR System Supply	45,700		117		30.7		671		
S-5	Offstream Stormwater Reservoir – Aliso Canyon (f)	3,500		18.3		1.5		430	3	6
S-6	Prado Pool Stormwater Enhancement	3,000		15.0		1.2		400	2	3
	Subtotal-SAR Stormflow	6,500	(h)	33.3		2.7		415		
	Total	52,200		150		33.4		639		

(a) Comparable to 5 cfs percolation rate
(b) Comparable to 25 cfs percolation rate
(c) Reference Table 5-3
(d) 1 Highest
(e) Includes GWR System Phase 2 treatment costs
(f) Smaller capacity project (4,000 af reservoir) (See PD S-5)
(g) Inclusion of all evaluation factors
(h) 50% probability of exceedance each year (See Figure 6-3)
(i) Could be implemented using GWR System Phase 1 facilities

Further investigation of the two potential water supply projects using SAR stormflow indicate that each project has significant institutional and environmental constraints that would need to be overcome to be considered viable for

implementation. For these reasons, the Offstream Stormwater Reservoir – Aliso Canyon (Project S-5) and the Prado Pool Stormwater Enhancement (Project S-6) are not included in the Water Supply portfolio. This decision should be reevaluated in future updates to the LTFP.

FIGURE 6-8
NEW WATER SUPPLY FACILITIES – GWR SYSTEM PORTFOLIO



Stage 1 of the LTFP Recommended Program is identified in the Executive Summary and Chapter 8. It includes Mid-Basin Injection and Radial Recharge – Ball Basin projects to be supplied from Phase 1 of the GWR System. Other new water projects could be implemented when additional OCSD wastewater is available to implement future phases of the GWR System. Table 6-8 outlines a potential future staged program based on 5-year increments, with each project producing an additional 5,000 afy of new water supply. The GWR System purification plant could be effectively adding 5 mgd RO trains to the Phase 1 facilities. Space has been provided for this expansion.

TABLE 6-8
GWR SYSTEM STAGING PLAN

Project	Capacity (afy)	Implementation Start 2005-10	2010-15	2015-20	2020-25	Cumulative Capacity (afy)[a]
GWR System Phase 1						48,000
S-3 Mid-Basin Injection - Stage 1	20,000	♦				68,000
R-4 Radial Recharge - Ball Basin - Stage 1	4,000	♦				72,000
Subtotal	**24,000**					
GWR System Phase 2						
R-11 Subsurface Recharge						
Stage 1	5,000		♦			77,000
Stage 2	5,000		♦			82,000
Stage 3	5,000		♦			87,000
S-2 Irrigation/Industrial Service	5,000			♦		92,000
R-4 Radial Recharge						
Stage 2	5,000			♦		97,000
Stage 3	5,000			♦		102,000
S-3 Mid-Basin Injection - Stage 2	5,000				♦	107,000
R-11 Subsurface Recharge - Stage 4	5,000				♦	112,000
Subtotal	**40,000** [b]					
Total	**64,000**					**112,000**

(a) Includes Phase 1 components already programmed: Talbert Barrier (35,000 afy); Kraemer Basin recharge (13,000 afy)
(b) Contingent on additional OCSD wastewater being available

6.3 BASIN MANAGEMENT FACILITIES PORTFOLIO

There are three categories of preferred projects to be included in this portfolio. They are summarized in Table 6-9. The three categories are:

- West Orange County Subsurface Outflow Control
- Seawater Intrusion Control
- Water Conservation

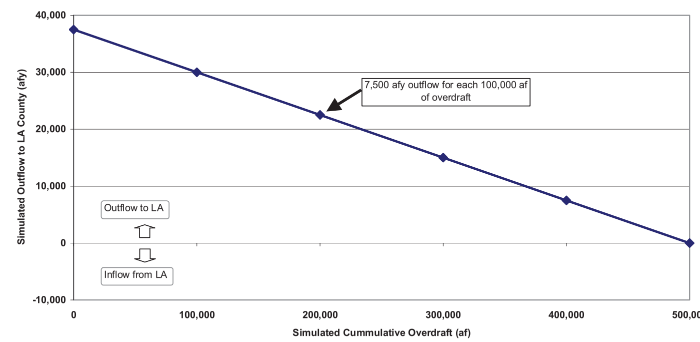
TABLE 6-9
BASIN MANAGEMENT PROJECT ALTERNATIVES

PURPOSE	PROJECT NO.	PROJECT TITLE
West Orange County (WOC) Subsurface Outflow Control	M-1	Shallow Aquifer Development
	M-2	Colored Water Development
	M-3	Basin Pumping Transfer Program
Seawater Intrusion Control	M-5	Talbert Barrier Expansion
	M-6	Alamitos Barrier Improvement
	M-7	Bolsa/Sunset Injection Barrier
Water Conservation	S-11	MWDOC Water Conservation Program

6.3.1 Subsurface Outflow

Groundwater outflow from the basin across the Los Angeles/Orange County line has been estimated to range from approximately 1,000 to 35,000 afy based on the amount of accumulated overdraft, groundwater elevation gradients, and aquifer transmissivity. Underflow varies annually and seasonally depending upon hydrologic conditions on either side of the county line. Modeling by OCWD indicated that, assuming groundwater elevations in the Central Basin remain constant at their 1999 level, underflow to Los Angeles County increases approximately 7,500 afy for every 100,000 af of increased groundwater in storage in Orange County (see Figure 6-9).

FIGURE 6-9
RELATIONSHIP BETWEEN BASIN STORAGE AND ESTIMATED OUTFLOW



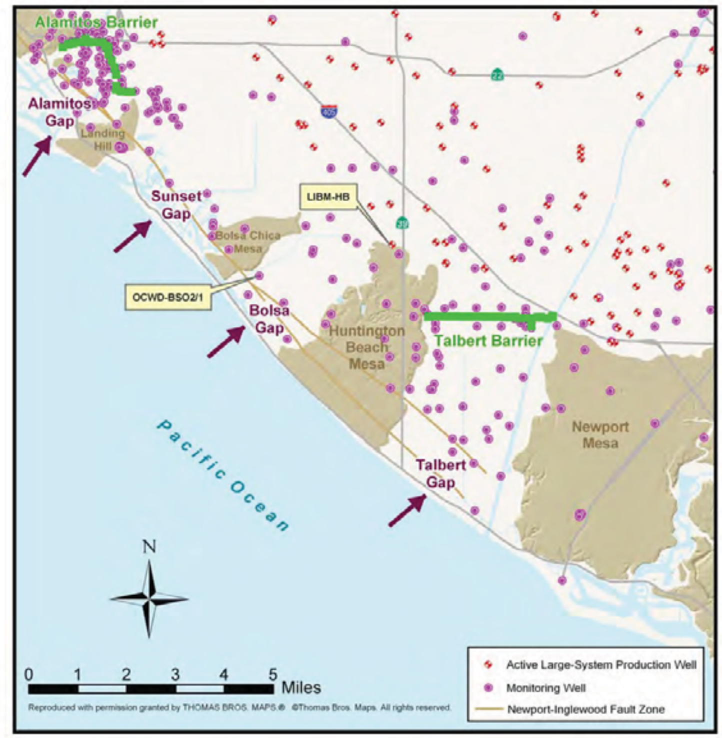
Projects M-1, M-2, and M-3 have been formulated with the goal of reducing subsurface outflow and beneficially using the recovered water. Shallow Water Development would reduce outflow from the shallow aquifer (Level 1) by increasing pumping from the shallow aquifer. The Basin Pumping Transfer Program would reduce outflow from the principal aquifer (Level 2) by transferring pumping from the coastal/central portion of the basin to WOC. Colored Water Development would reduce outflow from the deep aquifer (Level 3) by increasing pumping from the colored water aquifer.

6.3.2 Seawater Intrusion Control

Since the early 1900s, monitoring and preventing the encroachment of seawater into fresh groundwater zones along Orange County has posed a major basin management challenge. Seawater encroachment also represents a key factor in determining the basin operating range in terms of maximum accumulated overdraft. The primary avenues for seawater intrusion are permeable sediments underlying topographic lowlands or "gaps" between the erosional remnants or "mesas" of the Newport-Inglewood Uplift, as shown in Figure 6-10. The susceptible locations are the Talbert, Bolsa, Sunset, and Alamitos Gaps. Most previous seawater intrusion investigations focused on the gaps rather than the mesas.

Projects M-5, M-6, and M-7 have been formulated to enhance the ongoing seawater intrusion control program. These projects would only be built if future monitoring indicated additional facilities are required. These project(s) could be phased and accelerated if monitoring indicates near-term problems.

FIGURE 6-10
COASTAL SEAWATER BARRIER LOCATIONS



6.3.3 Water Conservation

In the LTFP, water conservation is considered as a new water supply, rather than a water demand reduction technique. This approach facilitates comparison of the cost-effectiveness of water conservation with other supplies, and avoids confusion with different water demand projections, with and without water conservation being included. Based on the analysis in Project Description S-11 (Appendix A), the Residential Evapotranspiration (ET) Smart Controllers are the best water conservation program to consider. It is envisioned that MWDOC would be the lead agency for implementing the water conservation program, and

OCWD could potentially provide financial support when this program would be scheduled in the new projects portfolio.

6.3.4 Basin Management Project Rankings

The Basin Management Facilities cost analysis and rankings are shown in Table 6-10. The Basin Management Portfolio is presented on Figure 6-11, comparing the relative project rankings with cumulative annual costs.

6.3.5 Drought Management

The GWMP contained a recommendation to evaluate projects to respond to and recover from droughts. Although a particular drought management portfolio has not been developed in the LTFP, the following projects could be considered for drought recovery:

	PROJECT TITLE	APPLICATION
M-2	Colored Water Development	Mine the colored water aquifer during a drought
S-9	Ocean Water Desalination	Develop the Huntington Beach Ocean Water Desalination Project only for drought supply

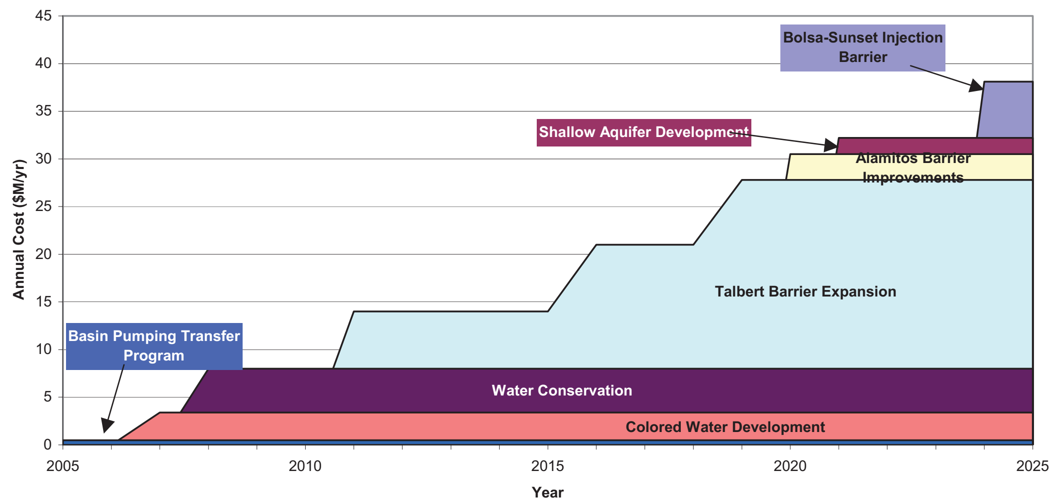
The GWR System has the benefit of increased groundwater basin reliability and is not subjected to reductions during droughts, and in that sense is also a drought management project.

TABLE 6-10
BASIN MANAGEMENT FACILITIES RANKING

PROJECT NO.	PROJECT TITLE	CAPACITY (AFY)	CAPITAL COST ($M)	ANNUAL COST ($M/YR)	UNIT COST ($/af)	RANKING COST	RANKING OVERALL
M-1	Shallow Aquifer Development	4,000	13.9	1.65	412	3	5
M-2	Colored Water Development (a)	7,200	22.7	2.90	402	2	2
M-3	Basin Pumping Transfer Program	4,000	-	0.5	125	1	1
	Subtotal-WOC Outflow Control	15,200 (c)	36.6	5.1	-	-	
M-5	Talbert Barrier Expansion (f)	27,000	47.3	19.8	- (g)	5	3
M-6	Alamitos Barrier Improvements (f)	2,800	11.8	2.7	- (g)	6	4
M-7	Bolsa/Sunset Injection Barrier (b)	15,000	67.4 (d)	5.9 (d)	- (g)	4	6
	Subtotal-Seawater Intrusion Control (e)	44,800	126.5	28.4	-	-	

(a) Phase 1 for direct use
(b) With full Colored Water Development project
(c) Modeling results show a reduction in WOC subsurface outflow of approximately 10,000 afy
(d) Net costs of Project M-7 less Project M-2
(e) Projects M-5, M-6, M-7 would only be constructed if future monitoring indicated additional facilities were required
(f) Source water is imported water, since GWR System supply would be dedicated to more cost-effective projects
(g) Projects do not produce new water, nor result in increased groundwater pumping

FIGURE 6-11
BASIN MANAGEMENT FACILITIES PORTFOLIO



6.4 WATER QUALITY MANAGEMENT FACILITIES PORTFOLIO

The District has an active and progressive water quality program to protect the basin. The basin is closely monitored to ensure water quality and to detect possible contaminants early. The District has a multifaceted program to protect the basin. Examples of this approach include:

- Using wetlands to treat SAR flows
- Working with producers to pump and treat contaminated groundwater
- Closely monitoring the SAR quality
- Proactively bringing legal action against entities contaminating the shallow portion of the basin before the contamination reaches the main aquifer
- Constructing projects to remove contaminants in groundwater near the District's recharge facilities

Two Water Quality Management projects are not included in this portfolio. The New Laboratory (Project Q-1) is being implemented separately. The GAP Modifications (Project Q-4) has significant cost constraints and received a low score in the project evaluations. The remaining projects are wetlands, as listed below:

Temescal Creek Wetlands
Chino Creek Wetlands
River Road Wetlands
Mill Creek Wetlands

6.4.1 Background

The District has operated the existing Prado Wetlands for many years. In the 1960s and 1970s, duck ponds were constructed on District property in the Prado Basin to provide recreational opportunities. During this time, the duck ponds were relatively "low profile" from a water quality perspective, since their intent was to provide for waterfowl hunting opportunities. In the 1980s, it became evident from evaluation of water quality data that there was a nitrogen "sink" in the Prado basin area. This "sink" was evidenced by decreased nitrogen concentrations in water that passed through the Prado basin.

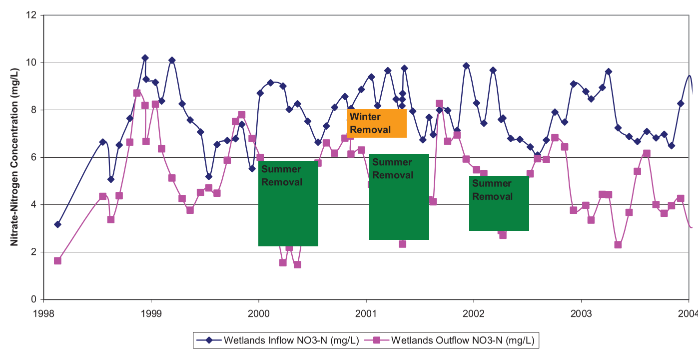
In the early 1990s, water quality studies conducted by OCWD and Santa Ana Water Project Authority (SAWPA) identified water quality improvements that occurred during flow through the duck ponds. The water quality improvements were particularly noticeable for nitrogen. Nitrate-nitrogen was observed to be removed by the duck ponds, even though the ponds were not designed with water quality improvements in mind. To improve flow conditions in the duck ponds and seek to enhance water quality benefits, the District completed relatively minor improvements on the existing duck ponds. These improvements provided some benefits, but it was determined that a larger scale reconstruction would be beneficial and allow for even greater water quality benefits. In 1995-96, the District completed a major reconstruction to increase the treatment capacity from about 20 cfs to 100 cfs. The reconstructed wetlands are referred to as the Prado Wetlands.

6.4.2 Existing Prado Wetlands

Since 1996, the Prado Wetlands have treated approximately 100 cfs of SAR flow diverted from the SAR at River Road (Figure 6-12). With this flow rate, the District has been achieving significant water quality improvements through operating the Prado Wetlands.

Nitrate-nitrogen removal from the Prado Wetlands is shown in Figure 6-12. The effluent sampling point shown in Figure 6-13 is approximately two-thirds through the wetlands. This effluent sampling location is used because the lower one-third of the wetlands is frequently submerged by backwater from the Prado water conservation pool. Nitrate data collected at the wetlands indicate that the wetlands remove an average of 30 tons of nitrate per month.

FIGURE 6-12
PRADO WETLANDS NITRATE REMOVAL (THROUGH 2/3 OF THE WETLANDS)



The Prado Wetlands provide multiple benefits, including:

- Improved water quality
  - Reduced nitrate concentrations by up to 90 percent (removal of nitrate is highest in the summer time when the water temperature is highest; warm water temperatures correspond to more rapid biological activity that breaks down the nitrate).
  - Reduced phosphate-phosphorus by 20-30 percent.
  - Total organic halides are reduced approximately 20 percent.

  - Ethylene diamine tetraacetic acid (EDTA) is reduced about 75 percent. EDTA is an essentially harmless compound at the concentrations observed in the river, but its removal is noteworthy because it is considered an indicator of the potential for removal of other photosensitive organic compounds of wastewater origin. EDTA enters the SAR through tertiary-treated wastewater discharged to the SAR. (Gross, et al, 2004)
  - Ibuprofen is reduced about 75 percent. (Gross, et al, 2004)
- Less clogging of the District recharge basins. Algae grows in the District's recharge facilities, particularly in the summer months. When the algae dies, it falls to the bottom of the recharge basins and forms a layer along the basin bottom that impedes percolation. This "clogging layer" is a negative consequence of algae production, and the reduced recharge rate caused by the clogging layer hinders the District's ability to maximize recharge. Elevated nitrate and phosphate levels cause more rapid growth of algae. Construction of additional wetlands and the resultant lowering of nitrate and phosphate levels in SAR water is anticipated to reduce production of algae and the formation of the clogging layer and result in greater recharge rates.
- Regulatory and public confidence benefits. Baseflow in the SAR is primarily tertiary-treated wastewater discharged into the river by treatment plants in Riverside and San Bernardino Counties. Proactive water quality testing, such as that conducted in the Santa Ana River Water Quality and Health (SARWQH) Study, and the Prado wetlands have helped address regulatory and public concerns about the use of the SAR to recharge the basin.

Future wetlands that the District has proposed would provide these same benefits, plus the additional benefit of improved habitat for endangered species. For example, the proposed Chino Creek Wetlands would convert land that is currently an agricultural field into a wetland and riparian woodland habitat.

The cost of providing wetlands treatment is significantly lower than alternative treatment methods that achieve the same nitrogen removal. Three different treatment methods to remove nitrogen were analyzed compared to wetlands treatment: fluidized bed, ion exchange, and reverse osmosis. The results of this analysis are summarized in Table 6-11.

TABLE 6-11
COST OF NITROGEN REMOVAL WETLANDS VS TREATMENT OPTIONS

TREATMENT METHOD	FLOW RATE (MGD)	CAPITAL COST ($M)	ANNUAL O&M COST ($M/YR)	ANNUAL COST ($M/YR)	TREATED (AFY)	COST ($/AF)
Wetlands	52	2	0.7	0.9	58,000	$16
Fluidized Bed	42	24	1.5	2.9	47,000	$62
Ion Exchange	42	41	3.1	5.4	47,000	$115
Reverse Osmosis	42	78	8.2	12.6	40,000	$315

Notes:
- Estimated costs are to remove 1,000 kilograms of nitrate per day
- Wetlands costs are based on Prado wetlands data
- Prado wetlands capital cost paid off over 10 years (allow for reconstruction after flooding)
- Conventional treatment plant capital costs paid off over 30 years
- Fluidized bed, ion exchange, and reverse osmosis costs from Carollo Engineers Tech Memo prepared August 2004 for River Road Wetlands Project
- Reverse osmosis costs do not include brine disposal cost (inclusion of brine disposal costs would increase the treatment cost further)

The cost estimate summarized in Table 6-10 is based on constructing and operating new nitrogen removal facilities at the Rapid Filtration Extraction (RIX), Rialto, and Riverside wastewater treatment plants. The combined flow treated at these three plants was assumed to be 47,000 afy. At the Prado Wetlands, 58,000 afy was assumed to be treated. In both cases, the same amount of nitrogen removal, 1,000 kilograms per day, was evaluated. Based on the cost comparison, wetlands treatment such as that provided at the Prado wetlands is approximately four times less expensive per acre-foot of water treated compared to the least expensive alternative treatment method. When the cost is calculated as the cost per pound of nitrogen removed, wetlands treatment is three times less expensive compared to the least expensive alternative treatment method.

6.4.3 OCWD Wetlands Policy

The District has established a long-term goal that each of the tributaries to the SAR in the Prado basin be provided natural wetlands treatment for baseflow. The District established the goal in 1999, and reaffirmed the goal in 2005. When the District reaffirmed the goal in 2005, language was added to the goal to emphasize the importance of considering all possible sources of funding for the wetlands. Implementation of the goal will help provide the highest quality water possible to recharge the groundwater basin.

The District's Wetlands Policy is to provide wetlands treatment for all tributaries in Prado basin. This is a long-term goal established by the District. Constructing new wetlands requires extensive planning, permitting, and coordination. The District also needs outside financial support to build the wetlands. Therefore, the District is seeking grants and other sources of funding to construct additional wetlands. Sources of funding that are being explored include contributions from land developments upstream of Prado Dam that may impact water quality and have regulatory requirements to mitigate water quality impacts. The District's Wetlands Policy is based on constructing new wetlands in a manner sequenced within budget constraints. As new potential wetlands are evaluated, the District will also re-evaluate the technical approach to design and operation to maximize the projects' survivability during storm events.

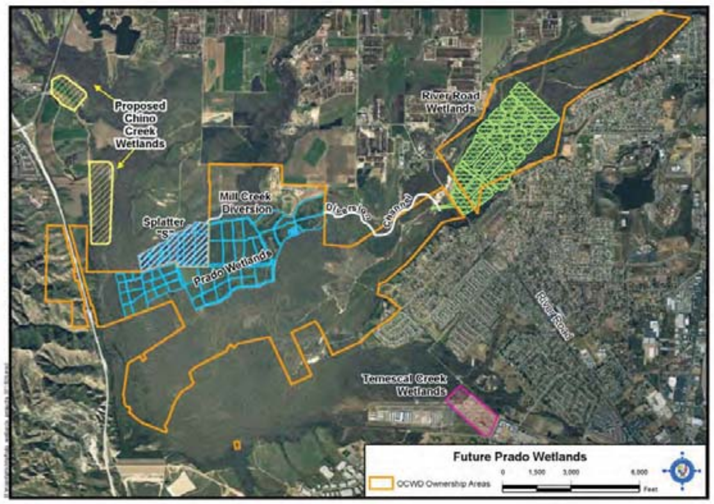
6.4.4 Identification of Potential Future Wetlands Sites

Future sites with the potential for constructing treatment wetlands similar to the Prado wetlands or diversions to provide additional flows to existing wetlands are shown in Figure 6-13, and include:

- Chino Creek Wetlands, just south of Euclid Avenue, between State Highway 71 and Chino Creek.
- Mill Creek Wetland; this project involves a diversion that would be located on Mill Creek, just north of the District's Prado wetlands. No new wetlands would be created. A diversion would be created to allow Mill Creek flows to be treated in the existing Prado wetlands and Splatter "S" wetlands. Mill Creek flows currently do not receive wetlands treatment.
- River Road Wetlands, just north of the crossing of River Road over the SAR.
- Temescal Creek Wetlands, at the old Corona percolation ponds, adjacent to the Corona Airport.

Additional details regarding these four sites and proposed projects at each site are included in the project descriptions in Appendix A.

FIGURE 6-13
EXISTING AND FUTURE WETLANDS



The Mill Creek Wetlands Project was previously permitted and completed CEQA compliance. Construction on the project was begun, but halted in October 2004 due to flooding caused by unseasonal heavy rains. Construction was not allowed during the summer months because of environmental considerations associated with the Southwestern Willow Flycatcher, which constrained the period of construction to the fall-winter period. The construction contract to build the project was terminated in June 2005. The inflatable dam purchased by the contractor for the project was delivered to the District and is available for installation. If the project is restarted, the period of construction will be reviewed with the regulatory agencies to evaluate the most recent nesting locations of the endangered species and determine a construction period that protects the endangered species and accommodates construction.

6.4.5 Proposed Wetlands Portfolio

The proposed wetlands portfolio is based on the District's Wetlands Policy. Chino Creek is the first tributary in the Prado Basin recommended for construction of a new wetland because of the grant funding available to the project. After the Chino Creek Wetlands, additional wetlands would be recommended for construction as funding allows. A potential schedule for construction is shown in Table 6-12. The potential schedule is for illustrative

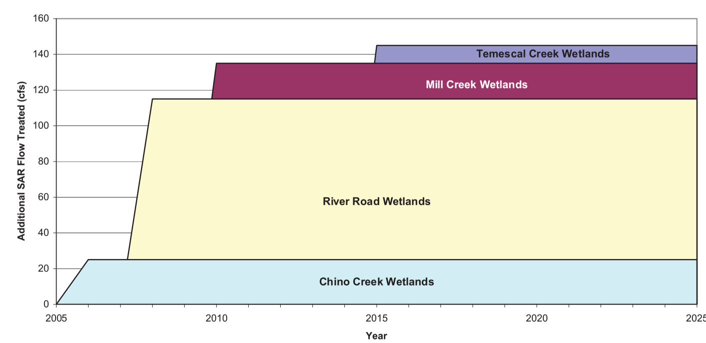
purposes, and would be modified based on the District ability to acquire grant funding and other sources of funding to construct the proposed wetlands.

TABLE 6-12
PROPOSED WETLANDS PORTFOLIO

TRIBUTARY/ WATER BODY	PROPOSED PROJECT	PROPOSED CONSTRUCTION START DATE	FLOW RATE (CFS)	CAPITAL COST ($M/YR)	O&M COST ($M)	ANNUAL COST ($M/YR)
Chino Creek	Chino Creek Wetlands – construct new diversion and wetlands	2006	15-30	8.7	1.1	1.6
SAR at River Road	River Road Wetlands – construct new diversion and wetlands	2008	80-100	9	1.1	1.6
Mill Creek	Mill Creek Diversion – construct new diversion to divert water into existing wetlands	2010	15-30	1.8	0.2	0.3
Temescal Creek	Temescal Creek Wetlands – refurbish existing ponds, construct new diversion to ponds	2015	5-10	3	0.4	0.6
	Total		115-170	22.5	2.80	4.1

The portfolio is shown on Figure 6-14, with increasing SAR flows treated over the LTFP planning period.

FIGURE 6-14
WATER QUALITY MANAGEMENT WETLANDS PORTFOLIO



6.5 Operational Improvements Facilities Portfolio

The Operational Improvements portfolio consists of projects in two categories:

1. Projects that are extensions of current District operational activities, such as rehabilitating and improving the intake structures at existing recharge basins, and
2. Previously planned projects that were originally included in the 2004-05 CIP, but were deferred due to budgetary constraints, these projects are carried forward in the LTFP.

The Operational Improvement projects, together with the related cost analysis are shown on Table 6-13.

Table 6-13
Operational Improvements Projects Portfolio

Operational Improvement Projects		Costs			Extension of Current Operational Activities	Projects from 2004-05 CIP carried forward in LTFP
No.	Title	Capital ($M)	O&M ($M/yr)	Annual ($M/yr)		
O-1	Basin Rehabilitation Program	0.85	0.55	0.60	●	
O-2	Burris Pit Recontouring	1.75	0.05	0.15		●
O-3	Lakeview Pipeline	4.67	0.185	0.46		●
O-4	Intake Structure Modification - Olive Pit	0.17	0.005	0.02	●	
O-5	Placentia/Raymond Basin Improvement	1.22	0.05	0.12	●	
O-6	Silt Disposal Program	0.10	0.50	0.51	●	
	Total	8.76	1.34	1.86		

6.6 Summary of Recommended Portfolios

The five recommended LTFP portfolios are summarized on Table 6-14. The LTFP considers 29 potential projects among the five portfolio categories that could produce as much as 125,000 afy of new water and corresponding increase in groundwater pumping over the next 20 years, and result in basin management, water quality, and operational improvements. Capital costs for all projects total $432 million, with related O&M costs at about $64 million per year. Total annual costs are estimated at $89 million per year. The unit cost of all projects that produce new water is $480/af, based on a total annual capital and O&M cost of $60 million in current dollars. The general location of the projects is shown in Figure 6-15.

Table 6-14
Summary of Recommended Portfolios

Portfolio	No. of Projects	Maximum				Unit Cost ($/af)
		Max. Capacity (afy)	Capital Cost ($M)	O&M Cost ($M/yr)	Annual Cost ($M/yr)	
Recharge	7 (a)	93,000 (b)(c)	124	14.3	21.5	-
New Water Supply	6 (a)	22,000 (d)	150	24.7	33.4	-
Basin Management - WOC Outflow Control Component	3	10,000 (e)	37	3.0	5.1	-
Subtotal - New Water Component	**16**	**125,000**	**311**	**42**	**60**	**480**
Basin Management - Seawater Intrusion Control Component	3	-	90.0	18.1	23.3	-
Water Quality Management	4	-	22.5	2.8	4.1	-
Operational Improvements	6	-	8.8	1.3	1.9	-
Total - All Projects	**29**	**125,000**	**432**	**64**	**89**	**-**

a. Mid-basin Injection included in New Water Supply Portfolio
b. Equivalent to 128 cfs additional percolation
c. Includes: Santiago Creek Recharge, Four New Recharge Basins (4), Desilting Facility, Vadose Recharge - Fletcher Basin, 5 BCVs - Deep Basins, and Future Basins (See Table 6-4)
d. 23,600 afy of GWR System Phase 1 flows for Mid-Basin Injection and Radial Recharge - Ball Basin, not included. Subsurface Recharge (7 sites) (See Table 6-7)
e. Includes: Shallow Aquifer Development, Colored Water Development, BPTP (See Table 6-9)

The following supplies are available to provide water for the various projects and portfolios:

- SAR Baseflow
- SAR Stormflow
- GWR System
- Reduced WOC Subsurface Outflow

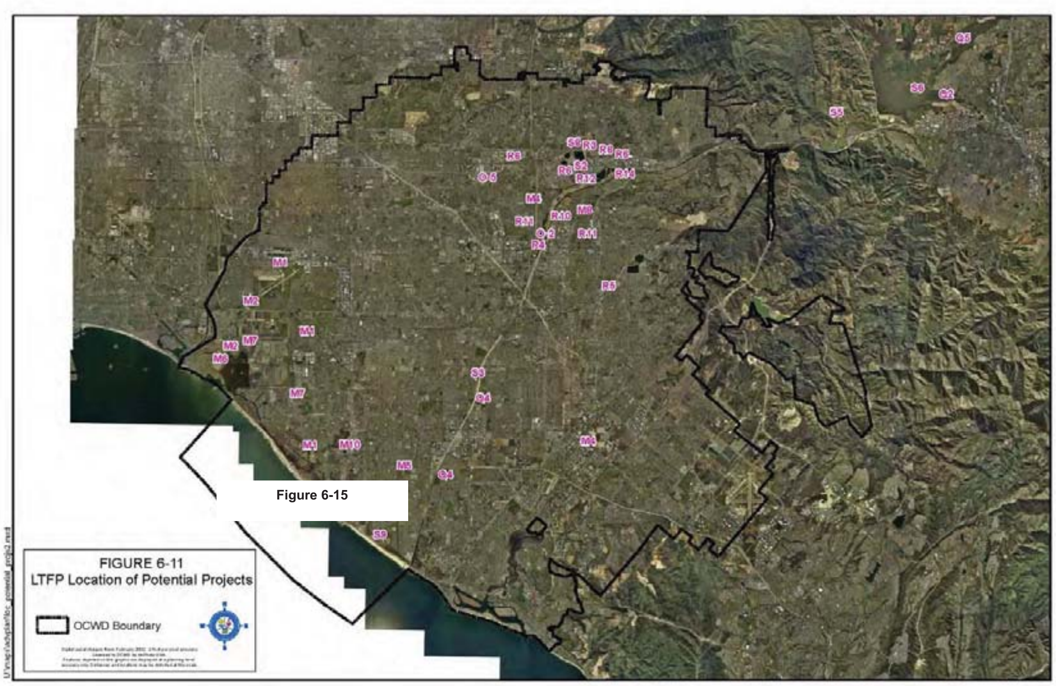
The assumed source water allocations for the five portfolios are shown in Table 6-15. As projects are refined throughout the planning periods, these allocations will need to be further refined.

TABLE 6-15
SOURCE WATER ASSUMPTIONS FOR PORTFOLIOS

Portfolio	Required Source Water Levels (afy)				
	SAR Baseflow	SAR Stormflow	GWR System	WOC Subsurface Outflow Control	Total
Recharge	70,000 (a)	-	23,000	-	93,000
New Water Supply	-	7,000 (b)	15,000	-	22,000
Basin Management	-	-	-	10,000	10,000
Water Quality Management	-	-	-	-	0
Operational Improvements	-	-	-	-	0
Total	70,000	7,000	38,000	10,000	125,000

a. Based on high availability projections, low SAR baseflow projections would limit this available source
b. Assumed to be available (50% probability of exceedance; see Figure 6-3)

FIGURE 6-15
LOCATION OF POTENTIAL PROJECTS



7 FINANCING PROGRAM

This chapter summarizes the various ways to finance the LTFP projects and portfolios, and general information on the elements of the financing program.

7.1 Financing Alternatives

The District's operating expenses include the following categories:

- General Fund
- Water Purchases
- Debt Service
- Replacement and Refurbishment (R&R) Fund
- Small Capital Items

Operating revenues fall into the following groups:

- Assessments (Replenishment Assessment [RA] and Basin Equity Assessment [BEA])
- Ad Valorem taxes
- Interest
- Miscellaneous (GAP sales; loan repayments)
- State and federal grants

Reserve categories are as follows:

- Operating Budget
- R&R Fund
- Toxic Clean-up
- Contingencies
- Debt Service

These categories have been discussed in detail in the District's *2010 Rate Plan Report (November 2004)*

The LTFP program would incur expenses in all the expense categories listed above. The principal revenue sources would be:

- RA
- State and federal grants

7.1.1 LTFP Financial Impacts

Six projects are recommended for implementation in the next five years as previously shown on Table ES-1. The total capital cost of the projects is $36.1 million. Assuming the District decides to construct the projects and long-term debt is used to fund their construction, the District would incur annual debt payments of approximately $2.0 million for 30 years. Some grant funding is available to offset a small portion of this cost. The annual O&M cost of the facilities is estimated at $2.9 million. Thus, the total cost of the six new projects is $4.9 million annually. If annual basin pumping is 390,000 afy by the year 2010

as previously projected, the RA would need to increase $13/af to support this new expense.

Offsetting this expense is the benefits the six new projects would bring to the District's residents, which primarily include:

- Increasing the District's recharge capacity, which would allow for capturing additional SAR flows and recharging increased amounts of Metropolitan replenishment water. Thus a higher BPP could be maintained; and
- Improved SAR water quality

The following grant opportunities could provide partial funding for certain LTFP projects:

Table 7-1
Potential Grants for LTFP Projects

Project No.	Project Title	Grant Source
R-4	Radial Recharge Well	DWR-Prop 50 Groundwater Management Program
R-11	Subsurface Recharge	DWR-Prop 50 Groundwater Management Program
S-3	GWR System – Phase 2	USBR – HR 1156 ($60 M)
M-5/6/7	Seawater Intrusion Control Barriers	♦ SWRCB – Seawater Intrusion Control Program ♦ DWR – AB 303 – Monitoring Wells
Q-3	Chino Creek Wetlands	Prop 13 - IEUA – Non-point Source Pollution Control Program ($2.5 M)

7.1.2 Basin Production Percentage Implications

In the *2010 Rate Plan* published in November 2004, it was predicted that annual pumping would increase to approximately 390,000 afy in 2010, which equates to a BPP in the area of 75 percent.

If annual pumping is maintained at 390,000 afy going forward from 2010, the BPP will slowly decline to approximately 65 percent in 2025 if the estimated total water demand increases as projected. Under this scenario the groundwater producers would rely upon Metropolitan to meet increasing water demands. At the opposite end of the spectrum, if all of the projects in the LTFP were found to be economical and implemented, the BPP would ultimately increase to 88 percent. The LTFP provides a menu of options (projects) that the OCWD Board of Directors can select to decide the target volume of groundwater the basin should provide assuming average hydrology.

7.2 LTFP Financial Benefits

The LTFP has identified projects that could provide for approximately 125,000 afy of additional groundwater production, and water quality and basin management improvements. The 16 projects within the LTFP that create new water have a total annual capital recovery and O&M cost of $60 million in current dollars. Including the producers' energy costs to pump the water, the cost to produce the additional 125,000 af of water is approximately $66 million per year in 2025.

The most likely alternative water supply to groundwater to meet increased future water demands in the District's service territory would be Tier II Metropolitan water. The cost of this water is currently $579/af. Using the current Tier II cost of $579/af, the cost to buy the 125,000 af from Metropolitan instead of producing it from the basin is $72 million per year.

Comparing the 16 projects in the LTFP that create new water supplies with Metropolitan Tier II rates is a broad and simplistic comparison that is only meant to give an initial indication that the projects could be economically feasible. Each project in the LTFP would have to be reviewed in greater detail via the preparation of an Engineers Report before the District could decide to construct the project.

8 IMPLEMENTATION

This chapter highlights policy principles to guide implementation, significant actions required to implement the LTFP projects, program staffing requirements, management needs, and space needs. Six projects are recommended for implementation in the next five years. Additionally, the LTFP will need to be closely monitored and adjusted as necessary to accommodate changing basin conditions.

8.1 Policy Principles

Implementation of projects evaluated in the LTFP would occur subject to examination of several important policy issues. The following is a list of policy principles to guide implementation of the LTFP projects:

- The costs and benefits of the project must be well understood.
  - Capital, operations and maintenance, and replacement and refurbishment costs are well defined.
  - All projects may not be amenable to calculating a benefit/cost ratio; some projects may be determined to be beneficial and worthy of implementation based on qualitative factors.
- For recharge projects:
  - The District will first maximize all potential Metropolitan in-lieu deliveries. In-lieu water will be received, whenever it is available from Metropolitan, within budget constraints.
  - Sufficient recharge water should be available to support the project. The water supply should come first, then the recharge project. This new supply must also be sustainable for the foreseeable future.
  - The cost-effectiveness of the proposed project should be evaluated relative to other recharge methods.
  - Operation of the District's existing recharge basins has been optimized
- The technology used to implement the project is well defined and proven. Some experimental projects with less proven technology may be implemented, but these would be relatively small-scale projects.
- Potential risks entailed in the project are well defined.
- The project is coordinated with other water districts, Municipal Water District of Orange County (MWDOC), and producers' projects. Potential conflicts with other projects have been evaluated to avoid unintended consequences.
- The project has been evaluated with respect to Metropolitan water supply issues. In some cases, Metropolitan water supply issues may drive decisions regarding project timing.

Development of each preferred project will require separate activities for planning, Engineers/Geologists Report, CEQA compliance, preliminary and final design, construction, startup and initial operations.

8.2 Five-Year Implementation and Monitoring Program

A five-year implementation and monitoring program has been developed to begin processing projects in the LTFP. Six projects are recommended for immediate consideration in the next five years. Initial funding to begin processing these projects will be recommended for the FY 06-07 budget. The projects are shown below in Table 8-1.

Table 8-1
LTFP Recommended Program – Stage 1 (2005-2010)

Project	Capital ($M)	Annual O&M Cost ($M/yr)	Total (a) ($M/yr)
Recharge Portfolio			
R-5 Santiago Creek Enhanced Recharge	2.6	0.2	0.3
S-3 Mid-basin Injection (GWR System Phase 1)	17.9	0.9	1.8
R-4 Multi-Lateral Recharge Well - Radial type - Ball Basin (GWR System Phase 1)	4.3	0.1	0.4
Subtotal	**24.8**	**1.2**	**2.5**
Water Quality Management Portfolio			
Q-3 Chino Creek Wetlands	8.7	1.1	1.6
Subtotal	**8.7**	**1.1**	**1.6**
Operational Improvement Portfolio			
O-1 Basin Rehabilitation Program	0.8	0.5	0.6
O-2 Burris Pit Recontouring	1.8	0.1	0.2
Subtotal	**2.6**	**0.6**	**0.8**
Total	**36.1**	**2.9**	**4.9**

(a) Total includes debt service for capital cost and annual O&M expenses

Four projects were selected to increase the District's ability to annually recharge the groundwater basin to support additional basin pumping. The basin rehabilitation program project would help the District begin to address the annual sand loss problem at the recharge facilities and maintain the recharge capacity of existing facilities. The Chino Creek wetlands project was chosen as the District has already entered into a partnership with the Inland Empire Utility Agency to develop this facility and has obtained grant funding. More specifically these six projects would:

- Increase the District's recharge capacity by 40 cfs;
- Remove 80 tons per year of nitrogen from the Santa Ana River.

These six new projects would be processed along with six other major projects currently underway at the District which include:

1. GWR System
2. New Water Quality Lab building
3. La Jolla recharge basin
4. Metropolitan storage program facilities
5. Anaheim and Fullerton VOC removal
6. Talbert Barrier Process Control System
7. Reconstruction of the Prado wetlands

The LTFP will be closely monitored and updated at least every five years. Changes can and will occur to the basin over time, which could create the need to refocus resources and to reprioritize District activities. Examples of changing conditions include:

- Has the SAR baseflows increased?
- Is the current expansion of the Talbert barrier preventing seawater intrusion?
- Has additional source water become available from Orange County Sanitation District (OCSD) for reclamation purposes?
- Have water demands increased as expected?
- Are new recharge techniques available to implement, etc.?
- Have new water quality or contamination issues developed?
- Is seawater intrusion occurring in other portions of the basin?

Annually during preparation of the OCWD Capital Improvement Program budget, the LTFP will be reviewed to determine if priorities should be changed or modified. The District's overall mission is to protect the groundwater basin. Future adjustments to the LTFP will be made as necessary to ensure that mission is accomplished.

8.3 Staffing and Program Management Needs

Anticipated requirements for additional staff for the preferred projects are delineated in each project description (Appendix A). An additional 32 full time equivalent (FTE) persons is projected if full implementation of the recommended LTFP projects is pursued. The current District staffing level is 188. Therefore, full implementation of the recommended LTFP projects would increase staff levels by about 17 percent over the next 20 years.

An alternative staffing approach using contract operations could be considered for certain projects. Potential candidates are:

- M-2 Colored Water Development
- O-1 Basin Rehabilitation Program
- O-6 Silt Disposal Program

A program management team could be required for some of the larger projects, such as:

- S-5 Offstream Stormwater Reservoir
- M2/M7 Colored Water Development/Bolsa-Sunset Injection Barrier

8.4 PROJECT SITE SPACE NEEDS

A new treatment site would need to be obtained in order to implement the Colored Water Development Project (M-2). A preferred site and several alternatives are identified in the M-2 Project Description (Appendix A). Space would need to be dedicated to home base the 32 additional staff members needed for full implementation of the recommended LTFP projects. The only remaining space available for that purpose at the Fountain Valley site is the footprint of the existing laboratory. The existing laboratory will be vacated following completion of the new laboratory in 2008, and the existing laboratory or its footprint could be used to provide office space following completion of the new laboratory (Project Q-11). Space may be available for new staff required for the recharge facilities at the Anaheim field site. New staff that would be required, if the additional wetlands are constructed, would be located in the Prado basin area. Space needs for new wetlands staff would be evaluated in the Engineers Reports for the wetlands projects. Further study is needed to determine the space needs for the additional staff to implement the LTFP. No other unique space needs are envisioned for the other LTFP projects.

8.5 GENERAL IMPLEMENTATION ACTIONS

Development of each preferred project will require separate activities for feasibility study planning, Engineers/Geologists Report, CEQA compliance, preliminary and final design, construction, startup and initial operations. Certain projects will require additional activities unique to their implementation. These actions are lists below by project.

8.5.1 Recharge Projects

R-3 Deep Water Basin Cleaning Vehicles

- Reactivate research program
- Conduct waterjet testing program
- Confirm technical feasibility
- Develop a production model Deep BCV

R-4 Radial Recharge Well – Ball Basin

- Prepare Feasibility Study (2005-06 budget)
- Conduct GWR System regulatory compliance investigations
- Develop joint site use plan with City of Anaheim

R-5 Santiago Creek Enhanced Recharge

- Complete initial grading activities at preferred sites
- Prepare Feasibility Study
- Develop joint site use plan with City of Orange

R-6 New Recharge Basins

- North Lakeview Avenue Site M
  - Continue negotiations with site owner leading to land sale
  - Prepare Site appraisal
- South Van Buren Site N
  - Determine viability of property sale
  - Prepare site appraisal
- East Mira Loma Avenue Site P
  - Determine viability of joint site use with City of Anaheim
  - Prepare site appraisal
- Kimberly Clark Site KK
  - Determine viable site development schedule to follow completion of the Forebay Cleanup Project
  - Prepare site appraisal
- Other Sites - Hire property management consultant to advise on development of other potential sites

R-10 Fletcher Basin Vadose Recharge

- Conduct Stage 2 of the Demonstration Test (2005-06 budget)
- Further evaluate effective life of the recharge wells

R-11 Subsurface Recharge

- Select a single site for a demonstration to confirm recharge viability
- Conduct regulatory compliance investigations

R-14 Desilting Improvement Program

- Prepare Feasibility Study (2005-06 budget)
- Develop a chemicals management plan
- Conduct a full-scale field demonstration
- Coordinate with Silt Disposal Program (Project O-6)

8.5.2 Water Supply Projects

S-2 GWR System Irrigation/Industrial Service

No action at this time.

S-3 GWR System – Mid-basin Injection

- Complete the installation of service connections on GWR System Pipeline Unit 2
- Conduct regulatory compliance investigations (travel time projections, Title 22 compliance plan, PEIR addendum, California Department of Health Services (DHS) negotiations)
- Confirm viability of reallocating GWR System Phase 1 capacity for this project
- Prepare Engineers Report

S-5 Offstream Stormwater Reservoir

- Conduct reconnaissance meetings with representatives from Chino Hills State Park, United States Fish and Wildlife Services, and California Department of Fish and Game regarding the viability and implementation issues for the smaller project in Aliso Canyon
- Prepare Feasibility Study if project becomes viable

S-6 Prado Pool Stormwater Enhancement

Monitor progress on Elevation 498 program

8.5.3 Basin Management Projects

M-1 Shallow Aquifer Development

No action at this time.

M-2 Colored Water Development

- Prepare Feasibility Study on potential colored water development for:
    - Capture of WOC subsurface outflow from Layer 3
    - Supply for the potential Bolsa/Sunset Injection Barrier
    - Direct potable use by selected west-side agencies
    - Drought supply (5-6 years mining program with subsequent long-term basin refill)
- Siting investigations for potential water treatment plant in Boeing-Seal Beach redevelopment zone

M-3 Basin Pumping Transfer Plan Program

Develop implementation of producer participation and FY 2006-07 budget needs

M-5 Talbert Injection Barrier Future Expansion

- Monitor extent of seawater intrusion
- Monitor basin recovery following GWR System Phase 1 startup

M-6 Alamitos Barrier Improvement

Monitor extent of seawater intrusion

M-7 Bolsa-Sunset Injection Barrier

Investigate potential for grant funding of monitoring wells through the Department of Resources Local Groundwater Assistance Program (AB303)

8.5.4 Water Quality Management Projects

Q-2, 3, 5, 6

Complete Engineers Report and CEQA compliance for Chino Creek Wetlands (Q-3)

8.5.5 Operational Improvement Projects

O-1 Basin Rehabilitation Program

- Prepare Engineers Report for new Sandwash plant and potential contract operations
- Rebudget for FY 2006-07
- Conduct demonstration program in an Anaheim Lake quadrant

O-2 Burris Pit Recontouring

- Complete feasibility study and CEQA compliance
- Rebudget for FY 2006-07

O-3 Lakeview Pipeline

- Refine estimates of additional percolation benefits
- Complete Revised Engineers Report
- Complete joint-use agreement with RDMD

O-4 Olive Pit Intake Structure Modification

Prepare Engineers Report

O-5 Placentia/Raymond Basins Improvement

Prepare Engineers Report

O-6 Silt Disposal Program

Prepare feasibility study

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