2005 URBAN WATER MANAGEMENT PLAN

Santa Margarita Water District
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Final
December 22, 2005

RESOLUTION 06-01-02

RESOLUTION OF THE BOARD OF DIRECTORS OF SANTA MARGARITA WATER DISTRICT, ORANGE COUNTY, CALIFORNIA RATIFYING ADOPTION OF THE 2005 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Santa Margarita Water District (the "District") held a public hearing to review its 2005 Urban Water Management Plan (the "2005 Plan) and

WHEREAS, the District Board of Directors adopted of the 2005 Plan at its regular meeting on December 13, 2005 with an effective date of December 22, 2005.

NOW, THEREFORE, This Board of Directors DOES HEREBY RESOLVE, DETERMINE AND RATIFY that District 2005 Plan was adopted effective December 22, 2005 in accordance with the Urban Water Management Planning Act, as amended, set forth in California Water Code Section 10610 *et seq.*

ADOPTED, SIGNED AND APPROVED this 20th day of January, 2006.

_____
President, Board of Directors

ATTEST:

_____
Secretary, Board of Directors
Santa Margarita Water District

URBAN WATER MANAGEMENT PLAN

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SECTION 1.0

Introduction (§10620 (a))

In 1983, the State of California enacted the Urban Water Management Planning Act (Act) requiring urban water suppliers to prepare an Urban Water Management Plan (UWMP or Plan) every five years evaluating water supplies and demands for a 20-year period. State of California Water Code (Code) Sections 10610 through 10657 detail the requirements of the Act and the information to be provided in the UWMP including but not limited to the following:

- Describe and evaluate sources of water.
- Describe and project water uses.
- Describe water conservation programs and document demand management programs and efficient uses of water.
- Describe water shortage contingency analysis, including stages of action.
- Describe recycled water uses.

Santa Margarita Water District (SMWD) is an urban water supplier as defined in Code Section 10617. As such SMWD is required to update its UWMP as required by Code Section 10644(a) and file a copy with the Department of Water Resources at least once every five years on or before December 31, in years ending in five or zero. This report constitutes the SMWD 2005 UWMP.

The UWMP presents information in the same sequence set forth in the Code. The Act requires a 20-year projection; however, SMWD has included projections for a 25-year period from 2005 to 2030. The additional data is provided for reference in the event SMWD is requested to prepare a Water Supply Assessment or a Written Verification between 2006 and 2010 (codified in Section 10910 et seq). The Plan does not attempt to detail specific projects, but is a summary of long-term general planning by SMWD. As such it identifies potential sources of supply, the reasonable projected yield from the projects and the probable demand based on reasonable assumptions for growth, input from other agencies and landowners. The Plan serves as the foundation for the development of cost-effective specific projects.

SECTION 1.1
Agency Coordination (§10620(d))

The Plan was developed by SMWD in coordination with the Municipal Water District of Orange County (MWDOC), Metropolitan Water District of Southern California (MWD), other local water purveyors, County of Orange, local cities, major landowners and homeowner associations. Table 1 lists the agencies and other groups contacted, which are summarized below:

❖ **Water Agencies**

- As a member agency of MWDOC, SMWD has participated in workshops, responded to data requests, and reviewed documentation provided by MWDOC concerning the availability of supply from MWD.

- SMWD can obtain up to 2,000 acre-feet (AF) from the Trabuco Canyon Water District's (TCWD) Lake Forest Treatment Plant. The water is delivered to the plant by the Santiago Aqueduct Commission from MWD. SMWD requested information on the availability of the water supply from TCWD to supplement supplies. The supply has not been included as a separate source in the UWMP since the base flow is supplied to TCWD from MWD by MWDOC.

- City of San Juan Capistrano (SJC) was requested to provide information on the availability of water from its Groundwater Recovery System for emergency supplies to SMWD. SMWD requested information from SJC on the availability of supplemental water supplies. SJC and SMWD are preparing a draft project plan and potential supplies have not been included in the UWMP.

- Via a water exchange arrangement, Cucamonga Valley Water District (CVWD) will provide up to 4,250 AF annually in the event of MWD Tier 2 water shortfalls. CVWD was requested to provide information on the availability of water per the exchange agreement. CVWD has indicated upon execution of the agreement it can supply Supplemental Dry Year water supply to SMWD.

- Via a water exchange arrangement, Southern California Water Company, now called Golden State Water Company (GSWC), will provide 2,000 AF in the event of MWD Tier 2 water shortfalls. GSWC was requested to provide information on the availability of water per the exchange agreement.

- Irvine Ranch Water District (IRWD) will, by agreement, supply recycled water from its Los Alisos Water Reclamation Plant. SMWD requested information on the availability of the recycled water supply from IRWD. IRWD has included supplying 1,500 AF per year to SMWD in its UWMP.

❖ **Water Management Agencies**

- San Juan Basin Authority (SJBA) manages the San Juan Creek Groundwater Basin which underlies much of SMWD. SJBA was requested to provide data on groundwater production and future projections.

- South Orange County Wastewater Authority (SOCWA) is a joint powers authority which operates regional wastewater treatment plants. SOCWA was requested to provide data on the portion of wastewater generated by SMWD treated by SOCWA.

❖ **Relevant Public Agencies**

- The Cities of Mission Viejo, Rancho Santa Margarita and San Clemente have land use authority within their respective boundaries overlapping a portion of SMWD's boundaries. Each city was requested to provide a planning update, if any. SMWD has Plans of Works for the areas within each city and coordinates regularly to ensure water supply availability for any proposed projects. Per Code Section 10621(b), the three cities within the jurisdiction of SMWD were provided notice of the preparation of the Plan. Copies of the letters are included in Appendix A.

- The County of Orange (County) has land use authority over the unincorporated communities of Coto de Caza, Las Flores and Ladera Ranch as well as the undeveloped land owned by Rancho Mission Viejo. SMWD and the County recently completed coordination on a Water Supply Assessment for the Rancho Mission Viejo project known as The Ranch Plan which details the build-out of the project over a 20 to 25-year time frame. Per Code Section 10621(b) the County was provided notice of the preparation of the Plan. A copy of the letter is included in Appendix A.

❖ **Homeowners Associations**

- The cities and communities in SMWD are planned communities with large Homeowner Associations (HOA). HOAs control large landscaped areas and are major customers within SMWD. SMWD provided information on the UWMP to the HOAs and solicited their input on conservation programs.

❖ **Major Landowner**

- Rancho Mission Viejo (RMV) is the owner of the remaining undeveloped land within SMWD most of which is planned for development. The Ranch Plan is a master plan development for the build-out of RMV land. SMWD has worked closely with RMV and the County on developing a water supply plan to meet future demands with the adoption of a Water Supply Assessment in 2003.

Table No. 1
Coordination with Appropriate Agencies

Check at least one box on each row	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt
Other water suppliers						
Metropolitan Water District of Southern California	X			X		
Municipal Water District of Orange County	X	X	X	X	X	X
Cucamonga County Water District	X			X	X	X
Golden State Water Company	X			X	X	X
Trabuco Canyon Water District	X			X	X	X
Irvine Ranch Water District	X			X	X	X
City of San Juan Capistrano				X	X	X
Moulton Niguel Water District					X	X
South Coast Water District					X	X
City of San Clemente					X	X
El Toro Water District					X	X
Inland Empire Utilities Agency						X
Water management agencies						
San Juan Basin Authority	X			X		X
South Orange County Wastewater Authority				X		X
Relevant public agencies						
City of Mission Viejo				X	X	X
City of Rancho Santa Margarita				X	X	X
City of San Clemente				X	X	X
County of Orange				X	X	X
Homeowner Associations						
Coto De Caza Master Association						X
Oso Greenbelt						X
Rancho Santa Margarita						X
Las Flores Maintenance Corporation						X
Talega						X
Ladera Ranch						X
Mission Viejo Environmental						X
Mission Viejo Lake Association						X
Casta Del Sol						X
Major Landowner						
Rancho Mission Viejo	X			X	X	X

SECTION 1.2
UWMP Preparation (§10620 (e))

SMWD staff prepared the 2005 UWMP in coordination with other agencies as discussed in the previous section and formatted the Plan to correspond to the sections of the Act and the Department of Water Resources *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan.*

SECTION 1.3
Resource Maximization / Import Minimization Plan (§10620(f))

SMWD has an aggressive approach to develop local resources. SMWD utilizes a variety of planning documents which are periodically updated to meet current conditions. The documents and plans include the following:

- South Orange County Integrated Regional Water Management Plan (IRWMP) was developed collectively by all the public agencies in the region to coordinate local water resource development and management. One of the primary goals of the IRWMP is to decrease the region's dependence on imported water through the development of local projects including beneficial uses of urban runoff, expansion of recycled water systems and development of emergency storage.

- Five-Year Capital Improvement Program, which is updated annually, projects the upcoming projects to meet new demands and identifies projects to develop local resources.

- The Plan of Works for Improvement District Nos. 4c, 4e, 5 and 6 was developed to identify the facilities needed to supply The Ranch Plan.

- Water Supply Assessment for The Ranch Plan was prepared to document water supplies needed to support new development.

- SMWD/Cucamonga Valley Water District (CVWD) Option Agreement enables SMWD to enter into a Water Supply Contract with CVWD for at least 25 years for the purchase and delivery of 4,250 AF of water each year over the term of the contract.

- Project 21 is a master plan of alternative water supplies including local urban water projects and expansion of the recycled water system.

SECTION 1.4
Update Plan Every Five Years (§10621(a))

SMWD's 2005 UWMP was prepared in accordance with the Act's requirements to submit an update every five years in years ending in zero and five. SMWD has

previously submitted plans in 1985, 1990, 1995, and 2000. The Act requires a 20-year projection; however, SMWD has included projections for a 25-year period from 2005 to 2030. The additional data is provided for reference in the event SMWD is requested to prepare a Water Supply Assessment or a Written Verification between 2006 and 2010 (Code Section 10910 et seq).

SECTION 1.5
Cities and County Notification (§10621(b))

SMWD notified the County of Orange and the Cities of Mission Viejo, Rancho Santa Margarita and San Clemente by letter (copies of letters in Appendix A) that it was updating its UWMP and requested those agencies to provide comments or input. SMWD received a response from the County of Orange providing projections for development in the unincorporated areas. SMWD verified the information was in accordance with the recently adopted County General Plan. The Cities provided verbal comments that their respective planning numbers were current. Additionally, SMWD provided notice of the public hearing held on December 9, 2005 and copies of the draft plan.

SECTION 2.0
SMWD Background (§10630)

SMWD, established in December 1964 under provisions of the California Water District Law, includes 62,674 acres in the southeastern corner of Orange County. SMWD is bounded on the north by El Toro Road in the City of Lake Forest, on the east by the Cleveland National Forest, on the south by United States Marine Corp Camp Pendleton and San Diego County and on the west by the City of San Juan Capistrano and Moulton Niguel Water District. SMWD is responsible for inter-agency coordination and long range planning to meet future water supply and wastewater treatment needs for its service area as shown in **Figure 1**.

SMWD is divided into eight basic Improvement Districts (I.D.) as shown in **Figure 2**. These districts were formed to meet the needs of specific portions of SMWD based upon such factors as land use, topography, land ownership boundaries and the timing and characteristics of water supply and wastewater treatment needs. The Cities of Mission Viejo, Rancho Santa Margarita and the incorporated communities of Coto de Caza, Las Flores and Ladera Ranch as well as the remaining undeveloped portion of the Rancho Mission Viejo are within the service boundary of SMWD as follows:

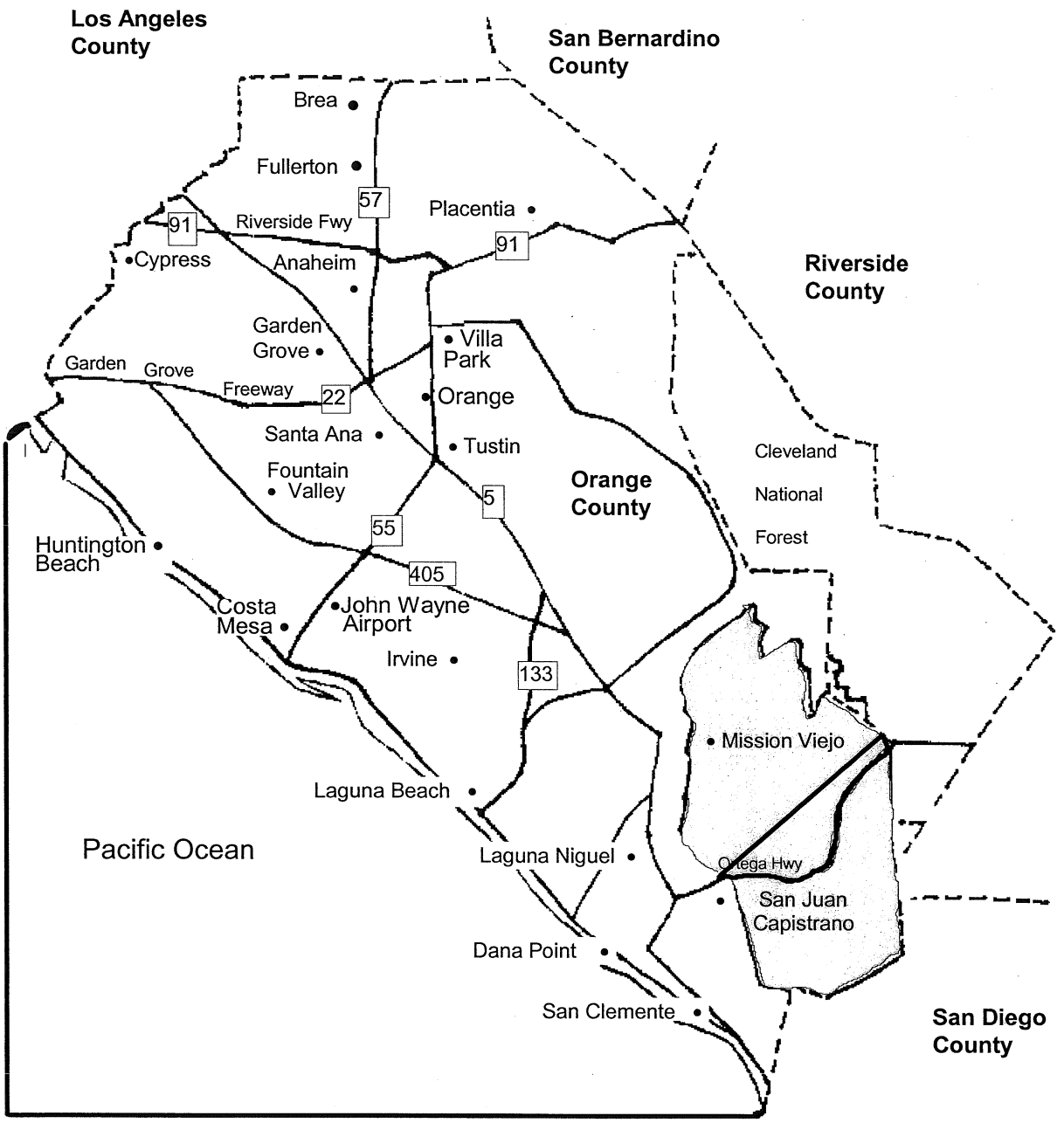


Figure 1
Santa Margarita Water District
Vicinity Map

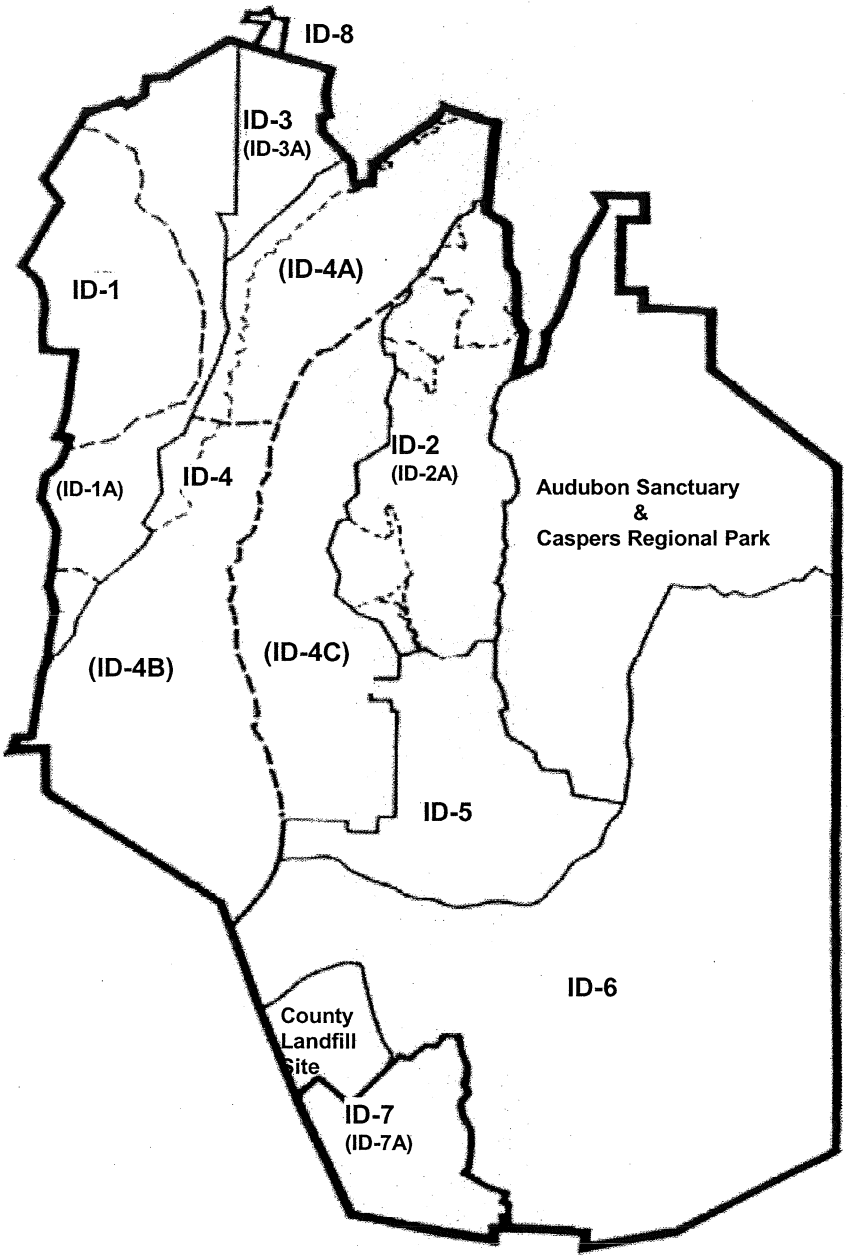


Figure 2
Santa Margarita Water District
Improvement Districts Map

Improvement District	Community/City
1	Eastern portion of the City of Mission Viejo
2	Unincorporated community of Coto de Caza
3	Northwest portion of Rancho Santa Margarita
4A	Central Rancho Santa Margarita
4B	Unincorporated community of Las Flores
4C	Rancho Mission Viejo County of Orange
4D	Unincorporated community of Ladera Ranch
4E	Rancho Mission Viejo County of Orange
5	Rancho Mission Viejo County of Orange
6	Rancho Mission Viejo County of Orange
7	Talega community in City of San Clemente
8	Meadow Ridge community in City of Mission Viejo
Not in I.D.	County of Orange Casper Regional Park
Not in I.D.	County of Orange Prima Deschecha Landfill
Not in I.D.	Audubon Starr Ranch Reserve

The governing body of SMWD (and all improvement districts therein) is a five-member Board of Directors, publicly elected at large for staggered four-year terms. SMWD's responsibilities as authorized by the California Water District Law are:

- Distribution of domestic water for consumption and fire protection.
- Collection and treatment of wastewater.
- Distribution of recycled water along with the collection and distribution of urban return flows for irrigation purposes.

SMWD is a member agency of the Municipal Water District of Orange County (MWDOC), a wholesale importer of water from the Metropolitan Water District of Southern California (MWD) and, as such, is entitled to receive water from available sources of MWD.

SECTION 2.1
Population (§10631(a))

SMWD has seen continual growth since the early 1970's. For the last 10 years SMWD has added over 2,000 connections per year. The current and projected population is shown on the following Table 2:

Table 2
Population - Current and Projected

	2005	2010	2015	2020	2025	2030
Service Area Population	150,759	161,727	176,248	188,106	196,226	197,120

The existing and proposed development has occurred within planned communities per the Orange County General Plan. The population projections are based on the projected number of dwelling units per the Orange County General Plan within SMWD boundaries multiplied by the estimated number of people per dwelling unit.

SECTION 2.2
Climate

SMWD's climate is mild, based on its location in close proximity to the Maritime Fringe Climatic Region of Southern California. SMWD has several microclimates based on its topography and the elevation change. The average annual rainfall is 13.49 inches. Table 3 is a summary of the data available from the California Irrigation Management Information System (CIMIS). CIMIS is a program in the Office of Water Use Efficiency (OWUE), California Department of Water Resources (DWR) that manages a network of over 120 automated weather stations in California. Station No. 75 is located in Irvine and is the closest to SMWD.

Table 3
Climate

	January	February	March	April	May	June	
Standard Average ETo	2.3	2.43	3.74	4.48	5.32	5.03	
Average Rainfall	2.32	4.65	1.28	1.00	0.28	0.03	
Average Temperature	55	55	58	58	63	65	
	July	**August**	**September**	**October**	**November**	**December**	**Annual**
Standard Average ETo	6.29	5.85	4.7	3.01	2.44	1.99	**3.96**
Average Rainfall	0.03	0.11	0.12	1.22	0.84	1.61	**13.49**
Average Temperature	70	70	69	63	58	54	**61.50**

Since SMWD's service area includes a variety of elevations and areas within coastal influence, several of the larger homeowner associations have installed local weather stations to assist in controlling the irrigation demands. Ladera Ranch, Coto de Caza and Rancho Santa Margarita all have weather-based computer control systems which monitor the local weather data and determine the water demand on a daily basis.

SECTION 2.3
Other Demographic Factors (§10631(a))

SMWD is primarily a residential community. The typical commercial and industrial concerns within SMWD are primarily retail and warehouse, with a minor amount of

manufacturing. Retail is concentrated in areas central to each of the communities and typically is a mix of grocery, restaurant and medical uses. Manufacturing is primarily in the Rancho Santa Margarita Business Park.

The Ranch Plan includes a mix of residential and commercial development in six planning areas and represents the build-out of the remaining open space within SMWD. The proposed residential development will consist of 14,000 units with 6,000 of the units being age-restricted units which have a lower water demand because of lower occupancy. The proposed commercial development is estimated to be 5.2 million square feet.

Water use sectors play the largest role in determining water supply demands within a given area. Water use sectors within SMWD include: residential, commercial (including industrial and governmental demands) irrigation and construction. SMWD does not provide water for agricultural use with the exception of water used by commercial nursery operations which is included in the commercial sector. Rancho Mission Viejo Company's existing ranching operations and lease holders are supplied from a private water system owned and operated by Rancho Mission Viejo and are not included in this UWMP.

Residential Sector

The residential sector accounts for approximately 57% of the existing water demand within SMWD. SMWD uses a planning factor of 450 gallons per day (gpd) per single family dwelling unit, 300 gpd per senior restricted dwelling units and 175 gpd for multi-family dwelling units.

Commercial Sector

SMWD has a mix of commercial uses including markets, restaurants, governmental entities such as schools, fire stations and government offices, office complexes, light industrial, warehouses and facilities serving the public. Current commercial demand is 10% of the overall demand. SMWD uses a planning factor of 225 gallons/day/1,000 square feet of building space. A sampling of existing users indicates the average demand is lower; however, since uses can change, the higher factor is considered prudent.

Construction Sector

SMWD has a variety of construction accounts with varying uses which account for 2% of existing demand. Demands are not in addition to new development, but occur temporarily and transitionally during construction as development occurs and, therefore, are included within the demand factors associated with new development. For this reason, separate projection factors are not generated for construction.

Irrigation

SMWD's water demands include recycled and domestic irrigation accounts. Existing centralized irrigation demands are 31% of SMWD's total water demands, with 11% of total irrigation demands provided by the recycled water system

Analysis of the Ladera Ranch irrigation system indicates that water requirements during the initial planting for slopes and shrub areas are 3.5 acre-feet per acre per year (afa/year) and 4.0 afa/year for turf areas. An overall system review indicates the average throughout SMWD is 2.5 afa/year. For purposes of this UWMP, a conservative factor of 3.5 and 4.0 afa/year, is used for slopes and turf, respectively.

Other uses

Uses, other than residential, commercial, irrigation or construction, are less than 2% of water use. These other uses include water used by SMWD facilities and for lakefill for the man-made lakes in Mission Viejo and Rancho Santa Margarita. SMWD uses will remain consistent in demand. Service agreements with SMWD for lakefill prioritize residential, commercial, construction and irrigation uses in the event of water shortage periods, enabling interruptions or avoided deliveries of water for lakefill.

SECTION 2.4
Water Sources (§10631(b))

This section addresses current and projected water supplies available to SMWD. Sources of supply addressed in this section include: imported (potable) water, recycled water, supplemental dry year(s) supplies, and local supplies. Table 4 shows the available and proposed supplies to meet the projected demands and the total capacity available to SMWD. Dry year supplies are not shown in the total water supplies because it would supplement the amount purchased from MWD if MWD supplies were less than required.

Table 4
Current and Planned Water Supplies - AFY

Water Supply Sources	2005	2010	2015	2020	2025	2030
Water purchased from:						
MWD/MWDOC	28,497	27,548	29,474	31,326	33,118	33,361
Supplier produced (San Juan Creek Basin)	116	116	116	116	116	116
Supplier surface diversions	1,418	2,540	2,540	2,540	2,540	2,540
Recycled Water (projected use)	4,012	6,101	8,031	9,830	11,983	11,983
Total	**34,043**	**36,305**	**40,161**	**43,812**	**47,757**	**48,000**
Dry Year Supply (CVWD)	4,250	4,250	4,250	4,250	4,250	4,250
Dry Year Supply (GSWC)	2,000	2,000	2,000	2,000	2,000	2,000

Imported Water

SMWD is a member agency of MWDOC, a member agency of and wholesale water importer from MWD, and as such is entitled to receive water from available MWD

sources. A 2005 Urban Water Management Plan, dated December 2005 and included as Appendix B, was prepared by MWDOC for its service area, inclusive of and consistent with SMWD's supply and demand projections addressed in this UWMP. SMWD has a service connection agreement with MWDOC whereby MWDOC will deliver water to SMWD as it receives water from MWD in the amount requested by SMWD, subject to MWD water availability. MWD has prepared an Urban Water Management Plan for the Metropolitan Water District of Southern California, dated November 2005, and included as Appendix C, for its service area. SMWD is relying upon water supply information provided by the wholesale agency in fulfilling informational requirements addressed in this UWMP.

SMWD receives imported (potable) water from MWD via the regional distribution system located in Orange County, components of which are described below. Although pipeline capacity rights do not guarantee the availability of water per se, they do guarantee the ability to convey water when it is available to the SMWD distribution system and, therefore, operate in tandem with water entitlements and/or contracts to receive supplemental water for purposes of demonstrating not only water supply reliability, but also physical delivery system reliability.

SMWD is connected to the Allen-McColloch Pipeline and the East Orange County Feeder No. 2 which deliver domestic water. For non-potable water, SMWD has capacity in the Baker Pipeline, operated by the Santiago Aqueduct Commission (a joint exercise of powers agency which includes SMWD), and the Irvine Lake Pipeline operated by Irvine Ranch Water District. SMWD is not currently directly connected to either the Baker or Irvine Lake Pipelines. Each of these facilities, along with entitlements or contracts to receive water from these facilities, is discussed below.

- **Allen-McColloch Pipeline**

  The Allen-McColloch Pipeline (AMP) is SMWD's primary source of domestic water in which SMWD owns specified capacity rights for the delivery of water. The AMP is connected to the South County Pipeline (SCP), which is jointly owned on the basis of capacity allocation, by SMWD and MWD. The SCP traverses the SMWD service area from north to south and passes through the area encompassed by The Ranch Plan. Additionally, SMWD has a connection to the AMP in Mission Viejo near the El Toro Reservoir. MWD owns and operates the AMP. SMWD's AMP capacity ownership, expressed as rate of flow, is 139.19 cubic feet per second (cfs).

  The Agreement For Sale And Purchase Of Allen-McColloch Pipeline (Metropolitan Agreement No. 4623) among MWD, MWDOC, MWDOC Water Facilities Corporation and certain other identified participants, including SMWD, dated July 1, 1994 (the AMP Sale Agreement) requires MWD, among other things, to meet SMWD's requests for water deliveries (subject to the availability of water from MWD). The AMP Sale Agreement further requires MWD to augment/increase capacity necessary to meet SMWD's projected ultimate service

area water demands, which includes The Ranch Plan and other undeveloped lands within SMWD.

- **East Orange County Feeder No. 2**

  The East Orange County Feeder No. 2 (EOCF No. 2) is a pipeline jointly owned by several local agencies and MWD. SMWD has 14 cfs, or 10,000 acre-feet per year of capacity rights in the EOCF No. 2 per the agreement entitled "1970 Agreement Municipal Water District of Orange County and Santa Margarita Water District," dated December 4, 1970. Water is delivered through the Aufdenkamp Transmission Main to SMWD's Plaza Pump Station.

  The EOCF No. 2 is considered a back-up system to the AMP and is currently used intermittently for facilities' maintenance purposes. Approximately 1,100 acre-feet of water per year is deliverable through this system as necessary to augment or replace deliveries, to the extent of capacity limitations, through the AMP.

  SMWD's capacity rights in the EOCF No. 2, and connecting local facilities, enable SMWD to receive water from sources including agencies located within the Orange County Water District (OCWD) service area. The delivery and method of delivery (i.e., direct delivery or exchange) of such water is likely to occur under dry year(s) conditions and will be subject to agreements or understandings involving MWDOC, OCWD and its member agencies.

- **Baker Pipeline**

  The Baker Pipeline conveys untreated water via a connection to MWD's raw (untreated) water feeder system. SMWD owns capacity in the pipeline pursuant to Santiago Aqueduct Commission Joint Powers Authority Agreement dated September 1961 and as amended, but does not currently have a direct connection. Trabuco Canyon Water District (TCWD) also has capacity and owns and operates a water treatment plant to produce domestic water. By agreement, SMWD can purchase up to 2,000 acre-feet per year from TCWD. This is included in the MWD imported water supply for purposes of this UWMP.

  This is considered a back-up system for reliability purposes. Additionally, in an emergency the Baker Pipeline can be converted to domestic use as it was in recent years, and used to deliver water to the South County Pipeline during the repairs to the AMP.

Recycled Water

Recycled water is considered a highly reliable water supply since it is generated from relatively constant and predictable wastewater flows that are not subject to seasonal variations. Code Section 1210 provides that the owner of a wastewater treatment plant operated for the purpose of treating wastes from a sanitary sewer system shall hold the

exclusive right to the treated waste water as against anyone who has supplied the water discharged into the waste water collection and treatment system, including a person using water under a water service contract, unless otherwise provided by agreement.

SMWD's permits for the operation of its wastewater treatment facilities addressed herein, allow only irrigation and customer uses of recycled water. Such water is not permitted to be discharged to a stream and, therefore, ownership or rights to use such water by appropriation is not possible. Consequently, SMWD owns and is entitled to sell recycled water.

SMWD owns and operates a recycled water system with three existing treatment plants, an agreement to purchase water from Irvine Ranch Water District and a seasonal storage reservoir. Recycled water is part of SMWD's overall menu of water supplies included in this UWMP for purposes of meeting the projected water demand for existing and planned future uses.

Supplies in any given year may exceed production due to storage capabilities. The Los Alisos Water Reclamation Plant (LAWRP) supply exceeds projected demands and can also be used to supplement flows during dry years.

- **Oso Creek Water Reclamation Plant**

  SMWD owns and operates the Oso Creek Wastewater Reclamation System (non-domestic system). Constructed in 1978 and upgraded in 1989 and 2004, this system includes: 1) tertiary treatment capacity of three (3) million gallons per day (mgd) in the Oso Creek Reclamation Plant; 2) the Upper Oso Reservoir; 3) a force main and distribution system for effluent disposal; and, 4) an interceptor system for low flow urban run-off waters in Oso Creek.

  Recycled water from this system is used to meet centralized irrigation requirements including a golf course and community landscape areas such as major slopes, parks and school grounds. Recycled water from the Oso Plant is pumped to the Upper Oso Reservoir, a 4,000 acre-foot seasonal storage facility located in Mission Viejo; capacity is allocated 75% to SMWD and 25% to Moulton Niguel Water District (MNWD).

  The Oso Plant recently completed modifications to the disinfection system and the aeration basins. The Oso Plant will produce approximately 2.0 mgd, which equates to 2,240 acre-feet per year.

- **Chiquita Water Reclamation Plant**

  SMWD completed construction of an expansion of the Chiquita Water Reclamation Plant in 2005. The current secondary treatment capacity of the Plant is 9.0 mgd, (7.8 mgd is allocated to SMWD, 0.64 mgd to IRWD and 0.56 to TCWD). The expansion included 5.0 mgd of tertiary capacity to produce recycled

water for irrigation uses. Additional capacity is planned to increase the total production of recycled water to 8 mgd, which is approximately 8,960 acre-feet per year by Year 2010, and to 12 mgd, which is approximately 13,440 acre-feet per year by Year 2020. Additional expansions are included in SMWD's Five-Year Capital Improvement Program (which includes longer-term capital facilities programs).

- **Chiquita System Seasonal Storage Reservoir**

  SMWD planning includes the construction of approximately 2,500 acre-feet of seasonal storage for recycled water produced from the Chiquita Plant. Approximately 20 potential sites were initially identified and geotechnical evaluation of the feasible sites is underway.

  Construction of a seasonal storage reservoir will allow for year-round recycled water production for use in peak irrigation demands which will increase the reliability of the recycled water supply. Sites will be identified for incorporation in The Ranch Plan, the Natural Community Conservation Plan (NCCP) and the Special Area Management Plan (SAMP) environmental documentation currently under preparation.

- **Los Alisos Water Reclamation Plant**

  SMWD entered into the Agreement by and between Los Alisos Water District and Santa Margarita Water District Relating to Interconnecting of the Districts' Nondomestic Systems whereby SMWD purchases recycled water from the Los Alisos Reclamation Plant owned and operated by Irvine Ranch Water District (IRWD) through a pipeline interconnection located in Mission Viejo. IRWD is the successor agency to the Los Alisos Water District. The agreement is included in Appendix D. Recycled water from the Los Alisos Plant is pumped to the Upper Oso Reservoir for seasonal storage. By agreement, SMWD can purchase up to 1,500 acre-feet per year from IRWD. IRWD has projected the supply to be available to SMWD through 2030. SMWD can purchase additional water on an as-available basis.

- **Interconnection Will Increase Reliability**

  The Oso/Los Alisos recycled water systems will be connected to the Chiquita system in 2005, thus increasing the reliability of the recycled supply throughout the SMWD service area, including the area within The Ranch Plan. The seasonal storage reservoir (discussed above) will add another layer of reliability and system operational flexibility but is not essential for purposes of supplying projected recycled water demands associated with existing and planned future uses.

Supplemental Dry Year(s) Supplies

MWD's 2005 Urban Water Management Plan, as discussed above, projects adequate supply reliability through at least 2030 including during single and multiple dry year(s). For purposes of further augmenting supply reliability during single dry and multiple dry years, SMWD has entered into two water purchase agreements involving existing water supplies located in the Chino Groundwater Basin.

The supplemental dry year(s) supply agreements addressed in this UWMP are directed to ensuring that additional water demands on SMWD's water resources, including potable and non-potable supplies, associated with The Ranch Plan do not result in a reduction in water supplies for existing demands/customers, while also taking into consideration approved new development uses (exclusive of The Ranch Plan). The supplemental water supplies addressed in this section enable SMWD to provide water for future customers without affecting the availability or reliability of supplies for existing customers under normal, dry or multiple dry year water years.

- **SMWD/Cucamonga County Water District Agreement**

  On March 25, 2003, SMWD and Cucamonga Valley Water District (CVWD) (formerly known as Cucamonga County Water District) entered into an exclusive three-year option agreement which, if exercised, enables SMWD to enter into a water supply contract with CVWD for at least 25 years for the purchase and delivery of 4,250 acre-feet of water each year over the term of the contract. The three-year option period provides sufficient time to determine the approval process for The Ranch Plan. A copy of the option agreement and water supply contract are included in Appendix E and F respectively.

  If The Ranch Plan proceeds, it is expected that SMWD will exercise the option to purchase water and thereafter will be committed to paying CVWD for 4,250 acre-feet of water each year irrespective of whether the water is called. SMWD and the owners of land encompassing The Ranch Plan have entered into a separate agreement whereby the latter is responsible for paying all costs associated with the option and water purchase contracts.

  The option and water supply contracts are specifically directed, and exclusive, to augmenting water supply reliability for The Ranch Plan as indicated in those contracts. In the event of unexpected MWD supply shortfalls up to 4,250 acre-feet of water can be called in each year to supplement MWD supplies. The effect of calling this water in the event of MWD supply shortfalls will be to enable the delivery of the amount of water necessary to meet The Ranch Plan demands during such a shortfall, while at the same time satisfying demands associated with SMWD's existing customers.

  The amount of 4,250 acre-feet of water has been secured to provide at least 64% redundancy to The Ranch Plan's projected Year 2025 potable water demand of

6,596 acre-feet during normal years and thus augment MWD's already conservative projected supply reliability as discussed above. Expected increased demand during dry and multiple dry years, will be met by increasing recycled water production, potentially from local supplies, and thus will enable at least a 50% margin of potable water supply redundancy in addition to meeting non-potable demands for The Ranch Plan.

- **SMWD/Golden State Water Company (Golden State Water Company) Agreement**

  On December 28, 2001, SMWD and Golden State Water Company (now known as Golden State Water Company; GSWC) entered into a water sale and purchase agreement providing for the purchase of 2,000 acre-feet of water by SMWD. The water is currently stored in the Chino Groundwater Basin. A copy of this agreement is included in Appendix G.

  The GSWC stored water was acquired in contemplation of augmenting MWD water supplies for The Ranch Plan. The water may be called if necessary to supplement the CVWD supply discussed above and is included for this purpose in this UWMP.

Local Supplies

Local supplies are urban run-off surface flow diversions comprised of the Oso Creek Barrier, Canada Gobernadora, Horno Creek and Dove Canyon. Additionally, SMWD is analyzing a potential project in Arroyo Trabuco, which has not been included in the water supply projections. SMWD overlies the San Juan Creek watershed. The State Water Resources Control Board (SWRCB) has determined the watershed is not a groundwater basin, but a surface and underground flowing stream and, therefore, it is subject to SWRCB jurisdiction and its processes with respect to the appropriation and use of waters within the watershed. SMWD is a member of the San Juan Basin Authority (SJBA) which has SWRCB Permit for Diversion and Use of Water Permit No. 21074 for appropriation and diversion of up to 8,026 acre-feet per year, with the ability to increase to 10,702 acre-feet of water per year upon demonstration of sufficient availability of unappropriated water.

As a member of the SJBA, SMWD is entitled to participate in the development of projects to appropriate and divert water from the San Juan Basin. Additionally, return imported flows, defined as water imported by the SMWD from outside the drainage basin (water purchased from MWD) used within the basin can be collected by SMWD for re-use. SMWD has a program to collect urban return flows for irrigation purposes to supplement the recycled water system. Collection and reuse of urban return flows limit or reduce urban run-off at the coast and reduce demand to import additional supplies. SMWD owns and operates the Oso Creek Barrier (discussed following) to supplement recycled water production. SMWD is proposing additional surface and/or subsurface flow diversions throughout its service area within the San Juan Basin watershed to

supplement the recycled water system. SMWD is participating in the SAMP and NCCP EIR development process to facilitate acquisition of permits which are reasonably expected to be issued subject to feasible terms and conditions.

- **Oso Creek**

  Since 1979, SMWD has operated the Oso Creek Barrier in Mission Viejo (the Barrier). The Barrier was constructed pursuant to *San Diego Regional Water Quality Control Board Order 77-11, Waste Discharge Requirements for Santa Margarita Water District Pilot Reclamation Near Mission Viejo, California.* The Regional Board required operation of the Barrier to mitigate potential degradation of the lower San Juan Creek Basin that may be caused by the use of recycled water produced and distributed from SMWD's Oso Creek Water Reclamation Plant. The Barrier is operated during non-storm periods and produces approximately one (1) mgd. SMWD is initiating design on an upgrade of the Barrier and anticipates the yield to ultimately be reliably 1,500 acre-feet per year.

- **Canada Gobernadora**

  SMWD has an on-going preliminary design effort for the construction of in Canada Gobernadora to collect and treat urban run-off from irrigation within Coto de Caza (Gobernadora Basin). A study prepared by Rivertech, Inc., dated September 1999, entitled *Gobernadora Multipurpose Basin Concept Plan and Estimated Yield* estimated the yield from the Gobernadora Basin is approximately 725 acre-feet per year.

  Water from the Gobernadora Basin would be pumped to the 500 acre-foot capacity Portola Reservoir located in the north end of Coto de Caza, which stores water used for non-domestic (irrigation) use. The Gobernadora Basin will yield water for irrigation use while providing wetlands and erosion protection. SMWD has started the environmental documentation for the project and has performed wildlife surveys.

- **Horno Creek**

  The Ladera Ranch master planned community in south Orange County has constructed an innovative storm runoff project that integrates flood control with state-of-the-art water quality system. As part of the permitting process, Ladera Ranch was required by the County of Orange, U. S. Army Corps of Engineers and State and Federal resource agencies to construct a 25-acre storm retention/detention facility and establish a wetland mitigation area for the Horno Creek located at the southern end of the development.

  The primary function of the Horno Water Quality Basin is to mitigate storm flows with the constructed detention basin so storm flows to the downstream community of San Juan Capistrano do not exceed pre-development levels. The

secondary function is to improve water quality within the watershed by naturally treating diverted low flows through constructed wetlands, prior to release to the natural and unimproved Horno Creek. To treat urban runoff, approximately four acres of the basin were set aside to establish a wetland mitigation area. Facilities include construction of two water quality control basins designed to capture first flush volume produced by all rainfall events occurring 90% of the time. Additionally, a 9.3-acre "riverine" system was constructed to reestablish the riparian character of the original Horno Creek. The riverine system was designed to function as a bio-filtration system for dry weather urban runoff, and captures over 95% of tributary urban runoff.

SMWD prepared a preliminary design for a project to capture urban runoff from the Horno Basin for irrigation purposes. The project consists of a manhole structure and piping system connecting to the underground drainage system at the outlet of the wetlands. Collected urban runoff would be pumped into the recycled water system for reuse. Plans and Specifications are currently being prepared for bidding in 2006.

- **Dove Canyon**

The natural habitat in the Starr Ranch, a preserve operated by the Audubon Society, is being degraded by urban return flows from Dove Canyon. Audubon has received a Proposition 13 grant to build a diversion structure to intercept the flow upstream of the habitat. Starr Ranch proposed partnering with SMWD to deliver the water into the nondomestic distribution system in Coto de Caza. The Audubon Society is proposing to collect and divert urban return flows in Dove Canyon from continuing downstream to Bell Canyon. The flow from Dove Canyon has increased with development and it is now a constant flowing stream instead of a perennial stream. The increase of water in Bell Canyon has impacted the habitat and native flora and fauna are being threatened by invasive species. The annual flow is estimated to be 100 AF.

- **Arroyo Trabuco**

In March of 1998, SMWD authorized a joint research project with Rancho Mission Viejo to conduct a technical feasibility study for new water production facilities to be located in the alluvium along Trabuco Creek in the reach roughly bounded by Oso Parkway and the proposed Crown Valley Parkway extension. The study was conducted by Wildermuth Environmental Associates and concluded that an infiltration gallery would capture approximately 1,500 acre-feet per year. The study was extended to include a source water determination to identify the percentage of non-storm water flows that were return imported flows.

A monitoring program conducted in conjunction with the study characterized water quality in strategic reaches and recharge areas of Arroyo Trabuco. Since, as explained above, SMWD retains imported water return flow rights, it is necessary

to establish the amount of return flow water available for collection and reuse by SMWD.

Eleven surface sites and four groundwater well sites were selected for the monitoring program. These sites were chosen to provide information about changes in water chemistry that occur within Trabuco Creek. The study's premise was that water quality in surface and groundwater varies substantially from upstream to downstream. Analysis of the water upstream of urbanization and analysis of imported water quality can be compared to water quality downstream of urbanization and the percentage of contribution of each can be determined.

Based on the water characteristic analyses, about 50 to 70 percent of the water in Trabuco Creek during non-storm flows is imported water. Dry-weather flow measurements conducted in the summer of 1996 indicate flow exceed 1 mgd, which is three acre-feet per day or a minimum of 1,120 acre-feet per year. Since, as indicated above, imported water return flows are in the range of 50-70%, this amounts to approximately 500 to 700 acre-feet of water each year which SMWD is entitled to harvest for irrigation use.

Nichols Institute

In April 1993, at the request of Nichols Institute (Nichols), SMWD and Nichols entered into "Agreement Between Nichols Institute and Santa Margarita Water District for Domestic Water and Wastewater Services for Nichols Institute Site". Nichols owns property within SMWD's boundaries that is remote from the existing water and wastewater facilities; no other source of supply is currently available. The facilities consist of a well for domestic water purposes which produces up to 150 acre-feet per year and a water reclamation plant for wastewater treatment and production of recycled water. The Nichols water production is included in the SMWD supply and demand for purposes of completeness. SMWD is not obligated provide an alternate source of water in the event the well becomes inoperable or unusable.

SECTION 2.5
Groundwater Sources (§10631(b))

SECTION 2.5a
Chino Groundwater Basin

This section includes groundwater information relative to SMWD's supplemental dry year(s) water supplies referenced hereinabove which are currently available pursuant to separate agreements with Cucamonga Valley Water District (CVWD) and Golden State Water Company (GSWC) entered into on March 25, 2003, and December 28, 2001, respectively. Both of these water supplies are located in and involve the Chino Groundwater Basin (the Chino Basin).

The CVWD and GSWC agreements specifically earmark reserved and stored water supplies, respectively, for SMWD supplemental dry year(s) purposes and enable the availability of such water to SMWD through an exchange process whereby they will increase groundwater production in-lieu of otherwise directly or indirectly receiving imported water from MWD. Access to and use of MWD's system for exchange purposes is addressed in Section 2.4 above.

Description of Chino Basin and Amount of Water CVWD and GSWC Have Legal Right to Pump Under Chino Basin Adjudication

CVWD and GSWC produce water from the Chino Basin which was adjudicated by the Superior Court of the State of California for the County of San Bernardino on January 27, 1978 (the Judgment). A copy of the Judgment and Court-approved amendments thereto is available at SMWD.

The Chino Basin consists of approximately 235 square miles in the upper Santa Ana River Watershed. While still considered a single basin for hydrologic purposes, the Chino Basin is divided into five management zones, based on similar hydrologic conditions, and three sub-basins. The Chino Basin stores approximately five (5) million acre-feet of groundwater with the capability of storing an additional one (1) million acre-feet.

The Judgment represents a plenary adjudication of all water rights in the Chino Basin and is currently administered under the authority of the Chino Basin Watermaster with continuing jurisdiction by the Court. The principal function of an adjudication generally is to control the use of a water source in order to ensure the source is utilized in an optimum manner. For purposes of an adjudication, the central feature is the determination of the safe yield of the Chino Basin.

The safe yield of a groundwater basin has been defined as the amount of water that can be withdrawn annually without producing an undesirable result. Withdrawal in excess of safe yield is termed overdraft. The Judgment established the safe yield of the Chino Basin in the amount of 140,000 acre-feet per year, however, Watermaster may determine that the operating safe yield can be higher from year-to-year depending on factors including favorable precipitation and management efforts that maximize the beneficial use of all water supplies in the Chino Basin. These management efforts, which ensure the long-term sufficiency of groundwater from the Chino Basin, including during dry years, are addressed below.

The Judgment does not place any limits upon the groundwater production by any party to the Judgment, which includes CVWD and GSWC. Parties are permitted to pump in accordance with the rights described by the Judgment.

The Judgment allocates safe yield of the Chino Basin according to the three pools as described in Paragraph 13 of the Judgment. The members of each pool are then enjoined from producing water from the Chino Basin in excess of such allocated amount "except pursuant to the provisions of the Physical Solution" (Judgment, Paragraph 13(a)-(c)).

The Physical Solution of the Judgment is described in broad terms by Paragraphs 39 through 57 of the Judgment. Paragraph 45 provides Watermaster with the authority to levy and collect assessments for the purchase of water necessary to balance the production by any party in excess of that party's allocated share of safe yield of the Basin. Paragraphs 49 and 50 describe the sources of water which are authorized to function as sources of replenishment water and the methods by which water can be replenished to the Basin. Exhibit "H," Paragraph 7, of the Judgment describes the way in which costs for replenishment water will be spread among the members of the Appropriative Pool, which includes CVWD and GSWC.

The afore-cited paragraphs of the Judgment evince a clear expectation that parties, including CVWD and GSWC, would produce water in excess of their adjudicated production rights. The injunction in Paragraph 13 of the Judgment should thus be interpreted to mean that parties are enjoined from producing water in excess of their adjudicated rights except to the extent that they will pay a replenishment assessment upon production exceeding a specified amount.

The ability to produce water from the Chino Basin is accordingly not a matter of availability, as contemplated and sanctioned by the Judgment for the reasons discussed above, but rather a matter of cost. Water produced in excess of production rights will cost more than water produced within a party's production rights. Thus, the quantity and reliability of water supplies for purposes of this UWMP is a matter of the cost of the water produced from the Chino Basin rather than limitations on production which may otherwise operate to reduce the sufficiency of the groundwater supply.

CVWD and GSWC have the right pursuant to Paragraph 12 of the Judgment to store supplemental water through written agreement with Watermaster, with the allocation of storage capacity subject to the needs and requirements of overlying users and owners of rights in the safe yield or operating safe yield having priority and preference over storage for export. CVWD's and GSWC's existing stored water is held pursuant to Local Storage Agreements with Watermaster and is included within the cumulative Local Storage limit of 50,000 acre-feet for all parties to the Judgment. Therefore, the right to produce water is not restricted to the extent water which CVWD and/or GSWC may produce in connection with the agreements with SMWD is considered stored water or stored water for export.

Whether the water is characterized as reserved or stored, does not affect its availability for CVWD's or GSWC's production for purposes of the agreements with SMWD since both parties, as discussed above, have rights to produce water pursuant to the Judgment and promulgating agreements and programs. Such characterization, therefore, may only be important with respect to whether the water is subject to a replenishment obligation and not CVWD's or GSWC's right to pump the water.

Detailed Description and Analysis of the Amount and Location of Groundwater Pumped for the Past Five Years by Cucamonga County Water District and Projected to be Pumped by Cucamonga County Water District Through 2030

CVWD pumps groundwater from the Cucamonga and Chino basins, both of which are adjudicated. The following table is a summary of the historical and the projected production from both basins:

Figure 3
Cucamonga County Water District
Historical and Projected Groundwater Supplies

Cucamonga and Chino Basins

Year	Acre-Feet
2000	16,837
2001	13,432
2002	17,305
2003	15,071
2004	19,296
2005	18,400
2010	33,400
2015	39,400
2020	42,400
2025	42,400
2030	42,400

The Cucamonga Basin is the predominant source of groundwater with the production being two-thirds, or more, of the total groundwater pumped by CVWD. Over the ten fiscal years from 1988-89 through 1997-98, the total annual groundwater production from both the Cucamonga Basin and Chino Basin has ranged from a low of about 11,419 acre-feet in Fiscal 1990-91, to a maximum of 24,337 acre-feet in fiscal year 1988-89. The average annual groundwater production for the ten-year period was about 16,200 acre-feet per year.

The southern portions of CVWD overlie the Chino Basin, which is separated from the Cucamonga Basin by the Red Hill Fault. SMWD's Chino Basin production in 2002 was from six wells. Based on the Judgment, CVWD's maximum annual groundwater pumping right is limited to an appropriative right of 3,619 acre-feet per year. In addition, CVWD purchased the Kaiser Ventures water rights of approximately 6,397 acre-feet per year in Fontana Water Company. With this, CVWD's minimum aggregate groundwater rights and access to groundwater in the Chino Basin is 10,016 AF.

Detailed Description and Analysis of the Amount and Location of Groundwater Pumped for the Past Five Years by Golden State Water Company and Projected to be Pumped by Golden State Water Company through 2025

GSWC has a single well within the Chino Basin and an annual appropriative right, exclusive of Agricultural Pool transfers, of approximately 411 AF. Agricultural Pool transfers provide an additional amount of water to GSWC of approximately 200 acre-feet per year, accumulated amounts of which may be sold from time-to-time.

Figure 4
Golden State Water Company

Chino Basin Groundwater Historical and Projected Production

Year	Acre-Feet
2000	411
2001	411
2002	411
2003	411
2004	411
2005	411
2010	411
2015	411
2020	411
2025	411
2030	411

Sufficiency of the Groundwater from the Chino Basin

CVWD's and GSWC's legal right to pump water in an amount necessary to meet all demands as sanctioned and protected by the Judgment as discussed above, including for purposes of the agreements with SMWD addressed in this UWMP, is buttressed by a number of programs and projects directed to ensuring the sufficiency of groundwater supplies from the Chino Basin, particularly during dry years. An adjudicated water right has perhaps the most substantial indicia of reliability of any water right that currently exists in California. An adjudicated right is based upon long-term studies whose purpose is to protect the long-term functionality of the water source. These rights are coordinated in an established and binding manner with all the other users of the Chino Basin and are overseen by Watermaster which has the authority to mandate and proscribe activities whose purpose is to protect the water source and maximize its long-term beneficial use. Chino Basin management activities include objectives, projects and programs identified in the Peace Agreement, entered into between Judgment parties on June 29, 2000, which are more specifically described in the Optimum Basin Management Program (OBMP) that implements the provisions of the Peace Agreement. All Watermaster processes are governed by Rules and Regulations and receive active oversight from the Court which, as noted above, retains continuing jurisdiction over the administration of the Judgment. Consequently, the sufficiency of the groundwater is not only directed by rigorous Watermaster management processes, but validated and ensured by continuing Court oversight.

OBMP projects directed to ensuring the maximization of safe yield and operating safe yield of the Chino Basin include: 1) a comprehensive monitoring program; 2) a

comprehensive recharge program; 3) development and implementation of a water supply plan for impaired areas of the Chino Basin; 4) development and implementation of a comprehensive groundwater management plan for Management Zone 1; 5) development and implementation of a regional supplemental water program; 6) development and implementation of cooperative programs with the Regional Water Quality Control Board and other agencies to improve Chino Basin management; 7) development and implementation of a salt management program; 8) development and implementation of a groundwater storage program; and 9) development and implementation of storage and recovery programs.

The referenced elements of the OBMP collectively comprise a comprehensive regimen directed to ensuring and maximizing the long-term beneficial use of water in the Chino Basin. The OBMP Program Elements are collectively directed to ensuring the sufficiency of Chino Basin groundwater supplies, particularly during dry years, and comprehensively address water quality and quantity, thus maximizing beneficial use over the long-term. The Inland Empire Utilities Agency (IEUA) Board of Directors approved and certified the overall OBMP Programmatic Environmental Impact Report in July 2000. Sufficiency of groundwater from the Chino Basin is further assured for the following reasons:

- IEUA is a member agency of MWD, which provides imported water from the State Water Project for direct use by parties to the Judgment in the Chino Basin and recharge purposes. IEUA has also reviewed the sufficiency of supplies for its service territory that includes the Basin in connection with its Year 2000 Urban Water Management Plan (IEUA UWMP).

- The IEUA UWMP is consistent with, and reiterative of, OBMP projects and programs. The IEUA UWMP projects increased requirements for imported water for direct and recharge use while noting reductions during dry years (due to increased reliance on groundwater from the Chino Basin) and in the higher amount otherwise required in the absence of OBMP projects and programs. The IEUA UWMP also analyzes the sufficiency of water supplies for single and multiple year drought scenarios and concludes the region is expected to meet 100% of its dry year demand under every scenario.

- California Water Code Section 10631(j) provides that urban water suppliers, such as IEUA, that rely upon a wholesale agency for a source of water may rely upon water supply information provided by the wholesale agency in fulfilling UWMP informational requirements. IEUA's independent analysis of contemporary regional water conditions in conjunction with MWD's most recent report, provide additional and reliable assurances concerning the sufficiency of imported water supplies that comprise a portion of overall Chino Basin supply sufficiency.

- IEUA's correspondence also references MWD's 100,000 acre-feet water storage and recovery program which, along with future storage and recovery projects will drought-proof the Chino Basin and all other appropriative pool members (including CVWD and GSWC) from imported water shortages. Watermaster is

currently finalizing an agreement for the MWD 100,000 acre-feet program that will include up to 10,458 acre-feet of participation by CVWD and thus further enhancing the sufficiency of CVWD's groundwater supply. This program is consistent with "OBMP Program Element No. 9-Develop And Implement Storage And Recovery Program". Benefits to the Chino Basin associated with this program include the construction of facilities to enhance imported water deliveries and the production of water from the Chino Basin. Further demonstrating the sufficiency of Chino Basin groundwater is MWD's program to use the Basin for dry year supply purposes, thus underscoring that sufficient Chino Basin groundwater is available during dry years not only for local use by agencies such as CVWD and GSWC but also in connection with MWD's regional reliability programs and other agencies such as SMWD.

In conclusion, the sufficiency of groundwater from the Chino Basin is assured due to CVWD's and GSWC's legal right to produce water necessary to meet ultimate demands in conjunction with OBMP objectives. These OBMP objectives which are overseen and administered by the Chino Basin Watermaster specifically assure, under the auspices of continuing Court jurisdiction, the long-term production of water from the Chino Basin.

SECTION 2.5b
San Juan Watershed

Local supplies are urban run-off surface flow diversions comprised of the Oso Creek Barrier, Canada Gobernadora and Arroyo Trabuco, all of which are described in Section 2.E.4. SMWD overlies the San Juan Creek watershed. The State Water Resources Control Board (SWRCB) has determined the watershed is not a groundwater basin, but a surface and underground flowing stream and, therefore, it is subject to SWRCB jurisdiction and its processes with respect to the appropriation and use of waters within the watershed. SMWD is a member of the San Juan Basin Authority (SJBA) a joint powers agency, formed to manage the watershed. Other member agencies include the City of San Juan Capistrano, Moulton Niguel Water District and South Coast Water District. SJBA has SWRCB Permit for Diversion and Use of Water Permit No. 21074 for appropriation and diversion of up to 8,026 acre-feet per year, with the ability to increase to 10,702 acre-feet of water per year upon demonstration of sufficient availability of unappropriated water.

As a member of the SJBA, SMWD is entitled to participate in the development of projects to appropriate and divert water from the San Juan Watershed. Additionally, return imported flows, defined as water imported by the SMWD from outside the drainage basin (water purchased from MWD) used within the basin can be collected by SMWD for re-use.

Table 5 Groundwater Pumping Rights - AFY	
Basin Name	**Pumping Right - AFY**
San Juan Basin (Contract operation)	150
Total	**150**

As stated above, SMWD operates the Nichols Well under a contract to serve the Nichols Institute. Nichols Well is included in the historic pumping by the Rancho Mission and is limited to 150 AF/Yr by agreement between Nichols and the Rancho Mission Viejo without prior permission.

The San Juan Watershed is bounded on the west by the Pacific Ocean and otherwise by tertiary semi-permeable marine deposits. San Juan Watershed includes San Juan Creek, Oso Creek, Trabuco Creek, Canada Gobernadora and Bell Canyon.

The primary water-bearing unit within the Basin is Quaternary alluvium. This alluvium ranges from a heterogeneous mixture of sand, silt, and gravel in the eastern portion of the basin, to coarse sand near the center, to fine-grained lagoonal sediments in the western portion of the basin. Thickness of the alluvium averages about 65 feet and may reach more than 125 feet. Specific yield of the alluvium is estimated to average about 13 percent and range from 3 to 22 percent. Wells typically yield from 450 to 1,000 gallons per minute (GPM). Sand layers of the Tertiary Santiago Formation may be water bearing within the region and beneath the basin, and minor amounts of water are extracted from fractured basement rock beneath the basin.

At the confluence of San Juan Creek and Canada Chiquita, near the middle portion of the basin, the Cristianitos fault forms a barrier to subsurface outflow. The Forster, Mission Viejo and Aliso faults are not known to form barriers to groundwater flow, but they are mapped as crossing the basin. Recharge of the lower Watershed is from flow in San Juan Creek, Oso Creek, and Trabuco Creek and precipitation to the valley floor. Water from springs flows directly from Hot Spring Canyon into San Juan Creek, adding to recharge in the upper watershed.

Groundwater levels in 1987 were similar to water levels in 1952. Hydrographs show seasonal cycles with average declines related to drought cycles that recover during more plentiful seasons. Groundwater flows southwest toward the Pacific Ocean. The total storage capacity has been estimated to be 90,000 AF.

The San Juan Basin Groundwater Management and Facility Plan by NBS Lowry (1994) investigated and modeled the groundwater basin for 1979 through 1990. The study determined that the mean pump extraction capacity was 5,621 AF/Yr and a mean subsurface inflow was 2,246 AF/Yr. Average subsurface outflow to the ocean was estimated to be about 450 AF/Yr.

In 1998, Stetson Engineers and Boyle Engineering Corporation prepared a study titled *Availability of Unappropriated Water San Juan Creek Basin for the SJBA*. The study concluded the following available unappropriated water which could be reliably extracted by the study subject projects in addition to existing (historic) pumping:

Base Period (1969/70-1991/92)	8,000 AF/year
Current	11,100 AF/year
Project Ultimate	14,100 AF/year

The study identified the above rates of withdrawal could be sustained indefinitely, assuming a repeat of the base period hydrological conditions. The Nichols Institute pumping is included under the historic pumping by the Rancho Mission Viejo.

Table 6 shows groundwater produced for Nichols Institute from the Watershed from 2000 to 2005:

Table 6
Amount of Groundwater Pumped – AFY

Basin Name	2000	2001	2002	2003	2004
San Juan Basin	232	158	116	107	116

Table 7 shows the projected groundwater production for Nichols Institute from the Watershed:

Table 7
Amount of Groundwater Projected to be Pumped - AFY

Basin Name	2010	2015	2020	2025	2030 - opt
San Juan Basin	116	116	116	116	116

SECTION 2.6
Reliability of Supply (§10631(c))

SMWD is dependent on imported water to meet its water demands and as such SMWD has taken numerous steps to insure it has adequate supplies. Development of recycled water systems, collection of urban return flows, and dry year supply agreements augment the reliability of the imported water system.

Table 8 below shows the reliability of SMWD for Normal Water Year, Single Dry and Multiple Dry Years. The water supplies are projected to meet the water demands. Additional supplies are available to SMWD in the event that projected supplies are inadequate. Primarily, the Supplemental Dry Year Agreements and the projected supply from the IRWD Los Alisos Recycled Water Plant are not fully subscribed. Also, the projected demand and supply for imported water is less than the amount that MWDOC has identified is available for SMWD from MWD. Appendix H shows the reliability by

source for Normal Water Year, Single Dry and Multiple Dry Years in five year increments.

Imported Water

MWD's 2005 Urban Water Management Plan finds that MWD is able to meet with existing supplies 100% of its member agencies' projected demands over the next 25 years (through Year 2030) during *normal years*, and 100% of its member agencies' projected demands over the next 15 years during *single dry years*. During *normal years*, and in addition to meeting 100% of all firm demands for 25 years, MWD projects reserve and replenishment supplies to refill system storage.

Table 8 Supply Reliability - AFY					
2010	**Normal**	**Single**	**Multiple Dry Water Years**		
	Water Year (1954)	**Dry Year (1961)**	**Year 1 (1959)**	**Year 2 (1960)**	**Year 3 (1961)**
Local Supply	8,757	8,845	8,920	8,733	8,845
	% of Normal	101.0%	101.9%	99.7%	101.0%
Imported Supply	27,548	29,457	29,818	28,915	29,457
	% of Normal	106.9%	108.2%	105.0%	106.9%
2015	**Normal**	**Single**	**Multiple Dry Water Years**		
	Water Year (1954)	**Dry Year (1961)**	**Year 1 (1959)**	**Year 2 (1960)**	**Year 3 (1961)**
Local Supply	10,687	10,881	10,979	10,734	10,881
	% of Normal	101.8%	102.7%	100.4%	101.8%
Imported Supply	29,474	31,489	31,873	30,913	31,489
	% of Normal	106.8%	108.1%	104.9%	106.8%
2020	**Normal**	**Single**	**Multiple Dry Water Years**		
	Water Year (1954)	**Dry Year (1961)**	**Year 1 (1959)**	**Year 2 (1960)**	**Year 3 (1961)**
Local Supply	12,486	12,779	12,898	12,600	12,779
	% of Normal	102.3%	103.3%	100.9%	102.3%
Imported Supply	31,326	33,443	33,849	32,833	33,443
	% of Normal	106.8%	108.1%	104.8%	106.8%
2025	**Normal**	**Single**	**Multiple Dry Water Years**		
	Water Year (1954)	**Dry Year (1961)**	**Year 1 (1959)**	**Year 2 (1960)**	**Year 3 (1961)**
Local Supply	14,639	15,050	15,196	14,833	15,050
	% of Normal	102.8%	103.8%	101.3%	102.8%
Imported Supply	33,118	35,333	35,761	34,691	35,333
	% of Normal	106.7%	108.0%	104.8%	106.7%
2030	**Normal**	**Single**	**Multiple Dry Water Years**		
	Water Year (1954)	**Dry Year (1961)**	**Year 1 (1959)**	**Year 2 (1960)**	**Year 3 (1961)**
Local Supply	14,639	15,050	15,196	14,833	15,050
	% of Normal	102.8%	103.8%	101.3%	102.8%
Imported Supply	33,361	35,590	36,020	34,943	35,590
	% of Normal	106.7%	108.0%	104.7%	106.7%

With the addition of planned supplies under development, MWD's 2005 Urban Water Management Plan finds that MWD will be able to meet 100% of its member agencies' projected demands through Year 2030, even under a repeat of the worst drought. In addition to meeting 100% of member agencies' firm demands through 2030, MWD projects a supply reserve.

MWDOC's 2005 UWMP states that it will provide 100% reliable service to its customers for the next 25 years. MWDOC concludes that MWD is capable of supplying water to meet demand projected by MWDOC under various hydrological conditions.

Recycled Water

Recycled water is a reliable source of water that is relatively drought-resistant, particularly with the hardening of supplies as low flow fixtures become more prevalent in the community. SMWD operates three water recycling facilities and also purchases recycled water from IRWD. Additionally, SMWD operates the Upper Oso Reservoir which stores recycled water seasonally to meet peak summer demands. Planning is underway for an additional seasonal reservoir.

The following table describes the quantity of recycled water produced in prior years.

Historical Recycled Water Production
(Acre-Feet per Year)

Year	1980	1985	1990	1995	2000
Oso Creek WRP	216	149	474	214	1,960
Los Alisos WRP	-	-	-	-	1,983
Chiquita WRP	-	-	-	-	-
Total	216	149	474	214	3,943

Supplemental Dry Year(s) Water Supplies

On March 25, 2003, SMWD and Cucamonga County Water District entered into the option agreement (with the executory water supply contract attached thereto) more fully described in Section 2.5A of this UWMP. A copy of the option agreement and water supply contract are included in Appendix E and F respectively.

On December 28, 2001, SMWD and Golden State Water Company entered into a water sale and purchase agreement more fully described in Section 2.5A of this UWMP. A copy of this agreement is included in Appendix G.

Local Supplies

Local supplies are urban run-off surface flow diversions comprised of the Oso Creek Barrier, Canada Gobernadora and Arroyo Trabuco, all of which are described in Section 2.E.4. SMWD overlies the San Juan Creek watershed. The State Water Resources Control Board (SWRCB) has determined the watershed is not a groundwater basin, but a surface and underground flowing stream and, therefore, it is subject to SWRCB jurisdiction and its processes with respect to the appropriation and use of waters within the watershed. SMWD is a member of the San Juan Basin Authority (SJBA) which has SWRCB Permit for Diversion and Use of Water Permit No. 21074 for appropriation and

diversion of up to 8,026 acre-feet per year, with the ability to increase to 10,702 acre-feet of water per year upon demonstration of sufficient availability of unappropriated water.

As a member of the SJBA, SMWD is entitled to participate in the development of projects to appropriate and divert water from the San Juan Basin. Additionally, return imported flows, defined as water imported by the SMWD from outside the drainage basin (water purchased from MWD) used within the basin can be collected by SMWD for re-use.

Factors Contributing to Reliability

Table 9 shows the basis of water year data. The determination of historical basis of the water year for Orange County was prepared by MWDOC and included in its UWMP (Appendix B). As noted, SMWD expects to be meet 100% reliability for every water year scenario included in the UWMP.

Table 9
Basis of Water Year Data

Water Year Type			
Average Water Year	1954		
Single-Dry Water Year	1961		
Multiple-Dry Water Years	1959	1960	1961

Table 10 shows the factors resulting in inconsistency of supply. Climatic conditions have been projected based on historical patterns; however severe pattern changes may occur in the future. SMWD has increased the reliability of its supply with the Supplemental Dry Year supplies to provide an allowance for changes in the climatic conditions.

Table 10
Factors Resulting in Inconsistency of Supply

Name of supply	Legal	Environmental	Water Quality	Climatic
Metropolitan Water District of Southern California				x
Surface Diversions				x

SECTION 2.7
Transfer and Exchange Opportunities (§10631(d))

SMWD has actively pursued additional water supply reliability through water transfers and successfully completed water transfers in the late 1990's through the MWD system. At present the future of such transfers as a reliable and cost-effective means of providing the basic supply are uncertain, however, transfer with specific purposes, such as supplementing dry year supplies can be effective. SMWD will continue to pursue water transfers as an alternative water supply and is currently working with MWDOC and other agencies to investigate possible transfers.

The Supplemental Dry Year Agreements noted in the previous section are transfer agreements that are triggered under specific conditions when supplies from MWD are limited. CVWD and GSWC will utilize groundwater in lieu of taking delivery of imported water from MWD. The imported water will be delivered to SMWD as summarized in Table No. 11.

Table 11
Transfer and Exchange Opportunities - AFY

Transfer Agency	Transfer or Exchange	Short Term	Proposed Quantities	Long Term	Proposed Quantities
Cucamonga Valley Water District	Transfer	X	4,250	X	4,250
Golden State Water Company	Transfer	X	2,000		
Total			6,250		4,250

SECTION 2.8
Water Use by Customer Type, Past, Current and Projected Future (§10631(e))

Past, current and projected future water service customers by type are provided in Table No. 12. The past and current information is based on existing customer service data. The projected future accounts are based on the County of Orange General Plan for the Ranch Plan. SMWD does not sell water to other agencies as shown in Table 13.

Table 14 shows SMWD's unaccounted for water losses through the system. All services are metered within SMWD. Any unaccounted for losses occur due to line breaks, system flushing and unaccounted for water during construction. Future losses are projected based on historic averages of approximately 4%

TABLE 12 Past, Current and Projected Water Deliveries							
Year	No. of Connections/ AF	Single Family	Multi-Family*	Commercial/ Industrial	Governmental/ Institutional	Landscape	Total
2000	Meters	27,790	9,865	1,134	47	1,975	40,811
	Acre Feet	13,500	2,099	1,222	674	11,667	29,162
2005	Meters	35,328	12,568	2,009	51	2,579	52,535
	Acre Feet	15,880	2,719	1,636	550	11,896	32,681
2010	Meters	39,106	14,296	2,049	55	2,719	58,225
	Acre Feet	15,721	2,573	3,463	556	12,541	34,853
2015	Meters	41,903	16,144	2,203	61	3,257	63,568
	Acre Feet	16,845	3,552	3,723	616	13,819	38,555
2020	Meters	44,364	17,815	2,467	65	3,761	68,472
	Acre Feet	17,834	3,919	4,169	657	15,481	42,060
2025	Meters	46,429	19,188	2,765	69	4,321	72,772
	Acre Feet	18,664	4,221	4,728	697	17,536	45,847
2030	Meters	46,669	19,338	2,825	71	4,356	73,259
	Acre Feet	18,668	4,254	4,774	715	17,669	46,080

* Number of meters and not total number of dwelling units. A portion of the multifamily meters serve more than one dwelling unit. The District requires condominium projects to meter each unit. Apartment complexes are allowed to have up to eight units per meter.

Table 13 Sales to Other Agencies – AFY							
Water Distributed	1999-2000	2005	2010	2015	2020	2025	2030
None	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Table 14 Additional Water Uses and Losses - AFY							
Water Use	1999-2000	2005	2010	2015	2020	2025	2030
Unaccounted-for system losses	1201	1362	1452	1606	1752	1910	1920
Total	1,201	1,362	1,452	1,606	1,752	1,910	1,920

Table 15 is SMWD's total water use including customer demands and unaccounted for water use for past, current and projected years.

Table 15 Total Water Use – AFY							
Water Use	1999-2000	2005	2010	2015	2020	2025	2030
Total of Tables 12, 13, 14	31,989	34,043	36,305	40,161	43,812	47,757	48,000

Comparison to Water Supply Assessment for "The Ranch Plan" General Plan Amendment / Zone Change

In June 2003, SMWD adopted the Water Supply Assessment for "The Ranch Plan" General Plan Amendment / Zone Change (Ranch Plan WSA) in response to the request by the County of Orange. Subsequently, the County of Orange entered into a settlement agreement to resolve a dispute challenging its certification of the environmental impact report and adoption of General Plan Amendment / Zone Change. The settlement agreement increases the amount of open space to be protected and reduces the amount of development area, which could result in increased densities in certain areas depending on the final allocation of proposed residential and non-residential uses. The net result to SMWD is a reduction in the water demand by decreasing the amount of both potable and recycled irrigation demands.

Additionally, the Ranch Plan WSA calculated water demands based on a uniform demand factor for all the proposed residential development units. The UWMP demand projections utilize three different demand factors for the projected development as follows:

	Number of Dwelling Units*	Projected demand per Dwelling unit (GPM)	Total Projected Demand (AF/Year)**
WSA Ranch Plan			
Residential	14,000	345	5,410
2005 UWMP			
Single Family	4,212	450	2,123
Age Restricted	6,000	300	2,016
Multi Family	3,788	175	742
Total	**14,000**		**4,881**

* The numbers and types of dwelling units are assumed to be the same evaluated in the Ranch Plan EIR

** Residential use only; does not included centralized irrigation demands or assumed losses

For the reasons outlined above, projected demands documented in the Ranch Plan WSA were higher than the demands now documented in the 2005 UWMP. The current demand projections were utilized to document the supply reliability. MWDOC has documented that the available imported supplies exceed the projected demand.

SECTION 2.9
Planned Water Supply Projects and Programs (§10631(h))

System reliability is ensuring the water importation system has adequate redundancy to continue to meet the minimum retail water demands. South Orange County is moving forward with the design and construction of reliability projects. The South Orange County Reliability Study identified a variety of projects, if implemented, to increase supplies and/or reliability to the region as follows:

Short Term Regional Projects (Projects that are easily implemented, under preliminary design or are planned to be implemented within five years).

- There are existing facilities for delivery of up to 10 cfs from MWD to Laguna Beach County Water District (LBCWD) and South Coast Water District (SCWD) through the Coast Supply Line from the Orange County Feeder and from Newport Beach Storage. During an emergency situation, the water being delivered from MWD has to be allocated to LBCD and SCWD by MWDOC. No facilities need to be constructed to implement this and during the last Diemer Filtration Plant (Diemer) shutdown storage from Newport Beach's Big Canyon Reservoir was utilized.

- MWD is preparing final design for the Orange County Cross Feeder to transfer water from the MWD Jensen Plant to the East Orange County Feeder No. 2 in the event Diemer is out of service. Completion of the facilities is projected for the winter shutdown in 2009 and funding is proposed to be provided by MWD. MWDOC has estimated 24 cfs can be delivered and possibly more, however it is sensitive to demands in the Los Angeles Region and other users on the pipeline.

- 20 to 25 cfs from MWD can be delivered via a temporary pump station at the Coastal Junction to the Aufdenkamp and Joint Regional Transmission Mains. This facility can generally be utilized only during a planned shutdown because of the set-up time to put in a temporary pump. The site is in an apartment complex and construction of a permanent facility would be difficult. The temporary pump station costs approximately $40,000 every time it is set up. The water is delivered from the Orange County Feeder through the last reach of the East Orange County Feeder No. 2 (water allocation can be increased if water is not allocated to the Coast Supply Line.) During the last Diemer shutdown in February 2005, approximately 15 cfs of water was delivered to MNWD, City of San Clemente and SCWD.

- Delivery of up to 50 cfs through the IRWD System by construction of pump stations and pipelines to the Aufdenkamp and Joint Transmission Mains and to the South County Pipeline is the goal of a current preliminary design effort by MWDOC and IRWD. The water can be a combination of MWD delivered water through the Orange County Feeder (water would not be in addition to the above temporary pump station but would be delivered by IRWD instead) or locally produced water from IRWD. Water from IRWD is currently available seasonally depending on its demands, future expansion of its projects may allow for increased flows and reliability.

- 725 Acre Feet of storage in the Upper Chiquita Reservoir can provide approximately 50 cfs over seven days subject to the final drawdown conditions. An additional reservoir (in Lower Chiquita or East Ortega) can increase the availability of water and extend the length of time emergency supplies can be provided. MWDOC has assumed that two reservoirs will provide approximately 70.2 cfs over 14 days.

- Local development of collection facilities for urban return flows in Horno Basin, Canada Gobernadora, Dove Canyon and Arroyo Trabuco as previously identified in Section 2.4.

- Expansion of the recycled water system at the Chiquita Water Reclamation Plant to 8 million gallons per day

Long Term Regional Projects (Projects that are more speculative or have a lead time of longer than five years for implementation).

- Dana Point Ocean Desalination was originally projected to provide approximately 25 mgd, 28,000 AF per year or 39 cfs if it is constructed as envisioned in the original configuration. The use of beach wells for the intake instead of a direct ocean intake pipeline may increase the likelihood of obtaining permits for the project but may reduce the capacity to approximately 15 mgd, 16,800 AF or 23 cfs. Capacity could be increased with the utilization of degraded groundwater in the San Juan Basin in addition to the beach wells subject to studies by the SJBA.

- MWD Central Pool Augmentation Project may provide an additional source of treated water to South County depending on the final project scope. The capacity would meet all the demands.

- Phase II of the Groundwater Emergency System will expand on the proposed IRWD interconnect with additional capacity in its well field and/or provide a connection directly to the East Orange County Feeder No. 2 from the upper Orange County groundwater basin.

- Expansion of the recycled water system at the Chiquita Water Reclamation Plant to ultimate capacity of 11 million gallons per day

Additional projects have been identified locally to provide for short and long term reliability and maximizing local resources as follows:

Local Reliability Projects (Projects that have been proposed to provide for local interconnections).

- A MNWD interconnect from the Joint Transmission Main will allow for water to be delivered to ETWD R-6 Reservoir in the event of an outage on the AMP. MNWD is preparing a preliminary design report identifying the required facilities. This project would be an alternative to the construction of the Gateway Pump Station by SMWD to

lift water from the Aufdenkamp Transmission Main to the reservoir; instead the Aufdenkamp capacity would continue to be pumped at the Plaza Pump Station.

- Investigations of potential interconnects have been started with the City of San Juan Capistrano Groundwater Recovery Project to maximize the existing production and review the potential for expansion of the project. Connection to the Joint Transmission Main is one alternative. During low water demand periods, the City has excess capacity available at the plant that could be used by other agencies.

- San Juan Basin Authority is reviewing the groundwater data to determine the expansion capability of the groundwater recovery projects by the City of San Juan Capistrano and South Coast Water District as well as incorporation of the Dana Point Desalter.

Table 17 summarizes the planned water projects that SMWD has included in the UWMP supply projections.

Table 17
Future Water Supply Projects

Project Name	Projected Start Date	Projected Completion Date	Normal-Year AF to Agency	Single-Dry Year Yield AF	Multiple-Dry-Year 1 AF	Multiple-Dry-Year 2 AF	Multiple-Dry-Year 3 AF
SMWD Chiquita Reclamation Expansion I	2008	2009-10	785	828	838	814	838
SMWD Chiquita Reclamation Expansion II	2016	2019-20	1154	1,402	1,456	1,321	1,456
Canada Gobernadora	2005	2008-09	725	653	653	653	653
Dove Canyon	2005	2007-08	473	90	90	90	90
Horno Basin Surface Water	2005	2006-07	215	194	194	194	194

SECTION 2.10
Ocean Desalination (§10631(i))

SMWD is not currently developing Ocean Desalination projects. MWDOC is studying regional desalination projects at three locations within Orange County and has included information in its UWMP about the projects. The projects are:

- Poseidon Resources Corporation Proposed Project
- Joint San Diego/Orange County Proposed Regional San Onofre Project
- MWDOC Proposed Dana Point Ocean Desalination Project

Currently, SMWD did not include any proposed supplies from ocean desalination in its planned water supplies to meet future demands. However, the opportunity may be available through MWDOC in the future. Table 18 summarizes SMWD opportunities.

Table 18
Opportunities for desalinated water

Sources of Water	
Ocean Water	Participate with MWDOC
Brackish ocean water	Participate with MWDOC
Brackish groundwater	Participate with MWDOC and SJBA

SECTION 2.11
Current or Projected Imported Water Supply (§10631(k))

As a member agency of MWDOC and MWD, SMWD is entitled to receive available water from MWD. Property owners within SMWD have been and continue to be, subject to the payment of property taxes levied by MWD since SMWD's formation in 1964 in connection with the entitlement to receive MWD water served by SMWD for use on their property. SMWD provided MWDOC with its projected water demands for five-year increments up to 2030. MWDOC coordinated with MWD on its projected imported water demands to serve its member agencies. As documented in the MWDOC UWMP, MWDOC reviewed two methodologies to prepare its demands:

- Forecast by MWD-Main Model which is an econometric-based model developed by MWD that statistically estimates water demands.

- Accumulation of member agency water demands. The methodologies and assumptions of the member agencies varied from agency to agency. Each agency used the best available information including general plan information from local cities and the County of Orange.

The results from the two methodologies were within approximately five percent of each other. MWDOC utilized the accumulation of data because it yielded the higher or more conservative demand number.

MWD's Draft 2005 Urban Water Management Plan documents its supply at the regional level. MWD specifies it is 100% reliable through 2030 to meet normal, single dry, and multiple dry year scenarios. MWDOC then compared the demand for imported water to the supply data provided by MWD and concluded that MWD was capable of supplying imported water to meet demand projected by MWDOC's member agencies under all studied hydrological conditions.

Table 19 presents the imported demand projections prepared by SMWD to provide to MWDOC and Table 20 presents the imported water supplies provided by MWDOC to SMWD as part of the information exchange between wholesale and retail water agencies.

Table 19 Agency Demand Projections Provided to Wholesale Suppliers - AFY					
Wholesaler	2010	2015	2020	2025	2030 - opt
MWDOC	27,548	29,474	31,326	33,118	33,361

Table 20 Wholesaler Identified & Quantified the Existing and Planned Sources of Water- AFY					
Wholesaler sources	2010	2015	2020	2025	2030 - opt
MWD via MWDOC	30,957	32,767	35,565	36,627	36,651

MWDOC supply projections exceed the SWMD demand projections. For this document, SMWD has assumed that supplies will equal demand and have not shown imported supplies to be greater than the demand. This is a reasonable conservative assumption because SMWD has been receiving water from MWD on a continual basis in increasing quantities based on service demands since 1973.

Table 21 indicates the reliability of wholesale supplies available to SMWD:

Table 21 Wholesale Supply Reliability - % of Normal AFY					
		Single Dry	Multiple Dry Water Years		
Wholesaler sources	Single Dry	1961	Year 1 (1959)	Year 2 (1960)	Year 3 (1961)
MWD via MWDOC	2010	105%	104%	107%	105%
MWD via MWDOC	2015	104%	103%	106%	104%
MWD via MWDOC	2020	106%	105%	108%	106%
MWD via MWDOC	2025	104%	102%	106%	104%
MWD via MWDOC	2030	103%	102%	105%	103%

MWD has indicated that climatic conditions as shown in Table 22 may add an element of inconsistency to its water supply. MWD has identified adequate reserves in groundwater storage and transfers to reliably serve its estimated demand if additional water is needed.

Table 22 Factors Resulting in Inconsistency of Wholesaler's Supply				
Name of supply	Legal	Environment	Water Quality	Climatic
MWD via MWDOC				x

SECTION 3
Demand Management Measures (§10631(f) and (g))

SMWD recognizes the importance of demand management as an integral element of its water planning strategies. While SMWD is not signatory to the California Urban Water Conservation Council's (CUWCC) Memorandum of Understanding Regarding Urban Water Conservation in California, SMWD has committed and dedicates resources to implementing the 14 Best Management Practices the CUWCC has established and are included in the Act.

SMWD promotes ongoing conservation and demand reduction through conservation although it is not required for purposes of meeting the combination of existing customer demands and projected demands associated with development occurring with the SMWD service area. Consequently, although demand reduction through conservation provides an additional level of conservatism for purposes of supply/demand analysis, existing and/or other developing lands within the SMWD service area are not required to reduce water use for purposes of enabling conserved water to be used to support or facilitate new development.

Conservation measures are undertaken as part of an overall comprehensive program throughout the SMWD service area directed to maximizing the availability of water for all customers while considering priorities of use by category (i.e. domestic; health and safety). The following is a discussion of each measure and the current activity:

SECTION 3.1
Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers (§10631(f)(1)(A))

SMWD's total water demand includes up to 70% for irrigation purposes. In addition, a majority of the residential and commercial accounts in SMWD boundaries were constructed after the 1992 plumbing code changes which required "Low Flow" devices to be installed. Therefore, a majority of our conservation programs focus on efficient irrigation practices for both residential and commercial accounts.

SMWD has developed and implemented a targeting/marketing strategy for Single-Family residential water use surveys by means of work order codes, meter reading codes, evaluating abnormal water bills, and consumption comparisons. These codes were implemented in 1995.

The following are the audit steps implemented by the District:

Audit 1	Developed By	Actions Taken
	Billing Generated Evaluate Invoicing stage-looking for abnormal consumption	Verify the meter read Leak detection & Notification Review landscape (moisture) Leave irrigation tips/schedule Market irrigation training program

Audit 2	Developed By	Actions Taken
	Customer generated	Verify the meter read Leak Detection Review landscape (moisture) Leave irrigation tips/schedule Market irrigation training program

Audit 3	Developed By	Actions Taken
To be Implemented in 2006.	Survey Target customers with +50 units on monthly water bills.	Letter Telephone call Request audit Leak detection Review landscape moisture Review and run timers Review all irrigation coverage Leave irrigation tips/suggestions Market irrigation training program

In addition, meter readers and field personnel assist customers with high consumption and leaks. They are tracked as:

- LD – Leak Detected
- LC – Leak Check
- OW – Over Watering
- ML – Meter Leak
- PC – Pressure Check
- FL – Flow Indicated

Each of these codes requires the field personnel to check for high consumption and notify the customer by means of personal contact or door hangers. We also complete home audits when a Pressure Check (PC) is requested. A pressure check requires field personnel to obtain static and residual pressure at a customer's home and complete an A2 audit when necessary.

SMWD customers are provided information packets that include evaluation results and water saving recommendations.

A1 –Actual	2001	2002	2003	2004	2005(proj)
# of Audits	5	95	65	12	20

A1 –Planned	2006	2007	2008	2009	2010
# of Audits	95	100	105	110	115

A2 –Actual	2001	2002	2003	2004	2005(proj)
# of Audits	308	218	114	165	180

A2 –Planned	2006	2007	2008	2009	2010
# of Audits	189	198	208	218	230

A3 –Actual	2001	2002	2003	2004	2005(proj)
# of Audits	0	0	0	0	0

A3 –Planned	2006	2007	2008	2009	2010
# of Audits	15	16	17	18	19

Actual	2001	2002	2003	2004	2005(proj)
# of Leaks Detected	593	800	242	67	39

Planned	2006	2007	2008	2009	2010
# of Leaks Detected	74	78	81	85	90

Actual	2001	2002	2003	2004	2005(proj)
# of Leak Checks	21,947	16,269	19,763	25,777	17,116

Planned	2006	2007	2008	2009	2010
# of Leak Checks	17,971	18,870	19,813	20,804	21,844

Actual	2001	2002	2003	2004	2005(proj)
Over Watering	2	4	-	1	-

Planned	2006	2007	2008	2009	2010
Over Watering	10	11	12	13	14

Actual	2001	2002	2003	2004	2005(proj)
Meter Leak	242	387	557	787	431

Planned	2006	2007	2008	2009	2010
Meter Leak	840	882	926	972	1021

Actual	2001	2002	2003	2004	2005(proj)
# of Pressure Checks	326	367	298	196	200

Planned	2006	2007	2008	2009	2010
# of Pressure Checks	210	220	231	243	255

Actual	2001	2002	2003	2004	2005(proj)
Flow Indicated	-	-	644	1,242	1250

Planned	2006	2007	2008	2009	2010
Flow Indicated	1313	1378	1447	1519	1595

SECTION 3.2
Residential Plumbing Retrofit (§10631(f)(1)(B))

The County of Orange has primacy over plumbing and building code enforcement within the unincorporated areas of SMWD. The Cities of Mission Viejo, Rancho Santa Margarita and San Clemente have jurisdiction within their regions. SMWD's Design Criteria and Standard Drawings references the Uniform Plumbing Code, which creates standards for plumbing fixture efficiency.

Plumbing Retrofit Saturation:

To determine whether or not the 75% saturation was achieved within Orange County, a saturation study was conducted by MWDOC and MWD and completed in Fiscal Year 2001. Data was obtained through telephone surveys and on-site inspections. Although the hypothesis that the 75% saturate rate was strongly supported with a 95% confidence level, the study showed that the low flow shower head saturation rate for single family homes was determined to be 67% as of FY 2001. For multi-family, it showed a saturation of 60%. Per the MWDOC UWMP, today low-flow showerhead saturation is estimated at nearly 100% and 94% saturation in single- and multi-family homes. As a result, Orange County and its water agencies, including SMWD, have reached the 75% saturation requirement for this BMP. No further low-flow showerhead distribution or installation activity has occurred.

SECTION 3.3
System Water Audits, Leak Detection, and Repair (§10631(f)(1)(C)):

SMWD has implemented the following system management programs:

- SMWD has a 100% metered system.
- Perform a system wide annual water audit to determine system loss.
- All distribution system water meters 4 inches and larger receive a complete maintenance and calibration once every 24 months, or as necessary to assure accuracy.
- Efficiency of pump units is checked once every 48 months.
- Perform random check of accuracy of meters 3 inches and smaller every three years.
  Meter accuracy is checked monthly by means of consumption comparisons between prior months and prior years.
- All metallic pipes have electrolysis test stations and cathodic protection.
- Prepare monthly report on each non-domestic service showing amount of water used bimonthly for prior year.
- Exercise each valve in system once every 24 months.

Actual System Water Audits	2001	2002	2003	2004	2005
Average % of Unaccounted Water	3.35 %	3.5 %	4 %	4.5%	4.5%
Miles of Distribution Lines Surveyed	198	214	256	261	272.6
Miles of Line Repaired	<1	<1	<1	<1	<1
Actual Expenditures [1]	$79,402	$82,291	$85,171	$88,418	$91,644
Actual Water Savings AF/Y[2]	N/A	N/A	N/A	N/A	N/A
Projected System Water Audits	**2006**	**2007**	**2008**	**2009**	**2010**
The following are all projected					
Average % of Unaccounted Water	4%	4%	4%	4%	4%
Miles of Distribution Lines Surveyed	285	292	305	315	330
Miles of Line Repaired	<1	<1	<1	<1	<1
Expenditures	$92,226	$101,037	$106,089	$111,394	$116,963
Water Savings AF/Y[2]	N/A	N/A	N/A	N/A	N/A

SECTION 3.4
Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections (§10631(f)(1)(D)):

SMWD requires all water connections to be metered. SMWD charges customers by volume of use based on unit prices per billing unit of 100 cubic feet. The District promotes the use of dedicated landscape meters for commercial facilities. Since wastewater charges are based on metered water usage, there is a financial incentive for customers to separately meter interior uses and landscape.

SECTION 3.5
Large Landscape Conservation Programs and Incentives (§10631(f)(1)(E)):

SMWD actively provides assistance with development of conservation based irrigation programs in the service area.

Number of dedicated irrigation meter accounts: 2605

Number of dedicated irrigation meter accounts with water budgets: 754

1 Actual expenditure calculated based on percentage of water distribution salaries and maintenance repair costs.
2 The SMWD system is relatively new and very little water is actually lost due to system leaks. The majority of water losses are through meter inaccuracies.

SMWD provides monthly web based Irrigation Performance Reports for accounts with irrigation budgets. With assistance from MWDOC, SMWD has implemented a marketing/targeting strategy for landscape surveys called, **"Landscape Certification Program."** MWDOC created a unique and innovative partnership linking landscape water management, green material management and non-point source pollution prevention goals of separate agencies into one program. This program is designed to:

- Assist water agencies to meet the landscape irrigation management requirements of the California Urban Water Conservation Councils Best Management Practice #5.

- Assist cities and the County of Orange to meet Integrated Waste Management Act goals (AB 979) to reduce the volume of green waste entering local landfills and to recycle those organic materials as mulch for the benefit of the landscape.

- Assist cities and the County of Orange to identify landscape run-off sites and to provide recommendations to minimize run-off.

Technical training sessions are designed to help both the landscape contractor and the property manager evaluate water consumption on dedicated irrigation meters and manage sites efficiently. The Landscape Performance Certification Program provides tools to help customers with the following:

- Utilize water resources more efficiently.

- Reduce water bills.

- Improve the health, appearance and the value of landscaping.

- Protect the environment by decreasing urban runoff.

- Access to each site's consumption data direct from SMWD and make comparisons between actual use and a calculated water efficient irrigation budget.

- Identify those accounts that are over watering (due to poor distribution uniformity and infrequent irrigation scheduling adjustments) for further discussion with the owner/property manager.

- Receive notification on upcoming training sessions, such as the Protector del Agua (PDA) series, as well as links to events from other industry associations.

How It Works:

The Landscape Performance Certification Program creates a loop of accountability between the Property Owner/HOA Board, the Property Manager, and the landscape contractor.

1. **Data Collected from Customer's Site:**
   Basic information from the property, such as contact information, location, and irrigated landscape area for each dedicated irrigation water meter is collected and stored in a secure database.

2. **Consumption Data from SMWD:**
   Every month SMWD develops a download of the consumption for all the irrigation accounts.

3. **Data from Weather Stations:**
   A daily data download from three weather stations in Orange County is received. This data download contains weather information for three regions: a coastal band; a central band; and a foothill band. Contained within this information is the Evapotranspiration Rate (ETo).

4. **Putting It All Together:**
   A water budget is then developed for the site. This budget is an estimate of the annual, monthly, or weekly water requirements for a specific irrigation meter, and is calculated by combining two formulas (one for turf and one for shrubs and all other non-turf irrigated plant material).

   It is also the intent of this "Certification" program to provide property managers and landscape contracting companies increased marketing opportunities, increased business retention and access to new business opportunities. The ability to recognize and promote certified companies can and should expand over the life of the program. To recognize and reward companies that implement and practice resource effectiveness throughout their managed sites. This program will promote those companies that achieve certification.

Promotion of "Certified" property managers and landscape maintenance contractors include:

- Advertisement of certified companies to local public agencies and their customers.
- Advertisement of certified companies to professional association.
- Advertisement of certified companies through trade publications.
- Potential advertisement of certified companies through local media outlets and the Internet.

Year program started: 2001

Table E1 – Actual	2001	2002	2003	2004	2005(proj)
Number of additional meters in program	333	354	558	640	753
Number of Acres	705.99	793	1410	1793	1797
Actual water savings-AF/Y	285	303	478	548	645

Foot-note: 2001-2005 actual water savings AF/Y are cumulative totals.

Table E2 – Planned	2006	2007	2008	2009	2010
# of meters in program	853	953	1153	1253	1353
Projected water savings-AF/Y (75 AF/year increase)	725	800	875	950	1025

Along with the Landscape Certification Program, SMWD also offers the Smart Timer Rebate Program. This regional program is available to all participating retail agencies and their customers. Residential customers are eligible to receive a rebate when they purchase and install a new, state-of-the-art, **weather-based sprinkler timer**. This advanced sprinkler timer technology has been shown to save 41 gallons per day per residential installation and to reduce runoff and pollution by 49%. A total of 5,000 residential and commercial Smart Timer installations are targeted for the SMWD boundaries and for the MWDOC service area over the next few years.

Other large landscape programs include **Protector del Agua Professional**. This training class is offered in English and Spanish and is directed towards landscape maintenance personnel. This course consists of six 4-hour consecutive classes in landscape water management. Each class builds on principles presented in the preceding class. Protector del Agua Professional begins with basic irrigation principles of soil-plant-water relationships, and concludes with irrigation scheduling. Each class consists of a slide show with lecture and demonstration. Every participant receives a bound booklet for the course.

SECTION 3.6
High Efficiency Washing Machine Rebate Programs (§10631(f)(1)(F))

SMWD provides customers with a rebate for a High Efficiency Clothes Washer through participation in the regional program sponsored by MWDOC and MWD. The customer receives a $100 rebate for replacing their old washing machine with a new High Efficiency Clothes Washer through the program. Rebates are offered on a first, come first serve basis. The High efficiency clothes washer uses 15 to 25 gallons less water per load and depending on use can save 7,000 gallons of water per year. SMWD does not incur any direct cost for the program; the cost of the program is included in its water purchases.

Year program started: 2001

Table F1 – Actual	2001	2002	2003	2004	2005 (proj)
Installed Clothes Washer	140	510	743	573	573
Actual Water Savings AF/Y	4.90	22.75	48.75	68.75	88.75

Table F2 – Planned	2006	2007	2008	2009	2010
Installed Clothes Washer	575	575	575	575	575
Actual Water Savings AF/Y	108.75	128.75	148.75	168.75	188.75

SECTION 3.7
Public Information Program (§10631(f)(1)(G))

SMWD recognizes the importance of water conservation and protection of water resources of the State. As a matter of policy and operational practice, SMWD seeks to maximize the beneficial use of available water resources. Therefore, it is the policy of SMWD to discourage and prevent water waste, and to encourage various water conservation methods.

SMWD programs compliment water conservation programs implemented by MWD and MWDOC. For information regarding water conservation measures by MWD and MWDOC please refer to their plans. In addition to their activities, SMWD has the following programs designed to increase public awareness.

SMWD publishes a monthly newsletter for our customers that includes discussion on a variety of topics, including water conservation, water reclamation, and landscape management. The newsletter is distributed to each customer as part of the billing cycle. This involves approximately 52,000 newsletters monthly.

Additionally, SMWD has prepared an educational packet for all new customers titled *Customer Guide.* Contained within this guide is general information regarding contact information, billing, and SMWD's organization. Also included are the following four informational brochures regarding water use:

- **Water Quality**: Describes the source of water in the SMWD service area and provides specific information regarding water quality issues such as disinfectants, Cryptosporidium, lead, and monitoring programs.

- **Water Costs:** Describes SMWD's tiered rate structure, imported water cost, energy cost, availability of supply and provides detailed instructions on how a customer can read their water bill to determine their usage patterns.

- **Water Conservation**: Explains the need to conserve water based on limited supply in a semi-arid region and SMWD's water conservation programs, including voluntary conservation programs and mandatory curtailment. Also provides water saving suggestions, such as installation of low-flow fixtures, landscape irrigation practices, and other water saving tips.

- **Water Wise Landscaping**: Comprehensive guide to drought tolerant planting, soil analysis, plant selection, landscape maintenance and irrigation practices. Also provides suggestions on proper watering, fertilizing and mowing of turf grass.

Other Literature:

SMWD budgets for and purchases or produces a wide variety of informational literature designed to inform readers about the water industry in general and the need to conserve water in particular. SMWD utilizes a billing format intended to provide customers with information on

their usage patterns. In addition, these bills allow for the insertion of information designed to provide the customer with water saving tips and advice on an as-needed basis.

- **Speaker Program**

SMWD's public relations efforts include a variety of presentations designed to convey the water conservation message to local organizations including homeowner associations, service clubs, business organizations, church groups, and public and private schools.

- **Residential Irrigation Education**

Protector del Agua was originally developed for the commercial irrigator but was modified for the residential customer. This four-hour class covers the basics of irrigation systems, watering and fertilizing, basic landscape design and plant identification. The class is taught through a series of slides and uses basic terms and concepts. Some hands-on exercises and demonstration displays help involve the participants further by giving them a better understanding of irrigation hardware and plant-water-soil relationship. SMWD also presents a series of Home Gardeners Water Conservation Workshops (HGWCW) as part of its Water Wisdom Program. The classes are taught through a series of slides, hands-on demonstrations, displays and exercises. These classes are held on a Saturday and are available to anyone.

HGWCW	2001	2002	2003	2004	2005
Number of classes	N/A	5	10	4	3
Number of attendees	N/A	89	90	89	90

HGWCW	2006	2007	2008	2009	2010
Number of classes	5	5	6	6	6
Number of Attendees	90	95	99	103	108

Table G 1 – Actual	2001	2002	2003	2004	2005
A. Paid advertising					
B. Public Service Announcements					
C. Bill inserts/Newsletters/ Brochures					
D. Bill showing water usage in comparison to previous year's usage.					
E. Demonstration Gardens					
F. Special Events, Media Events					
G. Speaker's Bureau					
H. Program to coordinate with other government agencies, industry and public interest groups and media.					
Actual expenditures - $	**252,408**	**361,908**	**283,200**	**386,725**	**376,000**

Table G2 - Planned	2006	2007	2008	2009	2010
A. Paid advertising					
B. Public service Announcement					
C. Bill Inserts/Newsletter/ Brochures					
D. Bill showing water usage in comparison to previous year's usage.					
E. Demonstration Gardens					
F. Special Events, Media Events					
G. Speaker's Bureau					
H. Program to coordinate with other government agencies, industry and public interest groups and media					
Projected expenditures - $	**555,000**	**582,000**	**600,000**	**600,000**	**600,000**

Detailed breakdowns of the costs are not available. The annual total expense includes cost for all the activities.

SECTION 3.8a
School Education Programs (§10631(f)(1)(H))

SMWD, in conjunction with MWDOC, offers the following school programs:

- Assemblies at schools/Field Trip/Essay Contest - Fifth Grade

SMWD has implemented a school education program to promote water conservation to Fifth grade students. SMWD offers a one hour classroom and/or assembly style presentation to all fifth grade classes in both public and private schools located within SMWD's service area. The program includes a Power Point presentation focusing on conservation awareness and urban runoff. The presentation also provides students an explanation of the reclamation process of SMWD's Chiquita Water Reclamation Treatment Plant. The program meets California Science Content Standards specific to the fifth grade. Educational hand-out materials and activities are provided to teachers and students in order to encourage further water related education. Students are invited to enter SMWD's essay contest by submitting an essay on various conservation topics.

SMWD offers an on-site field trip to fifth grade students from schools within SMWD's service area. The educational field trip consists of touring Chiquita Water Reclamation Plant and SMWD's headquarters, hands-on water experiments, an explanation of the SMWD agency structure including the board of directors and the role they play, and an educational video focusing on urban runoff as well as a conservation presentation with a question and answer period.

- Assemblies at Schools presented by MWDOC – Kindergarten through Fourth Grade

Students role-play as water molecules, investigate human impacts on water and learn how to control pollution. These lessons include:

1. Scarcity of water in California
2. The forms and sources of water
3. The water cycle
4. Water storage, filtration, treatment, recycling & conservation

- Hands-On Science courses – Fifth and sixth grade

Students receive three one-hour programs on consecutive days, consecutive weeks, or after school. Each student receives a chemical test kit for experiments and a canvas bound journal for recording scientific information and discoveries.

- Water Course For Teachers – Middle & High School

Free material kits are available to teachers for student experiments and standards-based activities in class. Topics include:

1. Chemical components of water
2. Water production
3. Purification & usage
4. Human impact on water, and water conservation

The kit includes chemical test kits for measuring nitrates, phosphates, pH, and dissolved oxygen, as well as other science based materials and equipment. Each kit includes enough supplies for up to 200 students

The program started in 2001. The costs shown are approximate, actual costs include salaries and public relation expenses.

Table H1- Actual	**2001**	**2002**	**2003**	**2004**	**2005(proj)**
K-3 (MWDOC)	4029	2467	2404	1519	1519
Grades 4-6 (MWDOC)	2556	1786	1104	689	689
Grades 7-8 (MWDOC)	465	726	0	0	0
Grades 9-12 (MWDOC)	0	0	0	0	0
5th Grade Field Trip	600	*	*	720	1200
Actual expenditures-$-	**14,706**	**6,276**	**6,080**	**29,200**	**30,000**

*Tours and educational field trips were halted for 2002 and 2003 due to terrorism threat *

Table H2- Planned	**2006**	**2007**	**2008**	**2009**	**2010**
K-3 (MWDOC)	1519	1534	1559	1574	1589
Grades 4-6 (MWDOC)	690	705	720	735	750
Grades 7-8 (MWDOC)	0	0	0	0	0
Grades 9-12 (SMWD)	60	60	60	60	60
5th Grade Field Trip (SMWD)	1260	1320	1380	1440	1500
Projected expenditures-$	**33,000**	**36,000**	**39,000**	**40,000**	**40,000**

SECTION 3.8b
Conservation Programs for Commercial, Industrial, and Institutional Accounts (§10631(f)(1)(I))

SMWD participates in the C.I.I. program that is tailored specifically for the Commercial Sector. Rebates and incentives are available to businesses, industry and institutional water customers on water saving devices through MWD. Those who qualify for the "Save a Buck Rebates" include businesses and companies who participate by installing or retrofitting with qualifying water saving devices. Businesses must be located in areas served by the Metropolitan Water District's Family of Southern California water agencies.

As discussed earlier, SMWD's total water demand includes up to 70% for irrigation purposes. In addition, a majority of the residential and commercial accounts in SMWD boundaries were constructed after the 1992 plumbing code change which requires Low Flow devices to be installed. Therefore, a majority of our conservation effort is dedicated to efficient irrigation practices for residential and commercial accounts.

SMWD Currently has 2,020 Commercial, Industrial, and Institutional accounts and started participating in the program in 2001. Funding is provided by MWD.

Table I 4 – Actual	**2001**	**2002**	**2003**	**2004**	**2005(proj)**
# of commercial replacements	0	1	3	2	3

Table I 5 – Planned	**2006**	**2007**	**2008**	**2009**	**2010**
# of commercial replacements	15	20	25	30	35

SECTION 3.9
Wholesale Agency Programs (§10631(f)(1)(J))

SMWD is a retail agency; all wholesale activities pertaining to conservation are implemented by Municipal Water District of Orange County.

SECTION 3.10
Conservation Pricing (§10631(f)(1)(K))

SMWD implemented a residential ascending block tiered-rate pricing structure in 1991 that recovers cost for providing services and provides an economic incentive to reduce the usage of water and/or curb the excessive use of water. Appendix I is a copy of SMWD's water and wastewater rates structure including pumping zone charges.

Santa Margarita Water Rate Summary		
Customer Class	**Tier Range CCF**	**Rate per CCF**
Residential	Lifeline 00 – 06	$ 1.38
	07 – 35	$ 1.56
	36 – 70	$ 2.05
	over 70	$ 2.46
Commercial	No Tier	$ 1.74
Domestic Irrigation	No Tier	$ 1.74
Non Domestic Irrigation	No Tier	$ 1.74

SECTION 3.11
Water Conservation Coordinator (§10631(f)(1)(L))

SMWD has staff dedicated to conservation. Gary Russell is the Conservation Coordinator and approximately 50% of his time is dedicated to conservation programs. In addition, Martina Trotta is the Conservation Office Specialist and approximately 40% of her time is dedicated to conservation programs.

Table L1- Actual	2001	2002	2003	2004	2005(proj)
SMWD Part-time staff	1	1	1	1	2
MWDOC Staff	2	2	2	3	3
SMWD expenditures-$-	48,200	50,200	52,800	55,000	76,000

Table L2- Projected	2006	2007	2008	2009	2010
SMWD Part-time staff	2	2	2	2	2
MWDOC Staff	3	3	3	3	3
SMWD expenditures-$-	78,200	80,620	83,000	85,500	88,100

SECTION 3.12
Water Waste Prohibition (§10631(f)(1)(M))

It is the desire of SMWD to achieve conservation of water resources whenever possible, such measures being consistent with legal responsibilities for utilization of the water resources of the State of California and the District.

No irrigation of new or existing parks, median strips, landscape public areas or landscaped areas, lawns, or gardens surrounding single family homes, condominiums, townhouses, apartments, or individual parks shall occur in such a way as to waste water. The rate and extent of application of water shall be controlled by the customer so as to minimize run-off from the irrigated areas.

It is also SMWD's policy to encourage the installation of Ultra-low flow toilets which flush with 1.6 gallons of water or less. Whenever reasonably possible, toilets in existence before the effective date of these Rules and Regulations shall be fitted with retrofit devices, such as, but not limited to, devices set into the toilet tank, which decrease the amount of water used to flush the toilets.

SECTION 3.13
Residential Ultra-Low Flush Toilet Replacement Programs (§10631(f)(1)(N))

SMWD participates in the Ultra Low-flow Toilet (ULFT) rebate Program through MWDOC. The Residential Ultra Low-Flow Toilet Rebate Program is designed to aid homeowners in replacing toilets manufactured before 1992 with new ultra low-flush toilets. SMWD had 24,004 dwelling units in 1992 and currently has 53,663.

Water savings and installed toilet information is compiled by MWDOC. MWDOC has included an economic analysis in its UWMP.

Year Single-Family program started: 1994

Table N 1 - Actual	2001	2002	2003	2004	2005 (proj)
# of ULF replaced	1226	727	629	236	139
Actual water savings – AF/Y	77	103	121	132	137

Year Multi-Family program started: 1994

Table N 2 - Actual	2001	2002	2003	2004	2005 (proj)
# of ULF replaced	32	63	35	24	40
Actual water savings – AF/Y	40	42	45	46	48

Water agencies have long recognized the water saving potential and economic benefits of ULFT installation. The Santa Margarita Water District's conservation program began with accelerating ULFT replacement because the savings captured were large, easy to quantify, and cost effective to implement. In 2001 an ULFT saturation study was performed by the Municipal Water District of Orange County with its result concluding that pre-1992 single-family homes in the Santa Margarita Water District had a measured saturation of 48.6% and multi-family homes measured at 37.6%. By extrapolating the 2001 data, SMWD's current saturation estimate for a single-family home measures at 70% with a multi-family home measuring 55%. Further marketing will continue through rebate programs, however recent interest has shown a decline. This will be reflected in SMWD projection for ULFT from 2006 to 2010. However, rebate incentives for High Efficiency Toilets (20% more efficient than ULF Toilets) are anticipated to be offered in 2006.

Year Single-Family program started: 1994

Projection	2006	2007	2008	2009	2010
# of ULF replaced	139	139	139	139	139
Actual water savings – AF/Y	143	148	153	158	163

Year Multi-Family program started: 1994

Projection	2006	2007	2008	2009	2010
# of ULF replaced	40	40	40	40	40
Actual water savings – AF/Y	50	52	54	56	58

SECTION 3.14
Evaluation of Demand Management Measures Not Implemented (§10631(g))

SMWD does not have any demand management measures (DMMs) that are not currently being implemented. SMWD has a program for each DMM or is participating in a regional program sponsored through MWD or MWDOC. Table No. 16 indicates cost for non-implementation is not applicable to this UWMP.

Table 16
Evaluation of Unit Cost of Water Resulting from Non-Implemented / Non-Scheduled DMMs and Planned Water Supply Project and Programs

Non-implemented & Not Scheduled DMM / Planned Water Supply Projects (Name)	Per-AF Cost ($)
Not Applicable	

SECTION 3.15
Determination of Demand Management Measures Implementation (§10631.5))

SMWD has provided documentation on its activities with regards to implementation of DMMs in its service area. In conjunction with programs sponsored by MWD and MWDOC, SMWD has an effective program to promote conservation.

SECTION 4.0
Water Shortage Contingency Plan

SECTION 4.1
Stages of Action (§10632(a))

In April 1991, the SMWD Board of Directors adopted Ordinance No. 91-4-01, providing for a comprehensive water conservation program in the event of a critical water supply shortfall (the Conservation Ordinance). The Conservation Ordinance was enacted because of an extended drought at that time and the establishment of a water rationing program by Metropolitan Water District of Southern California. The Conservation Ordinance established: 1) a tiered water rate structure to encourage conservation and 2) mandatory conservation stages, a copy is included in Appendix J.

Under the Conservation Ordinance the following stages are can be implemented by the Board of Directors:

- Stage One: Customers are encouraged to voluntarily conserve water by implementing restrictions set in stages 2, 3 and 4 to the extent possible.

- Stage Two: The following mandatory measures are implemented:

    1. Washing of vehicles is prohibited unless done with a bucket and hose with a shut-off valve or at a commercial car wash.

2. Wash down of paved areas is prohibited except to alleviated immediate fire or sanitation hazards.

3. Restaurants are restricted to providing water only on customer request.

4. Non-potable water shall be used wherever possible.

5. Construction water customers shall be required to use non-domestic water as prescribed by a Board approved list of construction water uses. Construction Water customers shall be prohibited from using any type of water for dust control in improved areas, street cleaning, rain clean-up or flushing of storm drains.

- Stage Three: In addition to the previous measures, the following will be implemented:

    1. All outdoor irrigation, including residential lawn watering, shall be permitted only between the hours of 6:00 p.m. and 6:00 a.m. the following morning.

    2. Washing of vehicles is prohibited except at commercial car washes.

    3. Filling or refilling artificial lakes shall only be by permit obtained from SMWD.

    4. Operation of fountains is prohibited unless the water is recycled or non-potable water.

    5. The use of domestic water for construction purposes shall only be permitted by and in accordance with a construction water use permit obtained from SMWD.

- Stage Four: In addition to the previous measures, the following will be implemented:

    1. All outdoor irrigation is prohibited.

    2. The use of water by commercial car washes shall be reduced in volume by 50%.

    3. Filling or refilling swimming pools, spas, ponds or artificial lakes is prohibited.

    4. Use of domestic water for construction is prohibited.

The Conservation Ordinance additionally establishes monetary penalties for violations. Based on previous shutdowns of the Allen-McColloch Pipeline, which provides most of the MWD imported water delivered to SMWD, demand can be reduced during single and multiple dry years in an amount of 43% acre-feet of normal year demands. This assumes, however, curtailment of all non-essential uses of water (primarily irrigation). Limited use of water for irrigation purposes would reduce demand projections by approximately 10% compared to normal year demands based on SMWD demand data from the last drought period in 1991. Table 23 summarizes the SMWD Stages:

Table 23 Water Supply Shortage Stages and Conditions RATIONING STAGES		
Stage No.	Water Supply Conditions	% Shortage
1	Voluntary Conservation	10%
2	Mandatory Conservation – Drought	20%
3	Mandatory Conservation - Serious Drought	30%
4	Mandatory Conservation - Severe Drought	40%

SECTION 4.2
Estimate of Minimum Supply for the Next Three Years (§10632 (b))

The Act requires quantification of the minimum estimated supply available during the next three years based on the driest historic sequence for the water supply. SMWD's three year historic sequence, 1959-1961, is based on MWDOC's UWMP.

MWD has identified it has adequate supplies to meet the single and multiple dry year demands and since MWDOC is a member agency of MWD it has identified it has adequate supplies to meet its member agencies single and multiple dry year demands. MWD developed the Water Surplus and Drought Management Plan (WSDM Plan) in 1999 to identify the steps it will take in response to both surplus and shortage of water supply.

The local supplies provided by SMWD are expected to be adequate in conjunction with the imported supplies. SMWD is projecting that it can meet its recycled demands with existing treatment plant capacities, seasonal storage and with proposed expansions. The urban water collection facilities are projected to be reduced to 90% of normal capacity, however, imported water capacity is available to replace the flows.

Additionally, SMWD has agreements for Supplemental Dry Year Supplies. SMWD has excess supplies in the event MWD reduces its supplies. The minimum supplies available to SMWD exceed the projected demands during driest historic sequence projection as shown on Table 24.

Table 24 Three-Year Estimated Minimum Water Supply (Based on Multiple Dry Years) - AFY						
Source	Normal			Multiple Dry Year		
	2006	2007	2008	2006	2007	2008
Local Supplies	7,407	8,286	8,443	7,597	8,245	8,907
Imported Supply	26,742	27,076	27,233	28,837	28,426	28,731
Supplemental Dry Year Supply				4,250	4,250	4,250
Total	34,149	35,362	35,676	40,684	40,921	41,888

SECTION 4.3
Catastrophic Supply Interruption Plan (§10632 (c))

SMWD is dependent on imported water supply delivered through pipelines that traverse Orange County. SMWD is subject to service disruption from pipeline and treatment plant failures due to disasters and equipment failures. SMWD has developed a system of interties and storage to meet emergency demands and in recent years have been developing reliability plans and coordinating with MWDOC in regional reliability planning. The supply planning identified above includes agreements for supplemental dry year supply to address source of supply interruptions such as droughts.

Additionally, SMWD is a member of the Water Emergency Response Organization of Orange County (WEROC). WEROC was formed by the regional wholesale agencies including MWDOC to coordinate the emergency response by the water districts in the county. WEROC conducts training including disaster exercises for the region.

Interconnections

SMWD maintains interconnections with other adjacent local water suppliers including, Moulton Niguel Water District (MNWD), Irvine Ranch Water District (IRWD), Trabuco Canyon Water District (TCWD), El Toro Water District (ETWD), City of San Juan Capistrano and City of San Clemente. The interconnections are various sizes and generally operate as an emergency source of supply. The significance of these connections is to collectively increase the water supply delivery reliability for interconnected agencies, including SMWD, particularly in the event of physical system failures involving delivery pipelines. The interconnections also operate to temporarily diversify SMWD's sources of water supply in the event deliveries are received from IRWD and TCWD, whose sources include local groundwater and imported untreated water.

Storage

SMWD purchased fifty percent of the capacity in the El Toro R-6 Domestic Water Reservoir which substantially increased the emergency storage within SMWD. In addition, SMWD has a distribution system of storage reservoirs which are designed to supply fire flow and one maximum-day of storage. SMWD is the lead agency for development of two additional regional emergency storage reservoirs which will increase the regional storage capacity by over 2000 acre feet.

Table 25 provides a summary of SMWD proposed actions in response to possible catastrophes.

Table 25 Preparation Actions for a Catastrophe	
Possible Catastrophe	**Summary of Actions**
Regional Power Outage	Coordinate with Southern California Edison and/or San Diego Gas and Electric for schedule of restoration of service. At sites with back-up power generators check that the generator is functioning and determine fuel requirements. Assess reservoir levels and coordinate reduction of demand. Provide back-up emergency pumps as required to meet demands.
Earthquake	Activate emergency response plan; contact customers directly or through media as needed to curtail demand; initiate mutual aid with neighboring districts, coordinate with California Department of Health Services (DHS) as required, issue health directives as needed.
Facility Failure	Isolate facility and coordinate demand reduction as required; issue appropriate health directives as needed. Provide alternative service and initiate repairs or replacement of facility
Water Supply Interruption	Initiate water demand reductions as appropriate to insure fire safety and health concerns are met, request intertie activation, utilize storage as appropriate
Water Supply Contamination	Notify DHS and law enforcement as necessary, isolate systems containing contamination; issue health directives as needed.

SECTION 4.4
Mandatory Prohibitions (§10632 (d))

In April 1991, the SMWD Board of Directors adopted the Conservation Ordinance. The Conservation Ordinance was enacted because of an extended drought at that time and the establishment of a water rationing program by Metropolitan Water District of Southern California. The Conservation Ordinance established: 1) a tiered water rate structure to encourage conservation and 2) mandatory conservation stages. Table 26 summarizes the mandatory prohibitions. In addition SMWD's Rules and Regulations prohibit irrigation runoff.

Table 26 Mandatory Prohibitions	
Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Using potable water for street washing	2
Using Potable water for dust control for construction activity	2
Outdoor irrigation limited to restricted times	3
Washing of vehicles	3
Refilling or filling artificial lakes by permit only	3
Operation of fountains except with non-potable water	3
Use of potable water fro construction by permit only	3
Using potable water for outdoor irrigation	4
Filling ponds, artificial lakes, pools and spas	4
Use of potable water for construction	4

SECTION 4.5
Consumption Reduction Methods (§10632(e))

SMWD has metered water connections and water consumption is billed on a monthly basis. Excessive water usage is monitored regularly and customers with high usage are contacted to review for on-site problems or informed of education opportunities to limit water usage. SMWD operation staff monitors the daily importation and distribution of water and documents regional deliveries. Anomalies in water demands are noted by staff for further investigation.

SMWD has an ongoing information program directed at the customers. This includes a monthly newsletter with information on water conservation and demand management practices. In addition, SMWD offers tours and educational classes on irrigation and water conscious landscaping. SMWD staff reviews installation of centralized irrigation and keeps a record of contact information to provide notification in event of a problems requiring irrigation to be reduced. During the AMP shutdown due to pipeline failure SMWD was able to reduce demands by 43% through public notification, restricting potable water used for centralized irrigation and construction water demands. It is estimated that a ban on residential irrigation will increase reduction to over 50%.

Table 27 is a summary of the reduction demands utilized by the SMWD staff during water shortages.

Table 27
Consumption Reduction Methods

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Ongoing education program and information campaign	1	10
Inform public of water shortage through press releases, billing notices, homeowner associations, and local government agencies. Notice to provide requested reduction and recommend activities to reduce demand. Specific notice provided to construction and large irrigation users through direct contact by staff.	2	20
Additional public notice of implemented restrictions and direct contact. Adoption of restrictions by Board of Directors per Conservation ordinance. Staff to provide notice to construction and large irrigation customers, meters to be locked as required.	3	30
Additional public notice provided and further restrictions adopted by the Board. Ban of potable water for irrigation and construction use. Implementation of water use monitoring and patrolling by staff to enforce restrictions. Meters to be locked or removed as required.	4	40 to 50

SECTION 4.6
Penalties for Excessive Use (§10632(f))

SMWD instituted a residential tiered rate structure to encourage conservation during the drought in the 1991. Appendix I is a copy of the current rate structure and tiers. The rate per billing unit increases from a minimum of $1.36 up to $2.46 in four incremental steps. During drought conditions the Board of Directors can review the tier range to decrease the allowable amount in each tier or can consider an increase in the unit price in each tier to further encourage conservation.

The SMWD Conservation Ordinance provides for the progressive steps in Table 28 to enforce mandatory conservation stages. A customer can be cited by a SMWD representative for one or more specific violation of the applicable water use restrictions for a particular mandatory stage. In addition, violation of the Conservation Ordinance is a misdemeanor which may be punished by imprisonment in the county jail for not more than 30 days or by fine not exceeding one thousand dollars, or both.

Table 28 Penalties and Charges	
Penalties or Charges	Stage When Penalty Takes Effect
Written Notice for first violation based on using more than the maximum applicable first tier consumption allocation	Stage 2, 3, 4
Written Notice for second violation using more than the maximum applicable first tier consumption allocation	Stages 2,3, 4
Third consecutive billing using more than the maximum applicable first tier consumption allocation violation will result in installation of flow restrictor installed for up to 30 days	Stages 2,3, 4
First violation of use restriction will receive written warning and use must be discontinued to avoid penalties	Stages 2, 3, 4
Second violation of use restriction will receive written warning describing the penalty for subsequent violations	Stages 2, 3, 4
Third violation will be assessed charges not to exceed $100 or $500 for construction violations on the next water bill. The charge shall double for each successive violation	Stages 2, 3, 4

SECTION 4.7
Analysis of Impacts on Revenues and Expenditures (§10632(g))

During preparation of rate analysis by SMWD, an analysis of the impacts on revenues and expenditures for various water supply and demand scenarios is performed to review the sensitivity of the rate structure and determine fixed and variable cost impacts. SMWD sets rates to recover its operating costs and, with the tiered structure, to encourage conservation.

SMWD has an ascending block structure for residential users which provides a financial incentive for SMWD's largest block of customers to use water wisely by increasing the unit price as usage increases.

The monthly service charge is a fixed meter charge that varies with the size of the water meter connection. Meter charges are set to meet approximately 65% of SMWD's fixed costs of operation (e.g. salaries, supplies, etc.) The variable ascending commodity charge is set to match the cost of producing and purchasing water and the unfunded portion of the fixed costs. The tiered rate structure is based on the number of units of water used. As previously described, this structure establishes an increasing unit cost per 100 cubic feet of water. The pumping surcharge is added to the commodity rate of those users who reside at higher elevations within the service area. The surcharge is based on prevailing energy charges.

SMWD established a rate stabilization reserve (current reserve is $9 million) to minimize the effects on rates due to changes in water purchase cost and consumption patterns due to either weather conditions or imposed conservation measures. Assuming a 40% reduction in water consumption, SMWD estimates a net operating shortfall of approximately $3.6 million. As indicated above the current rate stabilization reserve would be adequate to cover the shortfall for approximately two years.

The following table summarizes actions and conditions that impact revenue:

Type of Actions	Anticipated Revenue Reduction
Reduced Sales	Up to 35% of revenue for fixed expenses can be affected which can require use of rate stabilization funds
Development of reserves	Loss of contribution to reserves, SMWD would reduce revenue projections.
Increased cost of imported water	Require rate increase or use of reserves.

The following table summarizes actions and conditions that impact expenditures:

Category of Expense	Anticipated Costs
Increase in staff cost	No staff increase anticipated for implementation of conservation measures.
Increase in O&M costs	Loss of contribution to reserves, SMWD would reduce revenue projections.
Increased cost of supply	Require rate increase or use of reserves.

Tables 29 and 30 discuss SMWD's proposed measures to address revenue and expenditure impacts.

Table 29
Proposed Measures to Overcome Revenue Impacts

Names of Measures	Action
Rate Adjustment	SMWD can adjust rates or tier levels during water shortages to meet required conservation goals and to increase commodity revenue if needed to increase revenue.
Development of Reserves	SMWD maintains rate stabilization reserves to offset revenue fluctuation during droughts and to allow for time to increase rates as needed.
Reduce Expenses	SMWD can reduce overhead and reschedule capital improvements to delay expenses.

Table 30 Proposed Measures to Overcome Expenditure Impacts	
Names of Measures	**Action**
Use of Reserves	SMWD maintains rate stabilization reserves to address impacts to rates from changed conditions.
Reduce Expenses	SMWD can reduce overhead and reschedule capital improvements to delay expenses.

Table 31 Water Use Monitoring Mechanisms	
Mechanisms for Determining Actual Reductions	**Type data expected**
Analysis of historical water use	Monthly water usage
Review of importation/production	Daily water supply
More frequent reading of high usage meters	Water usage trends
Coordination with large irrigation customers	Water Demand identification and trending

SECTION 4.8
Water Shortage Contingency Ordinance/Resolution (§10632(h))

Appendix J is a copy of Ordinance No. 91-4-01 adopted in April 1991, by the SMWD Board of Directors, providing for a comprehensive water conservation program in the event of a critical water supply shortfall (the Conservation Ordinance). The Conservation Ordinance established: 1) a tiered water rate structure to encourage conservation and 2) mandatory conservation stages and is summarized in Section 4.1.

SMWD employs a variety of mechanisms to determine actual water reduction in water use. All connections are metered and each meter is read monthly. Records are kept for analysis and determination of customers using water in higher tiers. During emergency situations, the interval between readings can be modified to increase frequency for the high users. Additionally, SMWD tracks water importation and production amounts daily and reports those to appropriate departments for monitoring. Also, the District coordinates with large irrigation customers to establish irrigation cycles and irrigation demands. Table 31 provides examples of potential mechanisms for measuring reductions of customers' water use.

SECTION 5.0
Recycled Water Plan (§10633)

Recycled water is considered a highly reliable water supply since it is generated from relatively constant and predictable wastewater flows that are not subject to seasonal variations. As referenced above and indicated in the chart and graphs included in Section 2, SMWD owns and operates a recycled water system with three existing water reclamation plants. Recycled water is part of SMWD's overall menu of water supplies included in this UWMP for purposes of meeting the projected water demand for existing and planned future uses.

SMWD has been responsible for the planning of its water recycling system. Financial assistance has been provided by rebates from the MWD Local Projects Programs and by low interest loans obtained from the State Water Resources Control Board. SMWD also has an agreement to purchase recycled water from IRWD, which is the successor agency to the Los Alisos Water District, for a portion of the recycled water supply. Additionally, SMWD has an intertie with Moulton Niguel Water District (MNWD) and an agreement to provide MNWD storage in the Upper Oso Reservoir for its recycled system. Table 32 summarizes the participating agencies:

Table 32
Participating agencies

	Participated
MWD	Provides funding assistance through rebate program.
State Water Resources Control Board	Provides funding assistance through grants and low interest loan programs.
Irvine Ranch Water District	Provides a source of recycled water from its Los Aliso Reclamation Plant.
Moulton Niguel Water District	Interties with MNWD allow for joint use of the Upper Oso Reservoir.

SECTION 5.1
Wastewater Quantity, Quality and Current Uses (§10633(a-c))

Wastewater generated in SMWD is treated at the following facilities:

- Oso Creek Water Reclamation Plant (OCWRP) is an activated sludge plant that treats wastewater to tertiary levels in compliance with the California Administrative Code Title 22 (Title 22) for use as recycled water. Wastewater is diverted from the Oso Trunk Sewer for liquid treatment at OCWRP, the solids are returned to the trunk sewer for treatment downstream at either the MNWD 3A Plant or South Orange County Reclamation Authority (SOCWA) Jay B. Latham Plant. The rated capacity is 3.0 mgd and 1.5 to 2.0 mgd is treated on average.

- IRWD Los Alisos Reclamation Plant is owned and operated by IRWD. SMWD has an agreement for treatment of up to 0.7 mgd and approximately 0.6 mgd is treated on average.

- MNWD 3A Plant is operated by SOCWA and SMWD has 2.25 mgd capacity in the activated sludge secondary system. The wastewater is treated to secondary levels for ocean disposal through the SOCWA San Juan Outfall.

- SOCWA Jay B. Latham Plant is an activated sludge facility. SMWD has 2.25 mgd of secondary capacity. Wastewater is treated to secondary levels for ocean disposal through the SOCWA San Juan Outfall.

- Chiquita Water Reclamation Plant (CWRP) is owned and operated by SMWD. The plant has a rated capacity of 9.0 mgd and currently flows are approximately 6.4 mgd. CWRP has primary solids handling capacity of 9.0 mgd and secondary capacity divided between two treatment process, trickling filter capacity of 6.0 mgd and activated sludge capacity of 5.0 mgd. CWRP tertiary capacity is 5.0 mgd to meet Title 22 standards. Secondary effluent that is not recycled is discharged through the Chiquita Land Outfall to the SOCWA San Juan Outfall.

- Nichols Water Reclamation Plant has a 40,000 gallon per day (gpd) capacity and treats approximately 25,000 gpd to Title 22 standards for recycled water.

The following tables summarize the wastewater collected and treated by or on behalf of SMWD and recycled water production:

Table 33
Wastewater Collection and Treatment – AFY

Type of Wastewater	2000	2005	2010	2015	2020	2025	2030
Wastewater collected & treated in service area	10,677	12,544	13,404	14,871	16,260	17,760	17,866
Volume that meets recycled water standard	1,495	4,012	6,101	8,031	9,830	11,983	11,983

Table 34
Disposal of wastewater (Non-recycled) - AFY

Method of disposal	Treatment Level	2005	2010	2015	2020	2025	2030
Ocean Outfall	Secondary	8,532	7,303	6,840	6,430	5,777	5,883

Table 35
Recycled Water Uses - Actual and Potential - AFY

User type	Treatment Level	2005	2010	2015	2020	2025	2030
Landscape	Tertiary	4,012	6,101	8,031	9,830	11,983	11,983

SECTION 5.2
Potential and Projected Uses of Recycled Water (§10633(a-c))

All new development within SMWD is required to provide dual plumbing facilities to serve recycled water per SMWD Design Criteria and Standards. The majority of the proposed recycled water expansion will be new development. SMWD developed a master plan for the remainder of the undeveloped land within SMWD that includes an extensive expansion of the recycled water treatment, distribution and storage facilities to serve the irrigation demands.

Additionally, SMWD has an active retrofit program in existing areas. Environmental documentation has been completed and plans are being prepared for a portion of the projects. SMWD is pursuing financial assistance from the State Water Resources Control Board. Currently SMWD is installing distribution mains to serve a portion of the Las Flores community and has plans for expansion in portions of the City of Mission Viejo and the City of Rancho Santa Margarita.

SMWD is not currently planning to expand recycled water use to other types of users. The landscape demand is greater than the current production and storage. The wastewater treated by other agencies is not anticipated to be recycled for SMWD use at this time. The plants are located at lower elevations and are remote from the recycled water distribution system making the project financially unfeasible. SMWD is actively following projects proposed by SOCWA for the addition of tertiary facilities at the Jay B. Latham Plant, however, SMWD is not currently a project participant.

SMWD requires the use of recycled water where it is available for irrigation use and has procedures to discontinue supplying domestic water. The cost of recycled water is the same as domestic quality water. Customers who are being considered for retrofit are contacted well in advance of actual construction activity. SMWD staff works closely with the customers to ensure a smooth transition and will provide assistance on a case-by-case basis with any modifications that are required to the on-site system.

Table 36 shows the projected future use of recycled water in SMWD:

Table 36
Projected Future Use of Recycled water in Service Area - AFY

User type	Treatment Level	2010	2015	2020	2025	2030
Landscape	Tertiary	6,101	8,031	9,830	11,983	11,983

Table 37 shows the comparison between the recycled water use project in 2000 for 2005 and the current identified demand.

Table 37 Recycled Water Uses - 2000 Projection compared with 2005 actual – AFY		
User type	2000 Projection for 2005	2005 actual use
Landscape	4,759	4,012

The projections from 2000 included more aggressive expansions into existing areas that are currently under design or construction and not on-line yet. The original schedules were delayed because of design and permitting issues for crossing Trabuco Creek. Additionally, new development was accelerated during the time period and staff priorites were directed to other projects.

SECTION 5.3
Encouraging Recycled Water Use (§10633(f))

SMWD requires the use of recycled water for irrigation where it is available. With new development, it is a condition of approval for service. Incentives may be effective in the retrofit program to encourage balking participants. Since the recycled water is a more reliable source of water, generally customers have been enthusiastic in acceptance.

A variety of methods may be considered by SMWD to facilitate maximizing retrofit opportunities. The incentive program needs to be weighed against the retrofit cost to make sure the conversions remain financially viable. Table 38 shows methods to encourage recycled water use that may be considered by SMWD:

Table 38 Methods to Encourage Recycled Water Use					
	AF of use projected to result from this action				
Actions	2010	2015	2020	2025	2030
Financial assistance with capital costs	10	10	10	10	10
Grant or loan program	10	10	10	10	10
Rate discounts	10	10	10	10	10
Discontinue domestic water service for irrigation	5	5	5	5	5
Landscaping incentives	5	5	5	5	5
Irrigation equipment upgrades	10	10	10	10	10
Total	50	50	50	50	50

The projected savings is speculative. SMWD does not currently have an active incentive program. Each retrofit is reviewed individually for consideration of providing assistance to the customer.

SECTION 5.4
Recycled Water Optimization Plan (§10633(g))

As stated above, SMWD is planning major expansions of it recycled water system to serve new development as well as to retrofit existing areas. SMWD's recycled demand is expected to triple over the next 25 years. Service is expected to include irrigation of slopes, parks, medians, schools, golf courses and green belts. Some agricultural and industrial use may be considered with the ongoing expansion.

SMWD has included two projects in its long term master plans that will increase the capacity to produce recycled water at the CWRP. SMWD planning includes the construction of approximately 2,500 acre-feet of seasonal storage for recycled water produced from the Chiquita Plant. Potential sites have been identified and geotechnical evaluations are underway to determine the feasibility of the sites.

Construction of a seasonal storage reservoir will allow for year-round recycled water production for use in peak irrigation demands which will increase the reliability of the recycled water supply. Sites will be identified for incorporation in The Ranch Plan, the Natural Community Conservation (NCCP) Plan and the Special Area Management Plan (SAMP) environmental documentation is currently under preparation.

A sufficient amount of Improvement District general obligation bonds are authorized to fund the seasonal storage reservoir. Detailed discussion of bond authorization is included in Section 3.B. SMWD will pursue local, state and federal loan and grant programs.

In addition, SMWD integrates urban return flow diversion projects into the recycled water system to increase the amount of nondomestic supply available. The following reports document SMWD's planning efforts and are available for review from SMWD.

- "Improvement District No. 4C, 4E, 5 and 6 Plan of Works" Prepared by Tetra Tech.
- "Santa Margarita Water District Fiscal 2005-2006 Five-Year Capital Improvement Program."
- "Gobernadora Multipurpose Basin Concept Plan and Estimated Yield" dated September 1999, Prepared by Rivertech, Inc.
- "Arroyo Trabuco Water Supply Study, Source Water Determination" Dated May 1999, prepared by Wildermuth Environmental Associates.

SECTION 6.0
Water Quality Impacts on Reliability (§10634)

SMWD relies on imported water from MWD through MWDOC for its domestic water supply. MWD, as noted in its UWMP, has not identified any water quality risks that can not be mitigated. MWD does not anticipate any significant reductions in water supply availability due

to water concerns. Presently any recognized and/or projected water quality issues are included into the existing water supply planning efforts at MWD for the next 25 years.

SMWD's Supplemental Dry Year Supply Agreements with CVWD and GSWC are transfer agreements which result in SMWD receiving an allocation of water from MWD. Therefore, any water quality impacts in the Chino Basin are not anticipated to affect the water quality supply reliability to SMWD and are not discussed here.

Nichols well is operated by SMWD on a contract basis and the water is regularly tested and meets California Title 22 Drinking Water Standards which incorporate the Safe Drinking Water Act federal standards. SMWD does not anticipate any water quality impacts to the Nichols Well Supply.

Recycled water and urban return flows produced by SMWD meets all applicable standards for nondomestic use. Provisions have been made by SMWD to provide additional treatment including disinfection of urban return flows in the future if required.

Table No 39 summarizes the percentage of water quality supply changes for SMWD:

Table 39
Current & Projected Water Supply Changes Due to Water Quality - Percentage

water source	2005	2010	2015	2020	2025	2030
MWD	0	0	0	0	0	0
Nichols Well	0	0	0	0	0	0
Urban Return Flows	0	0	0	0	0	0
Recycled Water	0	0	0	0	0	0

SECTION 7.0
Water Service Reliability (§10635)

This section assesses the reliability of SMWD to provide water service to its customers during the following scenarios as discussed in Section 2:

- Normal Water Year: Based on SMWD projections of average demands.
- Single Dry Water Year: 1961 hydrology based on the MWDOC "Water Balance Model."
- Multiple Dry Water Years: 1959 to 1961 based on the MWDOC "Water Balance Model."

The plan concludes that SMWD is 100% reliable under every water year scenario. The evaluation is based on information provided by MWD and MWDOC to forecast imported water supplies and on projections for local supplies developed by SMWD.

SECTION 7.1
Projected Normal Water Year Supply and Demand (§10635(a))

Tables 40, 41, and 42 below recapitulate SMWD's supplies and demands under normal year conditions. During normal years, demand increases due to new development over the 25 year time period. Water supplies are projected to meet demands in all years. Additional imported water has been projected to be available from MWD, however, it is not included here since projected supplies meet projected demands.

Table 40
Projected Normal Water Supply – AFY

(from table 4)	2010	2015	2020	2025	2030 - opt
Supply	36,305	40,161	43,812	47,757	48,000
% of year 2005	107%	118%	129%	140%	141%

Table 41
Projected Normal Water Demand - AFY

(from table 15)	2010	2015	2020	2025	2030
Demand	36,305	40,161	43,812	47,757	48,000
% of year 2005	107%	118%	129%	140%	141%

Table 42
Projected Supply and Demand Comparison - AFY

	2010	2015	2020	2025	2030
Supply totals	36,305	40,161	43,812	47,757	48,000
Demand totals	36,305	40,161	43,812	47,757	48,000
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

SECTION 7.2
Projected Single Dry Water Year Supply and Demand (§10635(a))

SMWD has documented that it is 100% reliable for single dry year demands for the time period analyzed in the Plan. The following assumptions have been used by SMWD to determine the single dry water year supply and demands:

- Demands are based on the "Water Balance Model" prepared by MWDOC which indicates an increase in demand by 105.5% over normal demands based on 1961 hydrology for Orange County.

- Recycled water is reliable and SMWD can utilize recycled water from seasonal storage to meet increased demands. SMWD has up to 2000 Acre Feet (AF) of storage in Upper Oso Reservoir that can be utilized during dry years. An additional 2,500 AF of storage is proposed to be constructed.

- Urban return flows will reduce by 10% during dry year conditions. Assumption is based on SMWD collection of water from Oso Creek.

- MWDOC has provided its analysis of MWD available supplies and 100% of SMWD's imported water demand in dry years can be supplied by MWD.

- Cucamonga Valley Water District will reserve 4,250 AF on an annual basis for 25 years with an SMWD option to extend another 25 years per the Option Agreement in Appendix E and the proposed Water Supply Contract in Appendix F for supplemental dry year supply.

- Golden State Water Company will reserve 2,000 AF for supplemental dry year supply per the terms of the Water Supply and Purchase Agreement in Appendix G.

Tables 43, 44 and 45 compile SMWD's demand and supply projections for a single dry water year. As noted in the assumptions the available imported supply is greater than shown, however, it is not included in the tables because all demands are met.

Table 43
Projected Single Dry Year Water Supply - AFY

	2010	2015	2020	2025	2030
Local Supply	8,845	10,881	12,779	15,050	15,050
Imported Supply	29,457	31,489	33,443	35,333	35,590
Supplemental Dry Year	6,250	6,250	6,250	6,250	6,250
Supply Totals	**44,552**	**48,620**	**52,472**	**56,634**	**56,890**
% of projected normal	122.7%	121.1%	119.8%	118.6%	118.5%

Table 44
Projected Single Dry Year Water Demand – AFY

	2010	2015	2020	2025	2030
Demand	38,302	42,370	46,222	50,384	50,640
% of projected normal	105.5%	105.5%	105.5%	105.5%	105.5%

Table 45 Projected Single Dry Year Supply and Demand Comparison - AFY					
	2010	2015	2020	2025	2030
Supply totals	44,552	48,620	52,472	56,634	56,890
Demand totals	38,302	42,370	46,222	50,384	50,640
Difference	6,250	6,250	6,250	6,250	6,250
Difference as % of Supply	14.0%	12.9%	11.9%	11.0%	11.0%
Difference as % of Demand	16.3%	14.8%	13.5%	12.4%	12.3%

SECTION 7.3
Projected Multiple Dry Water Year Supply and Demand (§10635(a))

SMWD has documented that it is 100% reliable for multiple dry year demands for the time period analyzed in the Plan. The following assumptions have been used by SMWD to determine the multiple dry water year supply and demands:

- Demands are based on the "Water Balance Model" prepared by MWDOC which indicates an increase in demand of:
    - Year 1 106.7% over normal demands based on 1959 hydrology for Orange County.
    - Year 2 103.7% over normal demands based on 1960 hydrology for Orange County.
    - Year 3 105.5% over normal demands based on 1961 hydrology for Orange County.
- Recycled water is reliable and SMWD can utilize recycled water from seasonal storage to meet increased demands. SMWD has up to 2000 Acre Feet (AF) of storage in Upper Oso Reservoir that can be utilized during dry years. An additional 2,500 AF of storage is proposed to be constructed.
- Urban return flows will reduce by 10% during dry year conditions. Assumption is based on SMWD collection of water from Oso Creek
- MWDOC has provided its analysis of MWD available supplies and 100% of SMWD's imported water demand in multiple dry years can be supplied by MWD.
- Cucamonga Valley Water District will reserve 4,250 AF on an annual basis for 25 years with an SMWD option to extend another 25 years per the Option Agreement in Appendix E and the proposed Water Supply Contract in Appendix F for supplemental dry year supply.

- The water reserved by Golden State Water Company for supplemental dry year supply per the terms of the Water Supply and Purchase Agreement in Appendix G is a fixed amount and is not available during multiple dry years.

- Projections for the years not ending in zero or five are prorated equally between the years ending in zero and five.

Section 8.0 Adoption and Implementation of UWMP

Section 8.1 Public Participation (§10642)

SMWD has encouraged community participation in its UWMP by providing notice on its website at www.smwd.com and by providing regular opportunities to discuss it at its Engineering Committee meeting. In addition, SMWD attended the Community Associations of Rancho meeting to present its UWMP. Draft copies of the UWMP were made available at SMWD's offices and on the website. Letters were sent to the homeowners associations providing notice the document was available for comment.

Letters, copies are in Appendix A, were sent to the Cities of Mission Viejo, Rancho Santa Margarita and San Clemente as well as the County of Orange advising them SMWD was preparing a UWMP and requesting input. All Cities and the County were sent draft copies of the UWMP. SMWD received one letter from the County of Orange identifying projected development in unincorporated areas within the boundaries of SMWD. SMWD has included the identified developments in its demand analysis.

SMWD has closely worked with Rancho Mission Viejo to include projections from The Ranch Plan for the build-out of the District. Representatives of Rancho Mission Viejo and SMWD meet regularly to discuss planning issues.

Notice of the SMWD Public Hearing was published in the Orange County Register on November 23 and November 30, 2005 and notice was posted on the website and in SMWD's office. The public hearing was held on December 9, 2005.

The SMWD Board of Directors adopted the SMWD 2005 UWMP on December 16, 2005 with an effective date of December 22, 2005. This update was submitted to the California Department of Water Resources within 30 days of approval by SMWD Board of Directors. Copies of the final UWMP were sent to the cities within SMWD service area and to the County of Orange within 30 days following Board Approval. SMWD, as noted above, contacted the various HOA organizations and made presentations to the groups.

Tables 46 through 60 compile SMWD's demand and supply projections for a multiple dry water year sequence for five year increments. As noted in the assumptions the available imported supply is greater than shown, however, it is not included in the tables because all demands are met.

Multiple Dry Years Ending in 2010

Table 46 Projected Supply During Multiple Dry Year Period Ending in 2010 - AFY			
Supply	**2008**	**2009**	**2010**
Normal			
Local Supply	8,327	8,484	8,641
Imported Supply	27,349	27,507	27,664
Supply Totals	**35,676**	**35,991**	**36,305**
Multiple Dry Year			
Local Supply	8,885	8,798	9,116
Imported Supply	29,181	28,525	29,186
Supplemental Dry Year	4,250	4,250	4,250
Supply Totals	**42,316**	**41,573**	**42,552**
% of projected normal	118.6%	115.5%	117.2%

Table 47 Projected Demand Multiple Dry Year Period Ending in 2010 – AFY			
Demand	**2008**	**2009**	**2010**
Normal	35,676	35,991	36,305
Multiple Dry Year	38,066	37,323	38,302
% of projected normal	106.7%	103.7%	105.5%

Table 48 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2010- AFY			
	2008	**2009**	**2010**
Supply totals	42,316	41,573	42,552
Demand totals	38,066	37,323	38,302
Difference	4,250	4,250	4,250
Difference as % of Supply	10.0%	10.2%	10.0%
Difference as % of Demand	11.2%	11.4%	11.1%

Multiple Dry Years Ending in 2015

Table 49 Projected Supply During Multiple Dry Year Period Ending in 2015 - AFY			
Supply	2013	2014	2015
Normal			
Local Supply	9,799	10,185	10,571
Imported Supply	28,820	29,205	29,590
Supply Totals	**38,619**	**39,390**	**40,161**
Multiple Dry Year			
Local Supply	10,456	10,562	11,152
Imported Supply	30,751	30,286	31,217
Supplemental Dry Year	4,250	4,250	4,250
Supply Totals	**45,456**	**45,097**	**46,620**
% of projected normal	117.7%	114.5%	116.1%

Table 50 Projected Demand Multiple Dry Year Period Ending in 2015 – AFY			
Demand	2013	2014	2015
Normal	**38,619**	**39,390**	**40,161**
Multiple Dry Year	**41,206**	**40,847**	**42,370**
% of projected normal	106.7%	103.7%	105.5%

Table 51 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2015- AFY			
	2013	2014	2015
Supply totals	45,456	45,097	46,620
Demand totals	41,206	40,847	42,370
Difference	4,250	4,250	4,250
Difference as % of Supply	9.3%	9.4%	9.1%
Difference as % of Demand	10.3%	10.4%	10.0%

Multiple Dry Years Ending in 2020

Table 52 Projected Supply During Multiple Dry Year Period Ending in 2020 – AFY			
Supply	**2018**	**2019**	**2020**
Normal			
Local Supply	11,650	12,010	12,370
Imported Supply	30,701	31,072	31,442
Supply Totals	**42,351**	**43,082**	**43,812**
Multiple Dry Year			
Local Supply	12,431	12,454	13,050
Imported Supply	32,758	32,222	33,171
Supplemental Dry Year	4,250	4,250	4,250
Supply Totals	**49,439**	**48,926**	**50,472**
% of projected normal	116.7%	113.6%	115.2%

Table 53 Projected Demand Multiple Dry Year Period Ending in 2020 – AFY			
Demand	**2018**	**2019**	**2020**
Normal	**42,351**	**43,082**	**43,812**
Multiple Dry Year	**45,189**	**44,676**	**46,222**
% of projected normal	106.7%	103.7%	105.5%

Table 54 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2020- AFY			
	2018	**2019**	**2020**
Supply totals	49,439	48,926	50,472
Demand totals	45,189	44,676	46,222
Difference	4,250	4,250	4,250
Difference as % of Supply	8.6%	8.7%	8.4%
Difference as % of Demand	9.4%	9.5%	9.2%

Multiple Dry Years Ending in 2025

Table 55 Projected Supply During Multiple Dry Year Period Ending in 2025 – AFY			
Supply	**2023**	**2024**	**2025**
Normal			
Local Supply	13,662	14,092	14,523
Imported Supply	32,517	32,876	33,234
Supply Totals	**46,179**	**46,968**	**47,757**
Multiple Dry Year			
Local Supply	14,577	14,613	15,322
Imported Supply	34,696	34,092	35,062
Supplemental Dry Year	4,250	4,250	4,250
Supply Totals	**53,523**	**52,956**	**54,634**
% of projected normal	115.9%	112.7%	114.4%

Table 56 Projected Demand Multiple Dry Year Period Ending in 2025 – AFY			
Demand	**2023**	**2024**	**2025**
Normal	**46,179**	**46,968**	**47,757**
Multiple Dry Year	**49,273**	**48,706**	**50,384**
% of projected normal	106.7%	103.7%	105.5%

Table 57 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2025- AFY			
	2023	**2024**	**2025**
Supply totals	53,523	52,956	54,634
Demand totals	49,273	48,706	50,384
Difference	4,250	4,250	4,250
Difference as % of Supply	7.9%	8.0%	7.8%
Difference as % of Demand	8.6%	8.7%	8.4%

Multiple Dry Years Ending in 2030

Table 58 Projected Supply During Multiple Dry Year Period Ending in 2030 - AFY			
Supply	2028	2029	2030
Normal			
Local Supply	14,523	14,523	14,523
Imported Supply	33,380	33,428	33,477
Supply Totals	**47,903**	**47,951**	**48,000**
Multiple Dry Year			
Local Supply	15,496	15,060	15,322
Imported Supply	35,616	34,665	35,318
Supplemental Dry Year	4,250	4,250	4,250
Supply Totals	**55,363**	**53,975**	**54,890**
% of projected normal	115.6%	112.6%	114.4%

Table 59 Projected Demand Multiple Dry Year Period Ending in 2030 - AFY			
Demand	2028	2029	2030
Normal	**47,903**	**47,951**	**48,000**
Multiple Dry Year	**51,113**	**49,725**	**50,640**
% of projected normal	106.7%	103.7%	105.5%

Table 60 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2030- AFY			
	2028	2029	2030
Supply totals	55,363	53,975	54,890
Demand totals	51,113	49,725	50,640
Difference	4,250	4,250	4,250
Difference as % of Supply	7.7%	7.9%	7.7%
Difference as % of Demand	8.3%	8.5%	8.4%

APPENDIX A

LETTERS SENT TO CITIES OF MISSION VIEJO, RANCHO SANTA MARGARITA AND SAN CLEMENTE AND COUNTY OF ORANGE ADVISING CITIES AND COUNTY SMWD PREPARING UWMP AND REQUESTING INPUT

BOARD OF DIRECTORS
BETTY H. OLSON, PH.D.
SAUNDRA F. JACOBS
JIM MIZELL
CHARLEY WILSON
SAM JOHNSON
JOHN J. SCHATZ
GENERAL MANAGER

Santa Margarita Water District

August 4, 2005

Mr. Dennis Wilberg, City Manager
City of Mission Viejo
200 Civic Center
Mission Viejo, California 92691

Subject: **Preparation of 2005 Urban Water Management Plan for Santa Margarita Water District**

Dear Mr. Wilberg:

In accordance with Urban Water Management Planning Act (Water Code Section 10610 *et seq)*, Santa Margarita District is updating its Urban Water Management Plan (UWMP). The UWMP evaluates water supplies and demands for the period of 2005 to 2030, including conservation and drought management programs.

Part of the City is within the boundaries of the District as shown on the attached exhibit. The District is providing notice per Water Code Section 10621 that it is updating its UWMP and considering revisions for adoption by no later than December 31, 2005. Please provide the District any available information on activities in your jurisdiction that may have an impact on the District's water supply. This may include development or redevelopment plans, or water demand management programs or projects.

The draft UWMP will be provided to you for your review prior to adoption by the District. If you have any questions or comments please call Dan Ferons at (949) 459-6590.

Sincerely,

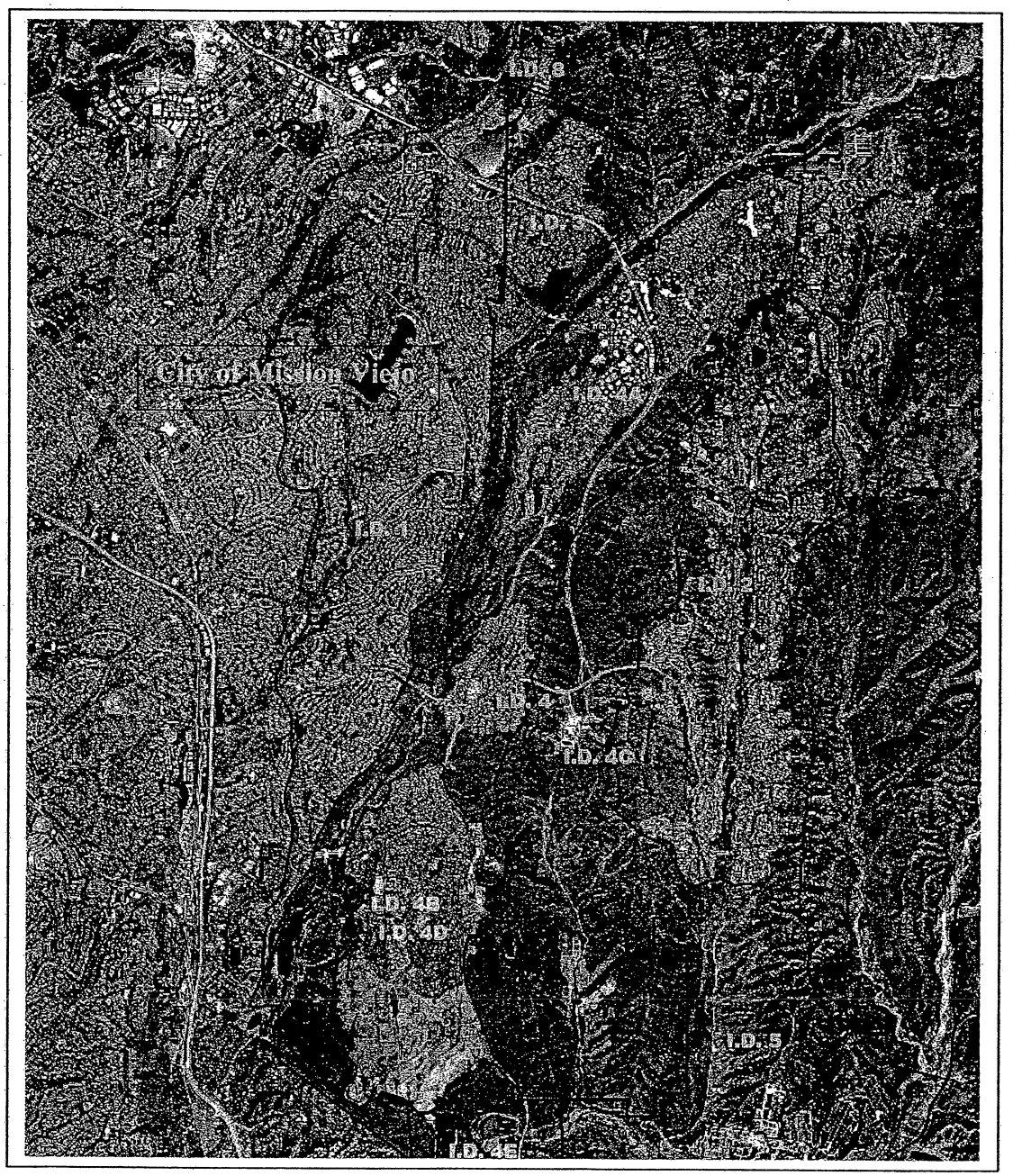
SANTA MARGARITA WATER DISTRICT

John J. Schatz
General Manager

cc: Municipal Water District of Orange County
Metropolitan Water District of Southern California

F:\Schatz\2005 Preparation of UWMP Mission Viejo ltr.doc.cl

Santa Margarita Water District
City of Mission Viejo Exhibit



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BETTY H. OLSON, PH.D. CHARLEY WILSON
SAUNDRA F. JACOBS SAM JOHNSON
JIM MIZELL JOHN J. SCHATZ
GENERAL MANAGER

Santa Margarita Water District

August 4, 2005

Ms. Kathleen Haton, City Manager
City of Rancho Santa Margarita
22112 El Paseo
Rancho Santa Margarita, California 92688

Subject: **Preparation of 2005 Urban Water Management Plan for Santa Margarita Water District**

Dear Ms. Haton:

In accordance with Urban Water Management Planning Act (Water Code Section 10610 *et seq)*, Santa Margarita District is updating its Urban Water Management Plan (UWMP). The UWMP evaluates water supplies and demands for the period of 2005 to 2030, including conservation and drought management programs.

Part of the City is within the boundaries of the District as shown on the attached exhibit. The District is providing notice per Water Code Section 10621 that it is updating its UWMP and considering revisions for adoption by no later than December 31, 2005. Please provide the District any available information on activities in your jurisdiction that may have an impact on the District's water supply. This may include development or redevelopment plans, or water demand management programs or projects.

The draft UWMP will be provided to you for your review prior to adoption by the District. If you have any questions or comments please call Dan Ferons at (949) 459-6590.

Sincerely,

SANTA MARGARITA WATER DISTRICT

John J. Schatz
General Manager

cc: Municipal Water District of Orange County
Metropolitan Water District of Southern California

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Santa Margarita Water District
City of Mission Viejo Exhibit

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JIM MIZELL JOHN J. SCHATZ
GENERAL MANAGER

Santa Margarita Water District

August 4, 2005

Mr. George Scarborough, City Manager
City of San Clemente
100 Avenida Presidio
San Clemente, California 92672

Subject: **Preparation of 2005 Urban Water Management Plan for Santa Margarita Water District**

Dear Mr. Scarborough:

In accordance with Urban Water Management Planning Act (Water Code Section 10610 *et seq)*, Santa Margarita District is updating its Urban Water Management Plan (UWMP). The UWMP evaluates water supplies and demands for the period of 2005 to 2030, including conservation and drought management programs.

The Talega development in the City is within the boundaries of the District as shown on the attached exhibit. The District is providing notice per Water Code Section 10621 that it is updating its UWMP and considering revisions for adoption by no later than December 31, 2005. Please provide the District any available information on activities in your jurisdiction that may have an impact on the District's water supply. This may include development or redevelopment plans, or water demand management programs or projects.

The draft UWMP will be provided to you for your review prior to adoption by the District. If you have any questions or comments please call Dan Ferons at (949) 459-6590.

Sincerely,

SANTA MARGARITA WATER DISTRICT

John J. Schatz
General Manager

cc: Municipal Water District of Orange County
Metropolitan Water District of Southern California

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City of Mission Viejo Exhibit

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SAUNDRA F. JACOBS SAM JOHNSON
JIM MIZELL JOHN J. SCHATZ
GENERAL MANAGER

Santa Margarita Water District

August 4, 2005

Mr. Tim Neely, Director
County of Orange RDMD
Planning and Development Services
P.O. Box 4048
Santa Ana, California 92702

Subject: **Preparation of 2005 Urban Water Management Plan for Santa Margarita Water District**

Dear Mr. Neely:

In accordance with Urban Water Management Planning Act (Water Code Section 10610 *et seq)*, Santa Margarita District is updating its Urban Water Management Plan (UWMP). The UWMP evaluates water supplies and demands for the period of 2005 to 2030, including conservation and drought management programs.

The District is providing notice per Water Code Section 10621 that it is updating its UWMP and considering revisions for adoption by no later than December 31, 2005. Please provide the District any available information on activities in your jurisdiction that may have an impact on the District's water supply. This may include development or redevelopment plans, or water demand management programs or projects. The District will include current projections for The Ranch Plan.

The draft UWMP will be provided to you for review prior to adoption by the District. If you have any questions or comments please call Dan Ferons at (949) 459-6590.

Sincerely,

SANTA MARGARITA WATER DISTRICT

John J. Schatz
General Manager

cc: Municipal Water District of Orange County
Metropolitan Water District of Southern California

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Santa Margarita Water District
City of Mission Viejo Exhibit

APPENDIX B

2005 MUNICIPAL WATER DISTRICT OF ORANGE COUNTY URBAN WATER MANAGEMENT PLAN

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1-A Copy of the Urban Water Management Plan Act (January 2005)

1-B Documentation and presentation for the Coordination Workshops with Metropolitan and MWDOC member agencies

1-C Informational Package Prepared for Each of MWDOC member agencies

1-D(i) Generic letter prepared by MWDOC for its member agencies to notify cities and county for the update of the Urban Water Management Plan

1-D(ii) Copies of the letters sent by MWDOC member agencies for notifying cities and county for the update of the Urban Water Management Plans

1-E Letter that MWDOC sent to notify Metropolitan of the amount of water MWDOC, on behalf of its member agencies, wishes to purchase over the next 25 years

1-F(i) Copies of display ads announcing the two community information meetings

1-F(ii) Record (attendance, presentation, and videotape) of the community information meetings

1-G MWDOC 2005 Urban Water Management Plan Review for Completeness Form

2-A(i) Outputs of MWDOC "Water Balance" Model – baseline run (without annexation)

2-A(ii) Outputs of MWDOC "Water Balance" Model – Supplemental run (assume annexations occur in 2006-07 for Irvine Ranch Water District and City of Anaheim)

2-B Copy of Orange County Water District Groundwater Management Plan

2-C(i) Copy of California State Water Resource Control Board Permit that granted 9,227 acre-feet per year to San Juan Basin Authority for diversion and use from San Juan Basin

2-C(ii) Copy of California State Water Resource Control Board Permit that granted 976 acre-feet to South Coast Water District for diversion and use from San Juan Basin

2-D Copy of San Juan Basin Groundwater Management and Facility Plan

2-E Copy of Metropolitan's 2005 Regional Urban Water Management Plan (September 2005) See Metropolitan Website: http://www.mwdh2o.com/mwdh2o/pages/yourwater/ywater02.html

5-A California Urban Water Conservation Council BMP Implementation Reports 2000 through 2004 (Fiscal Years 1999-2000 through 2003-2004) for MWDOC

5-B California Urban Water Conservation Council BMP Coverage Reports

LIST OF APPENDICIES

7-A Memorandum of Understanding Between MWDOC and IEUA for Exchange of MWD Drought allocation

7-B Irvine Ranch Water District – Water Shortage Contingency Plan

7-C Copy of Resolution for MWDOC Water Shortage Contingency Plan in 1991 (Resolution No. 1433)

8-A(i) Notice of Public Hearing

8-A(ii) Records (attendance, presentation, and videotape) of the Public Hearing

8-B Copy of Resolution Approving Municipal Water District of Orange County 2005 Urban Water Management Plan

LIST OF ACRONYMS

ACRONYMS	DEFINITION
AH/NR	Average Hydrology/Normal Replenishment
AOP	Advanced Oxidation Processes
AWT	Advanced Water Treatment
BEA	Basin Equity Assessment
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BPP	Basin Production Percentage
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
DATS	Deep Aquifer Treatment System
DBPs	Disinfection Byproducts
DHS	Department of Health Services
DOE	Department of Energy
DRIP	Desalination Research and Innovation Partnership
DWR	Department of Water Resources
DWSAPP	Drinking Water Source Assessment and Protection Program
EDCs	Endocrine Disrupting Compounds
GERA	Gobernadora Ecological Resource Area
gpcd	Gallon per capita (person) per day
gpm	Gallon per minute
GWR System	Groundwater Replenishment System
IDP	Irvine Desalter Project
IRP	Integrated Resource Plan
IRPP	Infrastructure Reliability and Protection Program
IRWD	Irvine Ranch Water District
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
IX	Iron Exchange
LRP	Local Resource Projects – Metropolitan's incentive program for developing local supplies
M&I	Municipal and Industrial
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
MF	Microfiltration
mg/L	Milligram Per Liter (10^{-3} gram per liter)
MOU	Memorandum of Understanding
MWDOC	Municipal Water District of Orange County
MTBE	Methyl Tertiary-Butyl Ether
NDMA	N-nitrosodimethylamine
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
PCE	Tetrachloroethene
pCi/L	Picocuries Per Liter (A unit of measure of levels of radon gas)

LIST OF ACRONYMS

ACRONYMS	DEFINITION
PPCPs	Pharmaceuticals and Personal Care Products
RA	Replenishment Assessment
RO	Reverse Osmosis
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SARI	Santa Ana River Interceptor
SAWPA	Santa Ana Watershed Project Authority
SCAG	Southern California Association of Governments
SDCWA	San Diego County Water Authority
SFWPA	South Feather Water and Power Agency
SWP	State Water Project
TCE	Trichloroethylene
TDS	Total Dissolved Solid
Title 22	California Title 22 Drinking Water Standards
TOC	Total Organic Carbon
µg/L	Microgram Per Liter (10^{-6} gram per liter)
ULFT	Ultra Low Flush Toilet
USEPA	United States Environmental Protection Agency
UV	Ultraviolet Light
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WRP	Water Recycling Plant

DWR "REVIEW FOR COMPLETENESS FORM" CHECKLIST

UWMP ACT CODE	REFERENCE IN MWDOC 2005 UWMP
Water Code §10620(d)(1)(2) – Agency Coordination	
Describe the coordination of the plan preparation and anticipated benefits.	Section 1.1.1, Section 1.1.2, and Section 1.1.3 Table 1-1-2-A
Water Code §10620(f) – Resource Maximization Tool	
Describe water management tools/options maximize resources & minimize need to import	Section 4.1
Water Code §10621(a) – Plan Update and File	
Date updated and adopted the plan	Section 8.1 (Date expected to file = 12/22/05)
Water Code §10621(b) – City and County Notification and Participation	
City and County notification and participation	Section 1.1.2
Water Code §10631(a) – Service Area Information	
Service area information, including population, climate, and other demographic factors	Sections 1.2.3 and 2.1.2 Tables 1-2-3-2-A, 2-1-2-1-A, 2-1-2-2-A, and 2-1-2-3-A
Water Code §10631(b) – Water Sources	
Identify and quantify existing and planned water supply sources	Section 2.2.1 Tables 2-2-1-A and 2-2-1-B
Water Code §10631(b)(1-4) – Groundwater Identified as Existing or Planned Source	
Describe basin management plan, attach management plan, describe groundwater basins, describe plan to eliminate overdraft, analyze location, amount, and sufficient of production of last 5 years, and analyze location and amount projected in next 25 years	Section 2.2.1.1 Tables 2-2-1-1-1-A, 2-2-1-1-1-B, 2-2-1-1-2-A, 2-2-1-1-2-B, 2-2-1-1-3-A, and 2-2-1-1-3-B Appendix 2-B and Appendix 2-D
Water Code §10631(c)(1-3) – Reliability of Supply	
Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage	Section 2.2.2 Tables 2-2-2-1-A, 2-2-2-2-A, and 2-2-2-2-B
Water Code §10631(c) – Water Resources Not Available on a Consistent Basis	
Describe reliability/vulnerability of the water supply to seasonal or climatic shortage	Section 2.2.2.2 Tables 2-2-2-1-A, 2-2-2-2-A, and 2-2-2-2-B
Water Code §10631(d) – Transfer or Exchange Opportunities	
Describe short term and long term exchange or transfer opportunities	Section 2.2.1.5
Water Code §10631(e)(1)(2) – Water Use Provision	
Quantify past, current and future water use by sectors	Section 2.1.3 Table 2-1-3-4-A
Water Code §10631(f)(g) – Demand Management	
	Section 5
Water Code §10631(h) – Planned Water Supply Projects and Programs	
Detail description of expected future supply projects and programs	Section 2.2.3 Table 2-2-3-A
Water Code §10631(i) – Opportunities for Development of Desalinated Water	
Describe opportunities for development of desalinated water	Section 2.2.1.6

DWR "REVIEW FOR COMPLETENESS FORM" CHECKLIST

UWMP ACT CODE	REFERENCE IN MWDOC 2005 UWMP
Water Code §10631(j) – District is a CUWCC signatory	
Agency is a CUWCC member, attach 2003-04 annual updates	Sections 5.1, 5.2, 5.3 Appendix 5-A and Appendix 5-B
Water Code §10631(k) – if Supplier Receives or will Receive Water from a Wholesale Supplier	
Provide written demand projections to wholesaler, and wholesaler provides written water availability to agency	Section 2.2.1.4 Table 2-2-1-4-A
Water Code §10632, 10632(a) – Water Shortage Contingency Plan and Stage of Action	
Provide stages of action, include plan for shortage	Section 7.0 Tables 7-2-A
Water Code §10632(b) – Water Shortage Contingency Plan and Stage of Action	
Identify driest 3-year period, quantify minimum water supply available by source for the next three years	Section 7.3 Table 7-3-A
Water Code §10632(c) – Preparation for Catastrophic Water Supply Interruption	
Provide catastrophic supply interruption plan	Section 7.4 Table 7-4-A
Water Code §10632(d) – Prohibitions	
List the mandatory prohibition against specific water use practice during shortage	Section 7.5.1
Water Code §10632(e) – Consumption Reduction	
List consumption reduction method	Section 7.5.2
Water Code §10632(f) – Penalties	
List excessive use penalties or charges for excessive use	Section 7.5.3
Water Code §10632(g) – Revenue and Expenditure Impact	
Describe impacts to revenue and expenditure, and describe measures to overcome them	Section 7.6
Water Code §10632(h) – Water Shortage Contingency Ordinance/Resolution	
Attach a copy of the draft water shortage contingency resolution or ordinance	Section 7.7 Appendix 7-A
Water Code §10632(i) – Reduction Measuring Mechanism	
Providing mechanism for determining actual reduction	Section 7.8
Water Code §10633 – Recycling Plan Agency Coordination	
Describe agency coordination for the recycling plan	Section 6.1 Tables 6-1-A and 6-1-B
Water Code §10633(a) – Wastewater System Description	
Describe and quantify wastewater collection and treatment	Section 6.2 Table 6-2-A
Water Code §10633(a-d) – Wastewater Disposal and Recycled Water Uses	
Describe method of wastewater disposal, describe uses of recycling water, quantify and describe potential uses for recycling	Sections 6.2, 6.3, and 6.5 Tables 6-2-B, 6-3-A, 6-3-B, and 6-5-2-A

DWR "REVIEW FOR COMPLETENESS FORM" CHECKLIST

UWMP ACT CODE	REFERENCE IN MWDOC 2005 UWMP
Water Code §10633(e) – Projected Uses of Recycled Water	
Projected use of recycled water, compare UWMP 2000 projections with UWMP 2005 actual	Section 6.4 Tables 6-3-A and 6-3-B
Water Code §10633(e) – Plan to Optimize Use of Recycled Water	
Describe action to encourage recycled water uses	Sections 6.6 and 6.7
Water Code §10634 – Water Quality Impacts on Availability of Supply	
Describe water impacts upon water management strategies	Section 3 Table 3-1-A
Water Code §10635(a) – Supply and Demand Comparison to 25 Years	
Compare the projected supply to projected water use under normal, single-dry, and multiple dry water years	Section 2.3 Tables 2-3-1-A to 2-3-1-F Tables 2-3-2-A to 2-3-2-B Tables 2-3-3-A to 2-3-3-DD
Water Code §10635(b) – Provision of Water Service Reliability to Cities and Counties	
Provide water service reliability section of UWMP to cities and counties within supplier's service area	Section 8.1
Water Code §10642 – Does the Plan Include Public Participation and Plan Adoption	
Encourage involvement of social, cultural, & economic community group, provide plan for public review, provide proof of public hearing, attach a copy of adoption resolution, provide meeting notice to local government	Sections 8.1 and 1.1.3 Appendix 8-B Appendix 8-A(i) Appendix 8-A (ii)
Water Code §10643 – Review of Implementation of 2000 UWMP	
Review implementation of 2000 UWMP	Section 8.2
Water Code §10644(a) – Provision of 2005 UWMP to local government	
Provide 2005 UWMP to DWR, cities, and counties within 30 days of adoption	Section 8.1
Water Code §10645 – Does the Plan or Correspondence Accompanying it show where it is available for public review	
Does UWMP shows where it is available for public review	Section 8.1

EXECUTIVE SUMMARY

BACKGROUND AND PURPOSE

Enacted in 1983, the Urban Water Management Planning Act (Act) requires every urban water supplier providing water to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan every five years. The Municipal Water District of Orange County (MWDOC), a water wholesaler and regional planning agency, fits the defined criteria and has prepared this Urban Water Management Plan (Plan) to address all the requirements set forth in the *State of California Water Code* Section 10610 through 10657.

Since its passage, many amendments have been added to the Act. These changes are intended to encourage increased regional planning and the cooperative management of California's most precious commodity – water. As a result, Urban Water Management Plans have evolved to become:

- foundation documents and sources of information for Water Supply Assessments (*California Water Code* Section 10613) and Written Verifications of Water Supply (*California Water Code* Section 66473.7);
- long-range planning documents for water supply;
- source data for the development of regional water plans;
- source documents for cities and counties preparing their General Plans;
- key components of Integrated Regional Water Management Plans; and
- a condition to qualify for receipt of certain State grant funds.

For MWDOC, the benefits of updating our Plan extend beyond legislative compliance. The regional approach of documenting water-service planning allows MWDOC to:

- evaluate supply-reliability goals for the region and provide a comprehensive assessment of water resource needs in its service area;
- provide a regional perspective on current and proposed water use efficiency programs and identify measures that can be accomplished in a cost effective manner;
- provide assistance to maximize the beneficial use of recycled water and other local resource supplies that reduce the need for imported supplies; and
- offer opportunities for public participation through publicly-noticed meetings and provide information that will allow the public to gain a better understanding of the region's comprehensive water planning.

Please note that MWDOC is a wholesaler of imported water for the region. For the purpose of evaluating a comprehensive assessment of the region's water services, MWDOC has taken a regional approach in compiling this Urban Water Management Plan. This Plan documents information on all sources of supplies – imported supply, groundwater supply, surface supply, recycled supply, and wastewater, as a summary of information for the regional planning. MWDOC does not currently provide any source of water other than imported supplies from Metropolitan, and it is not responsible for any of the projects or sources other than imported supply discussed in this Plan.

PLAN FINDINGS

The following are summaries for the sections discussed in this Draft Plan:

Water Service Reliability

Based on the preliminary information gathered, the Draft Plan concludes that the MWDOC service area will have sufficient existing and planned supplies to meet 100% of its projected demand under every water-year scenario for the next 25 years.

Retail consumptive demand is projected to grow at a slower rate of 0.5% per year compared to historical demand growth of 1.54% per year. Water demand for municipal and industrial use will continue to grow from approximately 500,000 acre-feet per year at the present time to more than 610,000 acre-feet per year in 2030. Demand in the agricultural sector is expected to decline from nearly 17,000 acre-feet per year today to less than 5,000 acre-feet per year in 2030. As driven by the availability of some of its replenishment supplies, the recharge of the Orange County Groundwater Basin is expected to increase from approximately 325,000 acre-feet per year (via the seawater intrusion barrier, in-lieu water, and spreading basins) to more than 400,000 acre-feet per year in 2030.

This Plan also evaluates each source of water in the region. The resource mix for meeting direct consumption includes local groundwater, recycled water, surface water, and imported water from Metropolitan Water District of Southern California (Metropolitan). The Plan documents MWDOC's cooperative efforts with its member agencies in developing local supplies. In fact, the region anticipates increasing its local supply from its current 53% of direct consumption to 60% in 2030. In particular, groundwater supplies are projected to grow from 45% to 48% and recycled water from 6% to 10%. As a result, it is projected that the region will decrease its dependence on imported supplies under normal climate conditions from 47% in 2005 to 40% in 2030. The resource mix for indirect consumption used for groundwater recharge and the seawater intrusion barrier also includes local and imported supplies. Currently, surface supplies from the Santa Ana River and local streams are meeting approximately 79% of demand for indirect use. Local recycled supply is meeting about 1% of the demand. Imported supplies, primarily from Metropolitan, are used to meet 20% of the indirect consumptive demand. Local supplies for meeting indirect consumptive demand are expected to increase when the Groundwater Replenishment System comes on line in 2007-08, and as municipal discharge continues to increase into the Santa Ana River due to population growth in the upper Santa Ana Watershed. By 2030, the region is projected to meet its indirect consumption with 69% of

surface supplies from the Santa Ana River and local streams, 18% recycled water, and 13% imported water.

When assessing the water supply reliability for the region, MWDOC used an inference approach to conclude that Metropolitan is capable of supplying imported water to meet the demand projected by MWDOC under various hydrologic conditions. In its Draft 2005 Urban Water Management Plan (September 2005), Metropolitan presents its supply availability at the regional level, rather than at the member-agency level. This approach does not enable MWDOC to quantify the availability of imported supply from Metropolitan specific to MWDOC. However, in that Draft Plan (Section II.2 – *Evaluating Supply Reliability*), Metropolitan was able to demonstrate it can maintain 100% reliability in meeting direct consumptive demand under a normal hydrologic year, the single-driest hydrologic year, and a series of multiple dry years through 2030. By inference, MWDOC determined the availability of its imported supply should equate to its projected imported demand. Thus, MWDOC concludes Metropolitan will meet all of the imported demand for direct consumption projected by MWDOC under this Draft Plan.

Water transfers and exchange and ocean water desalination are two potential sources of supply that are discussed in the Plan as part of MWDOC's long-term resource evaluation, but they are not included in the current resource mix. MWDOC and some of its member agencies are now developing long-term relationships with water suppliers in Northern California. MWDOC is also exploring water transfers from other Metropolitan member agencies. These relationships may lead to mutually beneficial transfer agreements in the near future. The Plan also discusses potential ocean desalination projects in the region: the Poseidon Resources Corporation proposed project in Huntington Beach; a potential joint San Diego/Orange County regional project at San Onofre; and the potential MWDOC/Dana Point Desalination Project.

Finally, the Plan compares the region's supply and demand to determine water service reliability under different climatic conditions – types of water years. The Plan first establishes the hydrologic conditions that define the types of water years in the MWDOC region by considering a combination of the following three variables:

1. Total retail demand of the water year;

2. Local supply condition of the water year; and

3. Imported supply condition of the water year.

Imported-supply demand typically increases during dry years when the weather is hot and there is a decrease in local runoff. Furthermore, in its preliminary Draft Plan Metropolitan demonstrated it has developed flexible water supplies through transfers and storage programs designed to increase its resources during dry water year conditions. As a result, the water year is defined by the net difference of total retail demand less local supplies. The greater the net difference, the more critical it is for MWDOC to depend on imported supply. Using this approach, the Plan defines the types of water years in the region as:

- Normal Water Year: average of 83 years, representing the historical hydrology from 1922 to 2004;

- Single Dry Water Year: 1961 hydrology (yields the highest one year demand for imported supply);

- Multiple Dry Water Years: 1959 to 1961 (a sequence that yields the highest three-year demand for imported supply);

When comparing supply and demand under those defined water years, the Plan concludes that the region is projected to maintain 100% water-service reliability under each type of water year. Under normal water years, the total retail demand from 2010 to 2030 is expected to be met by 60% local supply and 40% imported supply. Under single dry water years, retail demand is expected to increase by 6%. Local supply is anticipated to decrease from 60% in normal year to 57% in a single dry year for 2010 and to 52% for 2030. To compensate for the wide gap between retail demand and local supply, imported supply is expected to increase from 40% in a normal year to 43% in a single dry year for 2010, and to 48% in a single dry year for 2030. Similar trends can be observed under multiple dry water years.

Impact of Water Quality on Water Service Reliability

Water quality evaluation is based on known contaminants applicable to local and imported supplies by three levels of standards:

- Primary Drinking Water Standards (health);

- Secondary Drinking Water Standards (aesthetics);

- Notification Levels (not yet regulated contaminants).

After evaluating the water quality in the region, the Plan concludes that current management strategies have accounted for all known and foreseeable water quality impacts. The region does not anticipate that any water quality issues would either reduce supply availability or could not be handled through existing management strategies.

Programs to Improve Water Service Reliability

As a regional provider and resource planning agency, MWDOC is committed to programs that maximize existing water resources and minimize the region's dependency on imported supplies. To that end, MWDOC has taken a proactive stance, participating in the following efforts:

- Integrated Regional Water Management Plan;

- Water Use Efficiency Programs;

- Orange County Water Reliability Plan;
- South Orange County Water Reliability Study;
- Metropolitan's Local Resources Incentive Program - Assisting agency participation in this program for local supply development;
- Cooperative Agreement with Orange County Water District;
- Ocean Water Desalination Feasibility Investigation; and
- Southern California Comprehensive Water Reclamation and Re-Use Study.

Water Conservation Program

The Plan documents MWDOC's water use efficiency efforts. As a wholesaler, MWDOC is committed to developing and implementing regional conservation programs on behalf of its retail water agencies and their customers. This regional approach enables economies of scale, ensures a consistent message to the public, and assists in the acquisition of grant funding for program implementation.

To facilitate the implementation of Best Management Practices (BMPs) throughout Orange County, MWDOC focuses its effort on the following three areas:

- Regional Program Implementation: MWDOC develops, obtains funding for, and implements regional BMP programs on behalf of all retail water agencies in its service area. Program details are discussed in Section 5.4.3 of the Plan.
- Local Program Assistance: Upon request, MWDOC assists retail agencies in developing and implementing local programs within their individual service areas. MWDOC provides assistance with a variety of local programs including, but not limited to, Home Water Surveys, Landscape Workshops (residential and commercial), Public Information, School Education, Conservation Pricing, and Water Waste Prohibitions.
- Research and Evaluation: An integral component of any water use efficiency program is the research and evaluation of potential and existing programs. In the past five years, MWDOC has conducted research that allows agencies to measure the water-savings benefits of a specific program and then compare those benefits to the costs of implementing the program. This cost/benefit analysis enables individual agencies to evaluate the economic feasibility of a program prior to its implementation.

Wastewater Management and Water Recycling

This Plan documents wastewater collection, treatment, recycling, and disposal in the MWDOC service area. Currently the region collects nearly 340,000 acre-feet of

wastewater per year. 11% of that wastewater is used for recycled supply. The remainder is disposed through ocean outfalls. However, the Plan projects the amount of recycled water will increase in the future. The amount of wastewater is expected to grow to approximately 460,000 acre-feet per year in 2030, with 30% expected to be treated for recycled use and only 70% disposed through ocean outfalls.

The Plan projects that recycled water will become a significant, reliable source of supply in the future and examines its expanded use. The mechanisms encouraging recycled water use include:

- assisting retail agencies to secure funding from local, state, and federal agencies;
- promoting partnerships to encourage water recycling projects (example: the Groundwater Replenishment System, which is jointly funded by Orange County Water District and Orange County Sanitation District);
- urging regulatory agencies to streamline regulatory requirements;
- lobbying for state and federal assistance for the construction of brine lines to offset the cost of brine disposal; and
- supporting research that addresses public concerns on recycled water use, develops new technology for cost reduction, and assesses health effects to protect the public.

Water Shortage Contingency Plan

During water shortages, MWDOC works with its member agencies to manage the water supply in the region to ensure it meets the demands of its member agencies. Water shortages may result from variations in weather, natural disasters, or unanticipated situations (i.e. system failures, acts of terror). During a severe water shortage (such as a Stage 7 supply reduction as defined in Metropolitan's Water Surplus and Drought Management Plan), the MWDOC Board would be responsible for allocating imported water from Metropolitan. MWDOC would use the same principles as identified in Metropolitan's Water Surplus and Drought Management Plan for the allocation of imported water to its member (retail) water agencies, subject to any locally developed principles which would be developed in consultation with the retail agencies.

In the early 1980s, three regional water agencies – MWDOC, Coastal Municipal Water District (later merged with MWDOC), and Orange County Water District – jointly formed the Water Emergency Response Organization of Orange County (WEROC) to coordinate emergency response on behalf of all Orange County water agencies. Details of a catastrophic supply interruption plan developed through WEROC are discussed in Section 7.4 of the Plan.

COORDINATION

It is important to note that Metropolitan and many of MWDOC's retail member agencies are also required to prepare Urban Water Management Plans and are doing so simultaneously. As a result, MWDOC recognizes that close coordination among its wholesale agency and MWDOC's retail member agencies is the key to the success of its Plan.

The MWDOC Plan is meant to aggregate the planning information in a meaningful way so the public can better understand water resource planning on the regional level. Every effort has been made to coordinate information with local retail agencies' plans as they were being prepared to avoid any significant discrepancies in facts, figures, and estimates contained in each local Urban Water Management Plan. To that end, much of the information presented in this Plan is based on the BEST AVAILABLE information at the time of drafting. To the extent that any discrepancies exist, the local retail agency plan controls.

PLAN SUMMARY AND ADOPTION

Based on the data compiled in this Plan, water service in the MWDOC region is expected to be 100% reliable for the next 25 years. The Plan also finds that the region is continuing to improve its water reliability by designing programs to protect and ensure water quality, maximize local supplies, promote conservation, encourage recycled water use, and meet its demands during shortages.

In compliance with *California Water Code* Section 10644(b), MWDOC is required to file this Plan with the Department of Water Resources on or before December 31, 2005.

1.0 INTRODUCTION

1.1 Municipal Water District of Orange County's Urban Water Management Plan

This Urban Water Management Plan (Plan) has been prepared by the Municipal Water District of Orange County (MWDOC) for two purposes:

- to comply with *State of California Water Code* under the Urban Water Management Act (Act); and
- to provide information in a meaningful way so that the public can better understand water resource planning within the MWDOC service area.

MWDOC provides wholesale imported water from the Metropolitan Water District of Southern California (Metropolitan) to 30 Orange County cities and water agencies providing retail water service. MWDOC also coordinates and sponsors regional water conservation programs in cooperation with its local retail agencies, and engages in regional water resource and reliability planning in cooperation with other local and regional water, wastewater, and groundwater management agencies.

It is important to note that many of MWDOC's retail member agencies are also required to prepare Urban Water Management Plans and are doing so simultaneously. To that end, much of the information presented in this plan is based on the BEST AVAILABLE information at the time of drafting. However, the final authority of local water supply issues should be the plans prepared by each individual agency. Local supply information is included in this Plan to provide a regional summary and should not be considered in determining if local supplies are adequate for individual agencies.

The MWDOC Plan is meant to aggregate this information in a meaningful way so the public can better understand water resource planning on the regional level. Please note that MWDOC is a wholesaler of imported water for the region. For the purpose of evaluating a comprehensive assessment of the region's water services, MWDOC has taken a regional approach in compiling this Plan. This Plan documents information on all sources of supplies – imported supply, groundwater supply, surface supply, recycled supply, and wastewater, as a summary of information for the regional planning. MWDOC does not currently provide any source of water other than imported supplies from Metropolitan, and it is not responsible for any of the projects or sources other than imported supply discussed in this Plan. Every effort has been made to coordinate information with local retail agencies' plans as they were being prepared to avoid any significant discrepancies in facts, figures, and estimates contained in each local Urban Water Management Plan. To the extent that any discrepancies exist, the local retail agency plan controls.

1.1.1 Purpose of the Urban Water Management Plan

MWDOC has prepared this Plan consistent with the *State of California Water Code* Sections 10610 through 10657, known as the Urban Water Management Planning Act.

Enacted in 1983, the Act requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare and adopt, in accordance with prescribed requirements, an urban water management plan. The Act also requires urban water suppliers to describe and evaluate sources of water supply, efficient use of water, demand management measures, implementation strategies and schedules, and other relevant information and programs.

Since its passage, many amendments have been added to the Act. A copy of the Urban Water Management Plan Act is included in *Appendix 1-A.*

Today, an Urban Water Management Plan (UWMP) also serves as a foundation document and source of information for a Water Supply Assessment, *California Water Code* Section 10613, and a Written Verification of Water Supply, *California Water Code* Section 66473.7. Both statutes require detailed information regarding water availability to be provided to city and county decision makers prior to approval of specified large development projects. Additionally, an UWMP also serves as a:

- long-range planning document for water supply;
- source data for development of a regional water plan;
- source document for cities and counties, as they prepare their General Plans;
- key component of an Integrated Regional Water Management Plan; and
- condition to qualify for receipt of certain State grant funds

California Water Code 10644(a) requires urban water suppliers to file with the Department of Water Resources, the California State Library, and any city or county within which the supplier provides water supplies, a copy of its UWMP no later than 30 days after adoption. Urban water suppliers are required to file an Urban Water Management Plan at least once every five years on or before December 31, in years ending in five (5) and zero (0). The 2005 Urban Water Management Plans are due December 31, 2005.

For MWDOC, the activities associated with the update of its Plan and the benefits the Plan ultimately affords its local retailers extend far beyond the implied or stated supply-reliability goals. For example, the regional approach allows MWDOC to:

- provide a comprehensive assessment of water resource needs in its service area;
- provide guidance to coordinate implementation of water conservation programs in a cost effective manner;
- provide assistance to maximize the beneficial use of recycled water and local groundwater supplies, providing the region with new sources of local water to reduce the need for imported supplies from Metropolitan; and
- offer opportunities for public participation through publicly noticed meetings, and provide information that will allow the public to gain further understanding of the region's comprehensive water planning.

1.1.2 Coordination with Appropriate Agencies in the Preparation of the Plan

Recognizing that close coordination among other relevant public agencies is the key to the success of its Plan, MWDOC also worked closely with many other entities to develop and update this planning document. Table 1-1-2-A documents the name of the agencies with which MWDOC coordinated information for developing its Plan.

Table 1-1-2-A: Coordination with Appropriate Agencies in Preparation of this Plan

Check at least one box on each row	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to Update the Plan	Was Sent a notice of Intention to Adopt the Plan
MWDOC 27 Member Agencies	✓	✓	✓	✓	✓	✓	✓
Cities within MWDOC Service Area			✓		✓	✓	✓
County of Orange			✓		✓	✓	✓
Orange County Water District	✓			✓	✓	✓	✓
San Juan Basin Authority	✓			✓	✓		
Metropolitan Water District of Southern California	✓			✓	✓	✓	✓
Orange County Sanitation District	✓			✓	✓		
South Orange County Wastewater Authority	✓			✓	✓		

MWDOC's coordinated efforts with the relevant agencies are described in the following paragraphs.

MWDOC Member Agencies

MWDOC conducted three countywide coordination workshops and several surveys to facilitate the exchange of planning information with its member agencies. See *Appendix 1-B* for the documentation of the workshops conducted. MWDOC requested its 30 member agencies provide 25-year retail demand projections and a description of any planned development of local supplies. Methodologies and assumptions underlying these projections vary from agency to agency, but all projections reflect an in-depth knowledge of the individual agencies' service areas. Particularly in the area of demand projections, the data MWDOC obtained primarily correlated to the General Plans prepared by the County of Orange or cities within MWDOC's service area.

As required by *California Water Code* Section 10631(k), MWDOC provided its member agencies information that quantifies water availability to meet their projected demands for the next 25 years, in five-year increments. Based on the projections of retail demand and local supplies development done by its member agencies and the imported supply availability described in Metropolitan's May 2005 Draft Urban Water Management Plan, MWDOC prepared an informational package with data

specific to each member agency to be used by that agency to update its own UWMP. In the informational package, MWDOC quantified the reliability of the wholesale supplies from Metropolitan and the amount expected to be delivered to each agency during normal, single-dry, and multiple-dry years. A copy of the completed set of informational packages for MWDOC member agencies is included in *Appendix 1-C*. Please note that information collected was the best available at the time, and the results should be viewed as approximation. The values reflected in member agencies' plans should govern if there are any discrepancies from their plans to MWODC's plan.

Cities and County

As described earlier, General Plans are source documents for water suppliers as they assess their own water resource needs. When completed, an UWMP also serves as a source document for cities and counties as they prepare their General Plans. General Plans and UWMPs may be linked, as their accuracy and usefulness are interdependent.

California Water Code Section 10621(b) requires urban water suppliers to notify cities and counties in their service area of the opportunity to submit comments during the UWMP update process. To ensure the County of Orange and all cities within the MWDOC service area received notification of the UWMP updates in an efficient manner and were not bombarded with repeated notifications from numerous retail and wholesale water suppliers, MWDOC initiated a coordinated notification process with its member agencies and its wholesale supplier, Metropolitan. MWDOC created a generic letter describing the UWMP development process. The letter named all pertinent agencies that are updating their plans and requested comments and participation from cities and the county in the development of the plans. See *Appendix 1-D(i)* for a copy of the letter. MWDOC then provided a copy of the letter to each of its member agencies for use in notifying the cities in its service area and the County of Orange. *Appendix 1-D(ii)* includes copies of the letters sent by member agencies to cities within the MWDOC service area and to the County of Orange.

Groundwater Management Agencies

MWDOC also worked with the following five agencies to obtain information for the five groundwater basin resources in its service area: Orange County Water District for Lower Santa Ana River Basin, San Juan Basin Authority for San Juan Basin, City of La Habra for La Habra Basin, City of San Clemente for San Mateo Basin, and Laguna Beach County Water District for Laguna Canyon Basin. Details of the basin information are described in Section 2.2.1.1 of this Plan.

Metropolitan Water District of Southern California

As a member agency of Metropolitan, MWDOC participated in all the workshops hosted by Metropolitan to facilitate the information exchange for the development of this Plan.

To meet the requirement set forth by *California Water Code* Section 10631(k), MWDOC notified Metropolitan of the amount of water MWDOC, on behalf of its member agencies, wishes to purchase over the next 25 years. The letter documenting this formal information exchange is provided in *Appendix 1-E.*

MWDOC also worked with Metropolitan staff to develop demand projections using data from the Southern California Association of Governments (SCAG). A detailed description of the methodology and comparisons used to determine these demand projections are provided in Section 2.1 of this Plan.

Wastewater Management Agencies

To meet the requirements of the Urban Water Management Act in the preparation of this Plan, MWDOC contacted individual wastewater collection and treatment providers and other water agencies within MWDOC's service area for data on recycled water and associated projects in the region. The information MWDOC obtained was then combined with a review of several completed Orange County studies. MWDOC also reviewed operating information and interviewed staff from individual agencies. The information MWDOC obtained from wastewater collection and treatment providers allows the Plan to describe wastewater disposal methods, treatment levels, discharge volumes, and recycled use in the region. A detailed description of MWDOC's efforts, coordination, and the studies researched are discussed in Section 6 of this Plan.

1.1.3 Public Community Involvement

According to *California Water Code* Section 10642, "each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan" (qtd. Guidebook 89).

To generate interest and encourage the public's participation in the planning process and to actively seek input from the broadest audience possible throughout the yearlong endeavor, MWDOC conducted two Community Information meetings – May 12, 2005 and August 18, 2005. These meetings were in addition to the Public Hearing on the draft Plan, which was held in November 2005.

Hundreds of invitation letters and e-mail notifications announcing the Community Information meetings were sent to individuals representing businesses, environmental groups, residents interested in water management, as well as city and county staff. MWDOC also ran ads announcing each meeting in the *Orange County Register*, which has a weekday readership of 768,000. Copies of the display ads, which ran in the Local section of the paper, are attached in *Appendix 1-F(i).*

MWDOC videotaped each Community Information meeting as a way of accurately documenting the input of stakeholders. Copies of the videotapes are included in *Appendix 1-F(ii).* Below is a summary of participants' comments and questions as presented to staff during the May 12th meeting:

Water Supply

- Orange County has to reduce Colorado River water from 20% of our supply to 14%. What are programs to replace (this water)?

Water Quality

- What about medications in drinking water (emerging contaminants)?

Water Reclamation

- What percentage of Orange County Sanitation District wastewater will be recycled by the Groundwater Replenishment System? Could GWR be expanded to do 100%?
- I've heard that 87% of water used in Orange County is for landscape irrigation. Can recycled water be delivered directly to homes for outdoor use?
- What about gray water systems?
- How many acre-feet a day are flushed into the ocean? How much can be reused?
- Could you extend a recycled-water line to each and every home?
- If the Groundwater Replenishment System were expanded, would there be a need for a desalination plant in Huntington Beach?

Population Growth/Water Demand

- How will growth in the Inland Empire impact Orange County?
- How can we be assured the forecasting data is accurate (for agriculture…for industrial…for urban)?
- Who is responsible for forecasting water demand? Will we have more people? Will agricultural use drop off? What about industrial use - will manufacturing plants move out of area? Can statistics be produced showing water use by sector - urban, industrial, ag?
- How much water does agriculture use in California on a percentage basis?

Other Areas of Concern

- What about the privatization of water utilities? (I learned at a recent meeting that international companies are trying to privatize our public trust resource.)
- Need to look at integrated water management. Runoff from excess irrigation has water quality impacts…meeting the Clean Water Act. When looking at the cost of water supply alternatives, the cost of water conservation should factor in Clean Water Act compliance benefits. Desal is talked about as if a silver bullet. It's a new supply that will just make the Clean Water Act even more difficult to achieve. We should take a more holistic approach and look at conservation and reclamation before desal.
- What about solar-generated electricity?
- How can we reduce urban runoff? Can we capture and reuse urban runoff?
- Isn't there a proposal for a pipeline to go through the Santa Ana Mountains?

MWDOC staff also had a unique opportunity to speak before the 2004-05 Orange County Grand Jury and obtain their input, comments, and suggestions during the planning process. Their comments/questions included:

- Since water suppliers from around the state are compiling Urban Water Management Plans, the accuracy and consistency of the data projections they use is critical. How can we be assured everyone is using the same data? How can we be assured of the data's accuracy(Ex.: population projection from the Inland Empire)?
- Who's examining the impact on water quality of runoff from agriculture?
- I've heard there were toxic dumps in Orange County that have now been covered over. What's the impact on our groundwater?
- What's the purpose of all these little water districts throughout Orange County? Boards of directors run them, but what do they do(the water districts…and the boards)?
- It doesn't seem to me that any planning is done in this county. All we read about is that another thousand homes are being built. If planning is done, we need to learn about the new development when it's still in the planning stage.
- Residents really don't know about all the planning that goes on for (water) reliability…and they should. Water agencies should do a better job of educating the public.
- Don't privatize water. Look what happened to electricity.
- Orange County needs more water storage capacity…surface water capacity.

MWDOC conducted a second Community Information meeting on Thursday, August 18th, to keep stakeholders apprised of MWDOC's progress in Plan development and to obtain their continued input. Like its predecessor, this meeting was videotaped to accurately document comments, suggestions, and questions. Copies of the videotapes are included in *Appendix 1-F(ii)*. Below is a summary of participants' comments and questions, as presented to staff during the August 18th meeting:

Water Supply

- Included "what if…" scenarios in the plan (ex. Reduction in Colorado River water).
- South County agencies need MWDOC's assistance with transfer and exchange opportunities.
- Address the impact of CALFED.
- Desalination
    - Have you considered brackish water for desalination?
    - Beach wells are preferred
    - Is there enough water for Orange County without a desalination plant in Huntington Beach?
    - Describe the benefits (if any) that private companies provide over public agencies.
    - Include energy costs.
- How do climate changes impact supply and demand?

Water Quality

- Discuss water quality, including perchlorate in the Santa Ana River, and associated monitoring efforts.

Other Areas of Concern

- Include three cities (Anaheim, Fullerton, Santa Ana) in the MWDOC Plan and house a summary at MWDOC.
- Urban runoff is a regional issue that requires regional assistance
- Water cycle:
    - Need to close the loop in the local water cycle.
    - Work toward a more natural, efficient water cycle.
    - Balance supply with demand through conservation.
    - Promote California-friendly plants.
    - Importance of water recycling.
    - Capture and recycle urban runoff.
- UWMPs should include a programmatic Environmental Impact Report.
- Best Management Practices (BMPs) should be the floor, not the ceiling.
- There is a need for collaborative education programs between public agencies and Non Governmental Organizations.
- Need to consider Total Maximum Daily Loads.

- Department Water Resource planning is top down, rather than bottom up (like Orange County is doing); Orange County's approach makes more sense.
- Will the plan identify actions?
- How many years is the plan done?
- Do you monitor any changes from year to year?
- Growth
    - What is included?
    - Large development
    - Build out.
- Would like to know a cost comparison of all water.
- Conservation has a positive impact on water use and should be continued.

The results of our outreach efforts are notable. We were able to obtain input from a diverse population, including the environmental community (Surfrider Foundation), business owners, residents, the League of Women Voters, and others.

1.1.4 Department of Water Resource Role and Guidance for Urban Water Management Plan

California Department of Water Resource (DWR) staff reviews and determines the completeness of individual UWMPs pursuant to the Act. Agencies subject to the Act must have adopted a complete UWMP that meets the requirements of the law and submit it to DWR to be eligible for drought assistance or to receive funds through DWR. Results of the DWR review are provided to urban water suppliers through written correspondence. If necessary, water agencies with plans that do not meet DWR standards may wish to use the comments within the review letter to revise their UWMP for re-submittal. DWR provides a Legislative Report to the California Legislature one year after UWMPs are due, detailing the status and any outstanding elements of the UWMPs. DWR also prepares reports and provides data for any legislative hearings held to consider the effectiveness and/or completeness of the UWMPs in question.

DWR provides technical assistance to urban water suppliers to help them meet the requirements of the Act, and has provided guidance materials to aid water suppliers in developing 2005 UWMPs. These materials are intended both to help water districts comply with the law and to help DWR staff review submitted plans for regulatory compliance. Guidance materials consist of a series of worksheets and check lists detailing acceptable responses to the requirements set forth in the Act. MWDOC has used the guidance material in the development of this Plan. A copy of the completed review sheets with information contained in this Plan can be found in the appropriate tables in *Appendix 1-G.*

Utilizing the format of the review sheets, MWDOC prepared a customized informational package for each of its 30 member agencies. In each individual informational package, which contained data specific to a particular member agency, MWDOC completed 30 of the 60 tables contained in the review sheets. Data used to complete the appropriate tables was collected through a coordinated effort in the development of this Plan. MWDOC's member agencies were encouraged to use the data contained in their customized information package to prepare individual agency UWMPs. A complete set of the informational packages for each member agency is included in *Appendix 1-C*. The effort allows the resources assessed in the member agencies' plans sum to the resources assessed in MWDOC's plan.

1.1.5 Organization of this Plan

This document is divided into nine (9) Sections:

Section 1 – The introduction, which explains the purpose and development of the Plan. The introduction also describes MWDOC as an agency and its service area.

Section 2 – Assesses water service in the MWDOC service area.

Section 3 – Describes the water quality issues that exist in the MWDOC service area and addresses their impact on the reliability of providing water service.

Section 4 – Discusses programs and tools currently in place to maximize resources and minimize imported supplies to the MWDOC service area.

Section 5 – Describes water demand management programs.

Section 6 – Describes wastewater management and water recycling in the MWDOC service area.

Section 7 – Discusses the water shortage contingency plan.

Section 8 – Illustrates the adoption and implementation of the Plan.

Section 9 – Contains Appendix.

1.2 Municipal Water District of Orange County

1.2.1 Formation and Purpose

Orange County was settled around areas of surface water. San Juan Creek supplied the mission at San Juan Capistrano. Santa Ana River supplied the

early cities of Anaheim and Santa Ana. The Santa Ana River also provided water to a large aquifer underlying the northern half of the county, enabling settlers to move away from the river's edge and still obtain water by drilling wells.

By the early 1900s, Orange County residents understood that their water supply was limited, the rivers and creeks did not flow all year long, and the aquifer would eventually be degraded or even dry up if the water was not replenished on a regular basis.

In 1928, the cities of Anaheim, Santa Ana, and Fullerton joined with 10 other Southern California cities to form Metropolitan. Their objective was to build an aqueduct to the Colorado River to provide the additional water necessary to sustain the growing Southern California economy and its enviable lifestyle.

The Orange County Water District (OCWD) was formed in 1933 to protect the County's water rights on the Santa Ana River. Later that mission was expanded to manage the underground aquifer, making optimum use of local supplies and augmenting those with imported supplies provided through the Metropolitan member agencies in the County.

It was not long before other parts of Orange County also saw the need for supplemental supplies. A severe drought in the late 1940s further emphasized this need for coastal communities from Newport Beach to San Clemente. In 1948, coastal communities from Newport Beach south to the San Diego county line formed the Coastal Municipal Water District as a way to join in the benefits provided by Metropolitan.

The Municipal Water District of Orange County was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911. Today, MWDOC is Metropolitan's third largest member agency, providing and managing the imported water supplies used within its service area.

The Coastal Municipal Water District became a part of MWDOC in January 2001, a move that streamlined local government and allowed MWDOC to more efficiently provide wholesale water services at a reduced cost for the benefit of residents living throughout the service area.

1.2.2 Role of the Municipal Water District of Orange County

MWDOC's Mission Statement: *To provide reliable, high-quality supplies from Metropolitan Water District of Southern California and other sources to meet present and future needs, at an equitable and economical cost for all Orange County, and to promote water use efficiency.*

Related water management goals and objectives include:

- Represent the interests of the public within its jurisdiction;
- Appoint its representative directors to the Board of Metropolitan;
- Inform its directors about Metropolitan;
- Guide Metropolitan in its planning efforts and act as a resource of information and advocacy for member agencies;
- Work together with Orange County water agencies and others to focus on solutions and priorities for improving Orange County's future water supply reliability;
- Cooperate with and assist OCWD and other agencies in coordinating the balanced use of the area's imported and native surface and groundwater;
- Plan and manage the allocation of imported water to its member agencies during periods of short supply;
- Coordinate and facilitate the resolution of water issues and development of joint water projects among its member agencies;
- Represent the public and assist its member agencies in dealing with other governmental entities at the local, regional, state, and federal levels on water-related issues; and
- Inform its member agencies and inform and educate the general public on matters affecting present and future water use and supply.

As a regional wholesaler, MWDOC's most significant roles are broadly applicable to all of its member agencies. A key goal of MWDOC is to provide services and programs that are broad-reaching that the retail agencies cannot reasonably provide as single entities.

In terms of water management, MWDOC became a signatory to the Memorandum of Understanding (MOU) in 1991, monitored by the California Urban Water Conservation Council, which outlines 14 Best Management Practices for urban water conservation. The urban water conservation practices are intended to reduce long-term urban demands from what they would have been without implementation of these practices, and are in addition to programs that may be instituted during occasional water supply shortages.

For more than 30 years, MWDOC's Public Information and Water Education programs have reached thousands of consumers and nearly 90,000 Orange County students annually. The programs are performed on

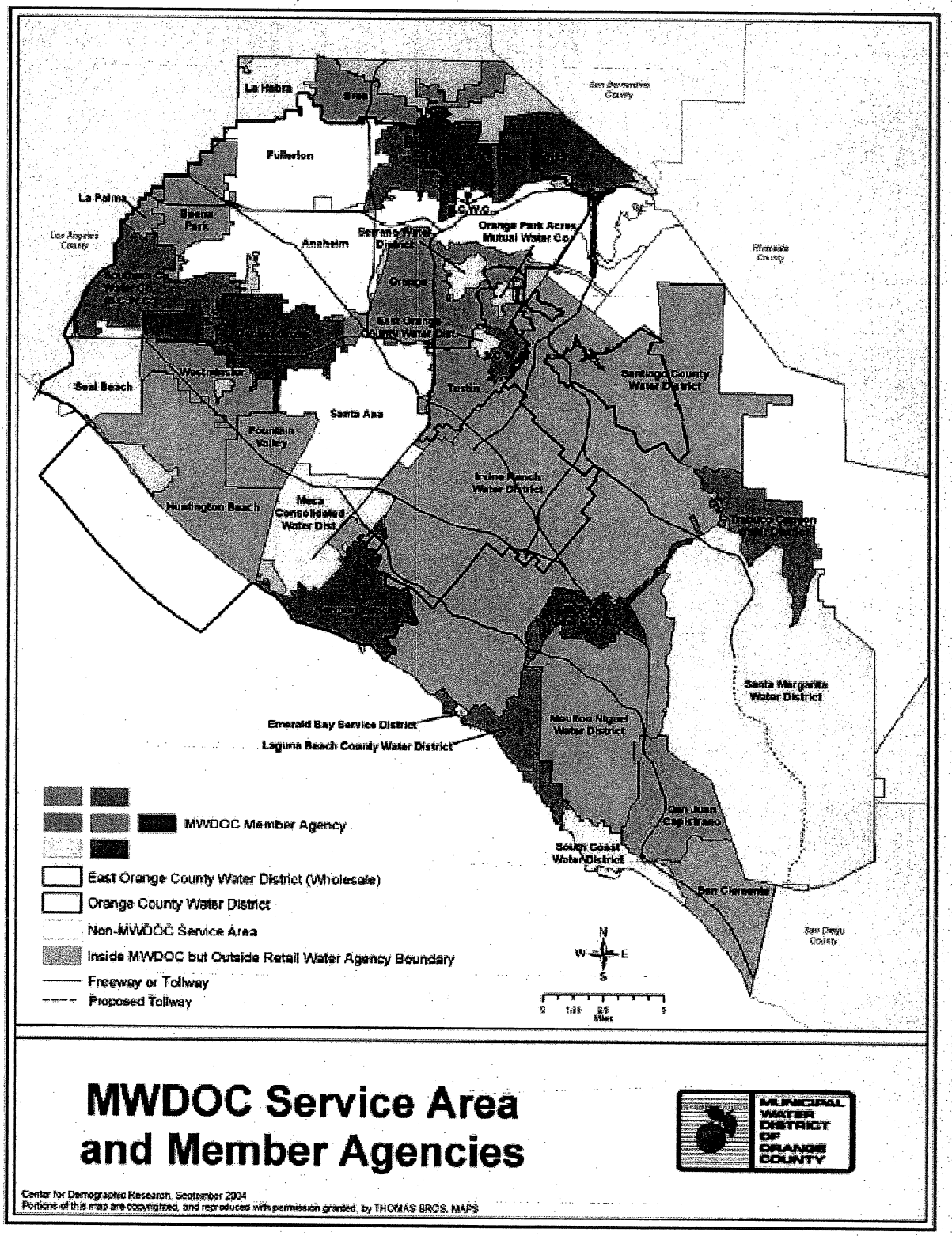
behalf of, and in coordination with, MWDOC's member agencies and are designed to facilitate a student's understanding of current water issues, as well as the challenges, opportunities, and costs involved in securing a reliable supply of high quality water.

In 2004, MWDOC formed a partnership with the Discovery Science Center to bring the School Education Program to even more students and provide them with even greater educational experiences in the areas of water and science.

1.2.3 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 (see Figure 1-2-3-A). Its commitment is to ensure water reliability for the communities it serves. To that end, MWDOC focuses on sound planning and appropriate investments in water supply, regional delivery infrastructure and emergency preparedness.

Figure 1-2-3-A: MWDOC's Service Area and Its Member Agencies

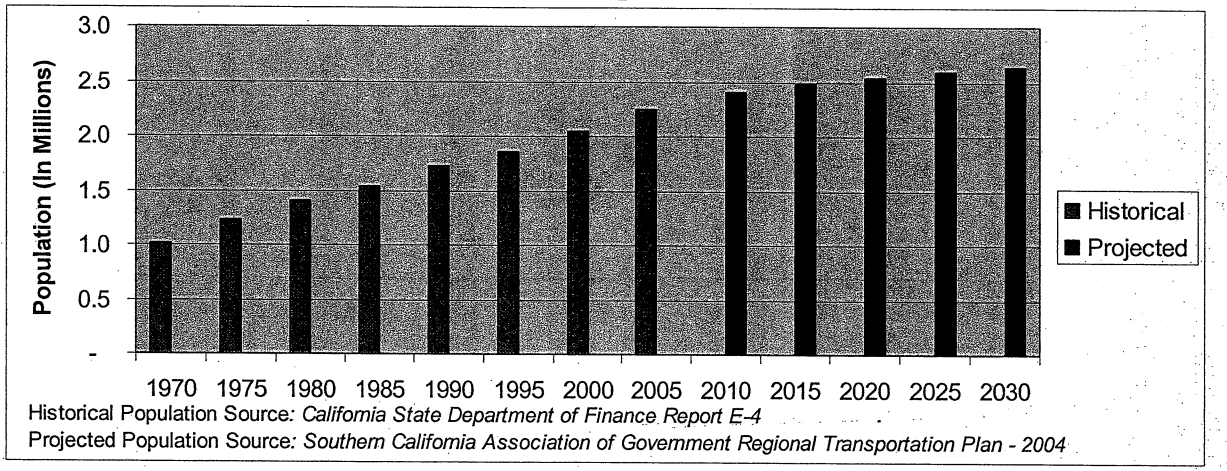


1.2.3.1 Current and Projected Population

The MWDOC service area doubled in population from 1.01 million residents in 1970 to 2.24 million by 2005, according to the California State Department of Finance. This represents an average growth rate of approximately 2.3% per year. Available housing along with a growing economy brought people to Orange County; an enviable lifestyle has kept them here.

Many older cities, especially those in north and central Orange County, anticipate reaching build-out in the near-term and, therefore, their population growth will remain relatively flat over the next 25 years. This, when combined with a relatively young and growing south Orange County population, will result in nearly 2.65 million living in the MWDOC service area by 2030 (Figure 1-2-3-1-A). This represents an average growth rate of 0.66% annually.

Figure 1-2-3-1-A: Historical and Projected Population in MWDOC's Service Area



Historical Population Source: *California State Department of Finance Report E-4*
Projected Population Source: *Southern California Association of Government Regional Transportation Plan - 2004*

1.2.3.2 Climate and Rainfall

Orange County has a semi-arid climate with an average of 14 inches of rain a year. Figure 1-2-3-2-A shows the record of rainfall in the area from 1973 to 2004. The driest year recorded during that period was 2002 with less than four inches of rain. Conversely, the winter of 1998 was one of the wettest during the same period with nearly 31 inches of rain.

Table 1-2-3-2-A presents the average monthly climate characteristics: evapotransportation rate; rainfall; and temperature in the MWDOC service area.

Figure 1-2-3-2-A: Annual Rainfall Record in Orange County

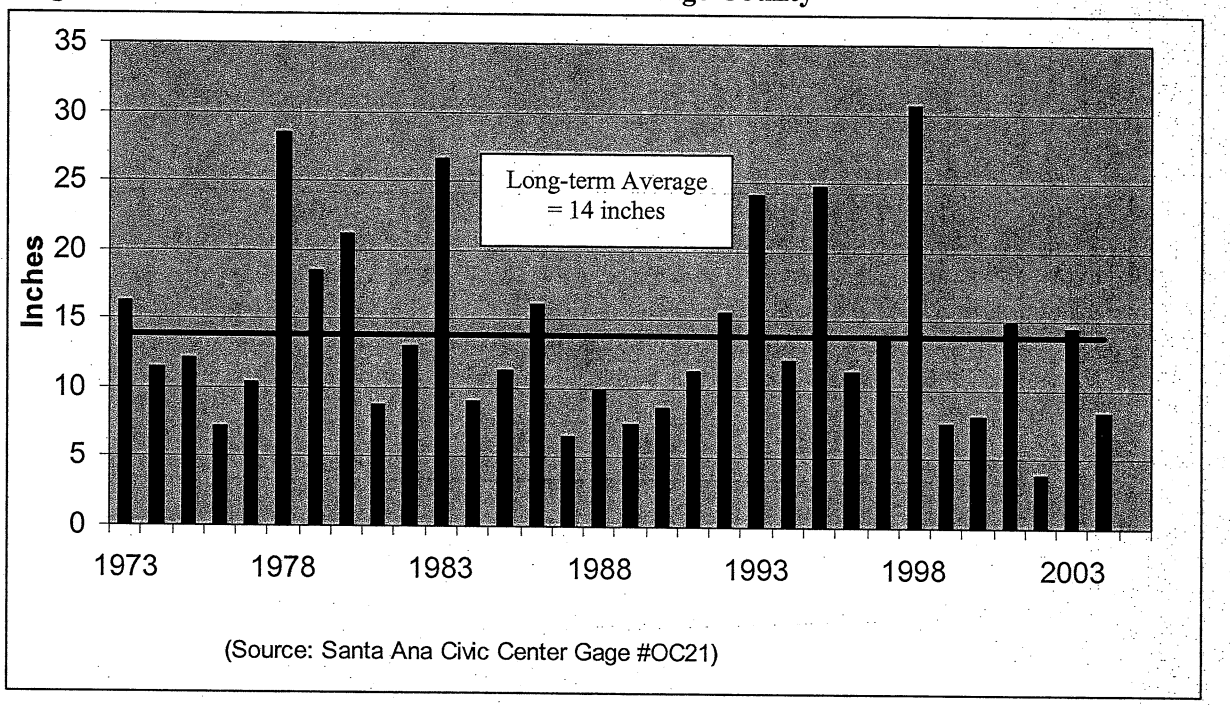


Table 1-2-3-2-A: Climate Characteristics in MWDOC's Service Area

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Standard Average ETo	2.18	2.49	3.67	4.71	5.18	5.87	6.29	6.17	4.57	3.66	2.59	2.25
Average Rainfall	2.53	2.73	2.21	1.01	0.26	0.07	0.01	0.08	0.27	0.36	1.32	1.99
Average Temperature	53.75	55.25	56.85	60.3	63.8	67.4	71.6	72.5	70.85	65.8	59.15	54.45

Sources:
1) Eto (Evapotransportation) is based on California Irrigation Management Information System Station of Irvine South Coast Valleys
2) Rainfall and temperature information are based on station of Tustin Irvine Ranch
3) Average information are based on record from period of 12/1/1927 to 6/30/2003

1.2.3.3 Other Demographic Factors

Orange County is now home to more than 3 million people living in a 798-square-mile area. Comprised of 34 cities, from Brea in the north to San Clemente in the south, Orange County is recognized worldwide for its beaches, recreational facilities, and enviable quality of life.

Of particular note is Orange County's housing market where the median price of an existing resale single-family home is $704,150. The average price of a new home is $543,000. The average price of all homes sold in Orange County is nearing $542,000. It should be noted that a relatively new phenomenon is occurring in the MWDOC service area – the emergence of high-rise condominiums. This type of housing is being marketed to homeowners tired of maintenance responsibilities.

It is estimated that of Orange County's labor force of over 1.6 million, nearly 1.55 million residents are currently

employed, making the unemployment rate a low 3.3%. The median family income is $78,600; the per capita income is just over $42,000 annually.

Major business sectors include:
Manufacturing;
Business and Professional;
Leisure and Hospitality;
Retail;
Government;
Education and Health;
Management; and
Information Services.

The area's gross county product is $160.7 billion, with total taxable sales reaching $12.7 million for the current year. Total assessed valuation for the county is just under $312 billion.

1.2.4 Member Agencies

MWDOC serves 30 member agencies, including:

- 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
- Emerald Bay Services District
- Irvine Ranch Water District
- Laguna Beach County Water District
- Mesa Consolidated Water District
- Moulton Niguel Water District
- Orange County Water District
- Orange Park Acres Mutual Water Co.
- Santa Margarita Water District
- Santiago County Water District
- Serrano Water District

- South Coast Water District
- Golden State Water Company
- Trabuco Canyon Water District
- Yorba Linda Water District

1.2.5 Water Service Organization in MWDOC Service Area

Orange County relies on numerous sources of water and water purveyors to meet the needs of its growing population.

Imported water from Northern California and the Colorado River meet approximately half of the County's water needs. The water is provided by Metropolitan, which serves the needs of six counties – Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego.

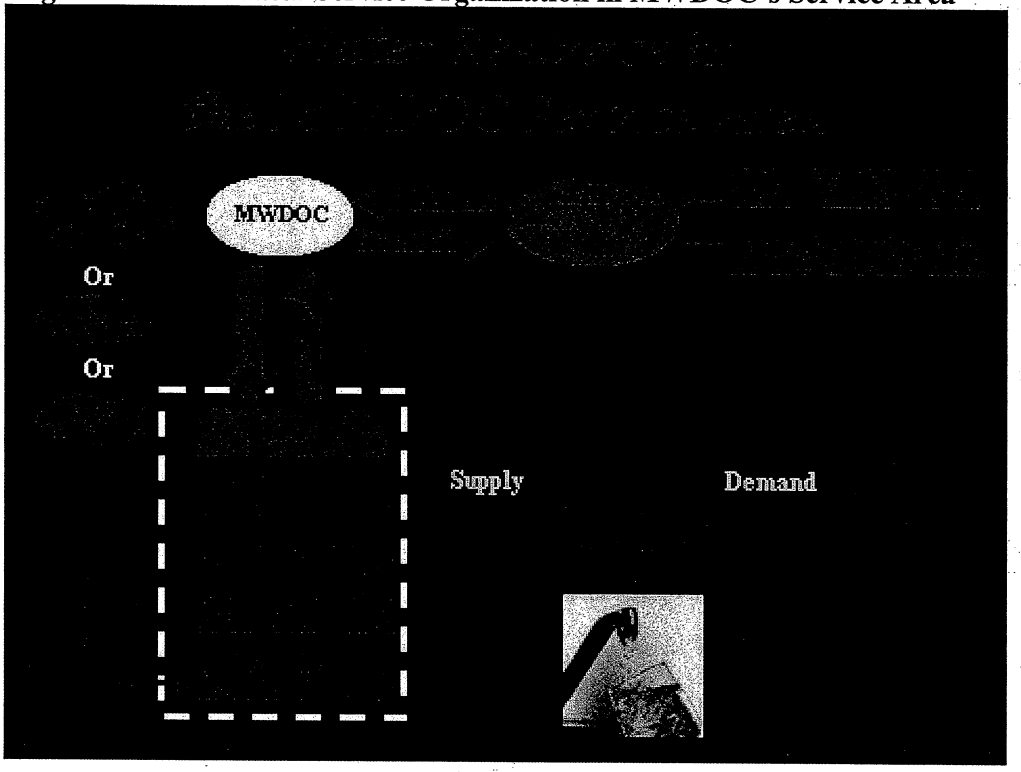
The MWDOC represents the interests of nearly all of Orange County and is Metropolitan's third largest member agency. The cities of Anaheim, Fullerton, and Santa Ana are Metropolitan member agencies and are not represented by MWDOC.

MWDOC is Orange County's imported water wholesaler, supplying 30 water retailers. These entities, comprised of cities and water districts, are referred to as MWDOC member agencies and provide water to approximately 2.3 million customers. South Orange County relies on imported water to meet approximately 95 percent of its water demand. The remaining five percent is provided by surface water, limited groundwater, and some water recycling.

The OCWD manages the Orange County groundwater basin. The groundwater basin, which underlies north and central Orange County, provides approximately 66 percent of the water needed in that area; imported water meets the balance of the water demand. Groundwater is pumped by producers before being delivered to customers.

Figure 1-2-5-A shows a diagram of the water service organization in the MWDOC service area.

Figure 1-2-5-A: Water Service Organization in MWDOC's Service Area



1.2.6 Board of Directors

MWDOC is governed by an elected seven-member Board of Directors, each board member representing a specific area of the County. Each director is elected to a four-year term by voters who reside within one of the seven divisions within the MWDOC service area.

Each director is a member of at least one of the following three working committees: Planning and Operations; Finance and Administration; and Public Affairs/MET Oversight. Each committee meets monthly. The full board convenes for its regular monthly meeting on the third Wednesday of the month.

The president of the board, vice president, and immediate past president also comprise the Executive Committee, which meets monthly with the general manager, assistant general manager, and board secretary.

References:

California State Department of Water Resources. *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan*. January 2005.

Center for Demographic Research, California State University, Fullerton. *www.fullterton.edu/cdr/*.

2.0 WATER SERVICE

One of the primary purposes of an Urban Water Management Plan (UWMP) is to provide a step-by-step guide for water utilities in assessing their water resource needs and reliability. In this section, discussions are dedicated to reviewing the water demands and water supplies in the MWDOC service area. The section concludes with an evaluation of the reliability of providing water service within the MWDOC service area by comparing its planned supplies to its forecast demands.

Information presented in this section is collected based on the best available information from each of MWDOC's 30 member agencies at the time of drafting. The information is presented to provide a regional summary within the MWDOC service area. MWDOC has made every effort to coordinate information during the preparation of this section in a manner that is consistent with local agencies' UWMPs. In the event of a discrepancy, the local retail agency UWMP should be consulted.

2.1 Water Demand

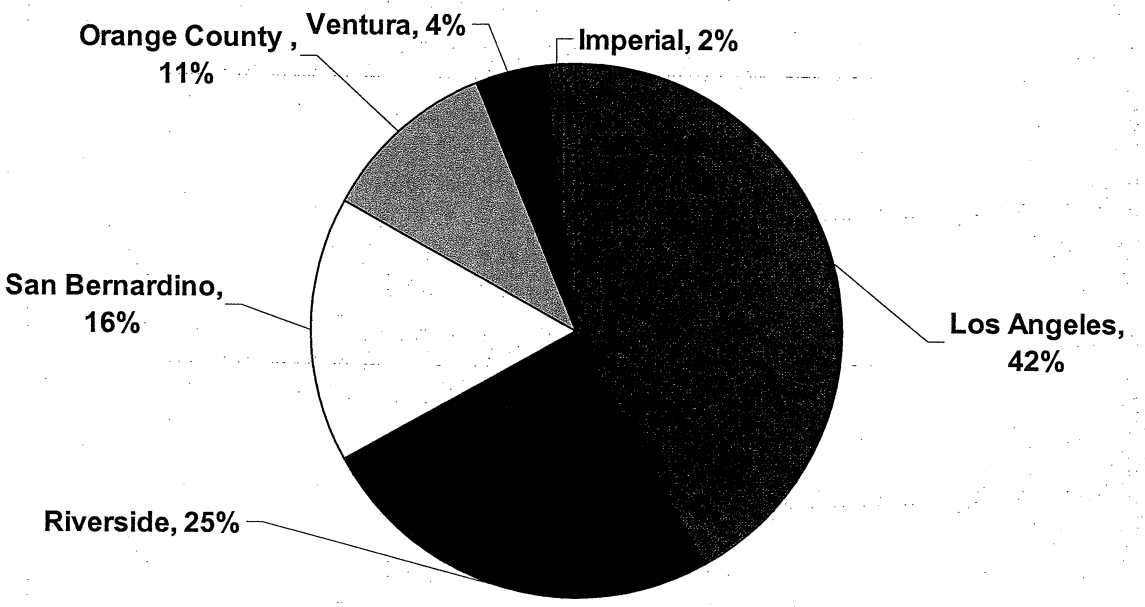
2.1.1 Overview – Orange County Level

There are approximately 3 million people currently residing in Orange County. According to the Southern California Association of Governments (SCAG) *Growth Forecast Report*, Orange County is projected to grow by more than 500,000 people by 2030, bringing the total population in the County to 3.5 million, a 15% increase. The same report also projects the overall SCAG region to increase from 16.26 million to approximately 22.89 million by 2030. Although the majority of this population increase in the SCAG region is due primarily to growth occurring in Los Angeles, Riverside and San Bernardino counties, Orange County is the second largest county in terms of population in the region, and comprises approximately 11% of this population increase (Figure 2-1-1-A). SCAG attributes population growth in the Inland Empire to the migration of people from Los Angeles and Orange County seeking lower-priced housing.

Overall, Orange County will continue to grow during the next 25-year period. As a result, it will be necessary to continue to develop new sources of water and determine the reliability of current water sources, as well as maintaining reasonable water rates. Development of new sources includes water use efficiency, increased capture of surface water, as well as water recycling and seawater desalination.

**Note: The MWDOC service area does not include the cities of Anaheim, Fullerto, and Santa Ana.*

Figure 2-1-1-A: Percent of Population Growth in the Southern California Association of Government Region, by County



Source: Southern California Association of Government, *Growth Forecast Report 2004*

2.1.2 Demographic Trends in the MWDOC Service Area – Past, Present, and Future

2.1.2.1 Population

Population is a key indicator of regional growth. According to the California State Department of Finance, the MWDOC service area had a population of 1.01 million in 1970 and 2.24 million by 2005. This represents an average growth of approximately 2.3% per year. During the 1970s, the population growth averaged 3.3% per year; while during the 1990s growth averaged 1.7% per year. According to the *SCAG Regional Transportation Plan 2004*, the population within the MWDOC service area is expected to increase to about 2.64 million by 2030, representing an average growth of 0.66% annually. This slower rate of growth is attributed to the build-out of the MWDOC service area. Table 2-1-2-1-A and Figure 2-1-2-1-A show historical and projected population for the MWDOC service area.

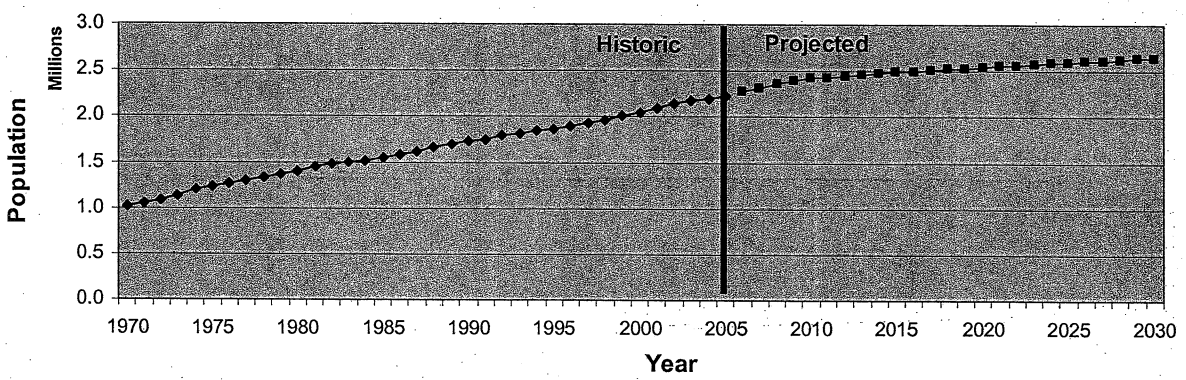
Table 2-1-2-1-A: Historic and Projected Population in MWDOC's Service Area

	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
Population in MWDOC Service Area (in Millions)	1.01	1.23	1.40	1.54	1.73	1.86	2.04	2.24	2.41	2.48	2.54	2.59	2.64

[1] Historical source: California State Department of Finance, *Report E-4*

[2] Projected source: Southern California Assocation of Government, *Regional Transportation Plan-2004*

Figure 2-1-2-1-A: Historical and Projected Population in MWDOC's Service Area



Historical source: California State Department of Finance, *Report E-4*
Projected Source: Southern California Association of Grovernment, *Regional Tranportation Plan - 2004*

2.1.2.2 Employment

Economic trends are also important drivers of water demand in MWDOC's service area.

The recession of the early 1990s cost Southern California 40,000 jobs and caused a major shift in the region's industry base. Almost 300,000 manufacturing jobs were lost by 1995, many of them in the aerospace and defense industries. Los Angeles and Orange counties were especially hard hit by this trend. While manufacturing and other sectors of the economy suffered, service employment held steady and experienced modest growth in Riverside and San Bernardino counties.

The economic recovery of the late 1990s included growth in high-tech and computer-related industries and rapid expansion of the service-related economy. Since 2000, job growth in the region has slowed as a result of the recent mild economic downturn.

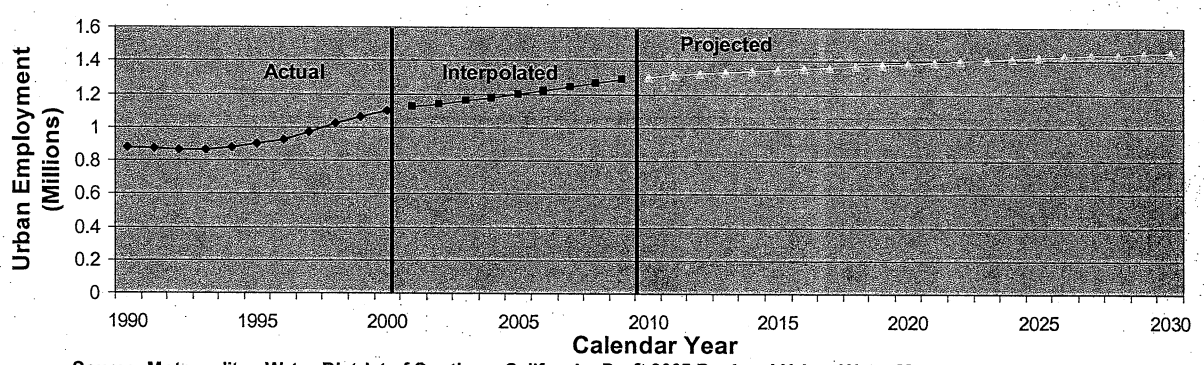
Table 2-1-2-2-A and Figure 2-1-2-2-A summarize the historical and projected employment in MWDOC's service area. The number of people employed in commerce and industry is expected to increase from 1.10 million in 2000 to about 1.46 million in 2030, a 33% increase.

Table 2-1-2-2-A: Historical and Projected Employment in MWDOC's Service Area

(Calendar Year)									
	Actual		Interpolated	Projected					Percent Change
1990	1995	2000	2005	2010	2015	2020	2025	2030	2000-2030
876,103	895,512	1,097,428	1,198,707	1,306,183	1,349,422	1,389,566	1,424,369	1,455,281	33%

Source: Metropolitan Water District of Southern California, *Draft 2005 Regional Urban Water Management Plan (September 2005)*

Figure 2-1-2-2-A: Historical and Projected Employment in MWDOC's Service Area



Source: Metropolitan Water District of Southern California, *Draft 2005 Regional Urban Water Management Plan (September, 2005)*

2.1.2.3 Residential Consumers

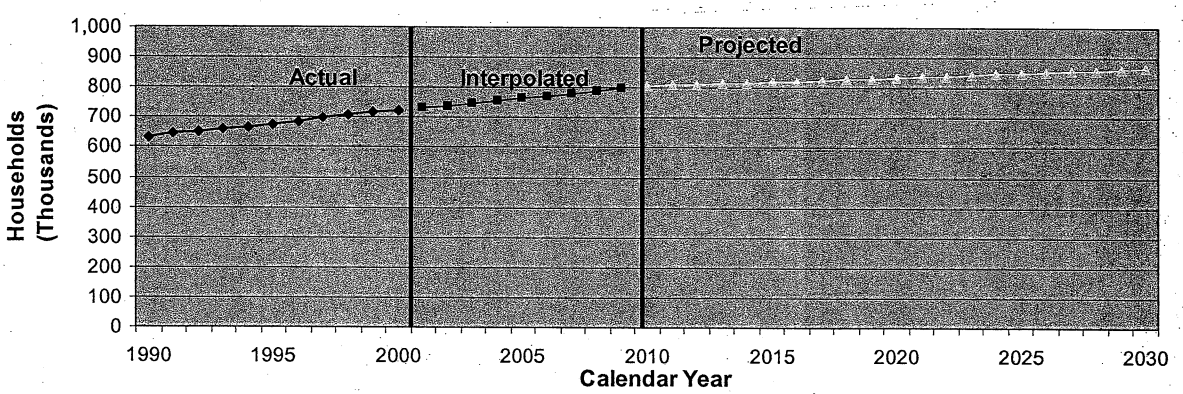
According to the California State Department of Finance, the total occupied housing stock in the MWDOC service area has grown at a steady pace, even during the recession period of the early 1990s. MWDOC had 630,900 occupied households in 1990 and 760,700 in 2005, representing an average growth of 1.3% annually. Regional planning agencies – SCAG – have forecasted growth in residential housing in the MWDOC service area. The total of occupied households is expected to increase to 865,700 in 2030, a 20% increase from 2000. Table 2-1-2-3-A and Figure 2-1-2-3-A show the historical and projected number of residential units in the MWDOC service area. Within the service territory, the household occupancy size (household population divided by total occupied dwelling units) is forecasted to remain at around 3 persons per household.

Table 2-1-2-3-A: Historical and Projected Occupied Households in MWDOC's Service Area

(Calendar Year)									
Actual			Interpolate	Projected					Percent Change
1990	1995	2000	2005	2010	2015	2020	2025	2030	2000-2030
630,855	674,238	719,530	760,671	803,971	818,850	834,402	850,135	865,661	20%

Source: Metropolitan Water District of Southern California, *Draft 2005 Regional Urban Water Management Plan (September, 2005)*

Figure 2-1-2-3-A: Historical and Projected Occupied House in MWDOC's Service Area



Source: Metropolitan Water District of Southern California, ***Draft 2005 Regional Urban Water Management Plan (September, 2005)***

2.1.3 Water Demand Trends in the MWDOC Service Area– Past, Present, and Future

2.1.3.1 Direct Use and Indirect Use of Water Demand

There are two types of water use in Orange County. "Direct use" is that water directly piped from treatment facilities or wells to homes and commercial and institutional buildings. "Indirect use" is that water needed to replenish groundwater storage and to serve as a barrier against saltwater intrusion. Water used to fill the groundwater basins or act as a saltwater barrier will eventually become a source of supply for Orange County residents. However, due to the nature of its usage, this water is often referred to as "indirect use." This Plan discusses both types of water use.

Integrating the two usages of water in the planning process can be confusing and misleading and does not truly reflect water demand in the region. In practice, the two types of water usage are often shown separately. The following subsections will discuss these two types of uses separately. However, the guidebook provided by the Department of Water Resources specifically instructs suppliers to present total water uses by summing both "direct use" and "indirect use." To comply with the requirement, this Plan also provides a

table summing direct use and indirect use of water demand. However, a footnote is provided to caution the reader not to view the sum as the total water demand in the region for any given point of time.

2.1.3.2 Historical Demand

Direct Use

Historical water demand in the MWDOC service area increased from 285,200 acre-feet per year in 1970 to 467,900 acre-feet per year in 1990. Demand began to decline in 1990, and by 1992 demand was 406,500 acre-feet per year. From that point on, demand began to increase again. By 2000 demand in the MWDOC service area was 524,000 acre-feet per year.

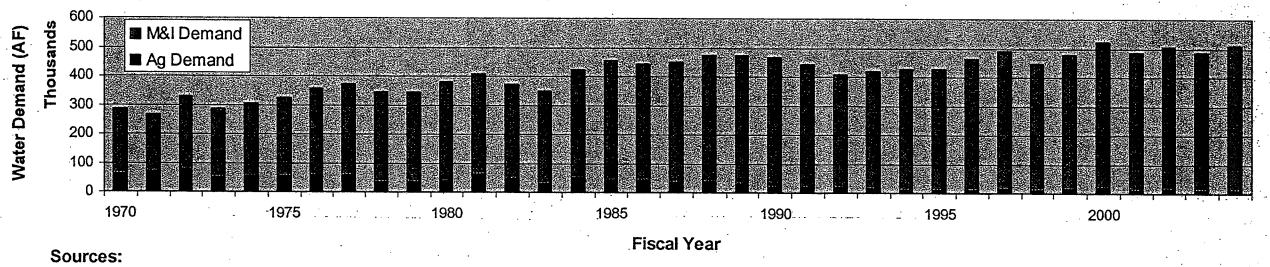
Agriculture-related water demands in the MWDOC service area have steadily decreased since 1971 as agricultural acreage was converted to urban land use. In 1970, agricultural water demands were 64,700 acre-feet and represented approximately 23% of the total demand in the MWDOC service area. By 2004, agricultural water demands were 13,000 acre-feet and represented approximately 3% of total demands. Table 2-1-3-2-A and Figure 2-1-3-2-A show historical water demands for the MWDOC service area.

Table 2-1-3-2-A: Historical Water Demands for Direct Consumption in MWDOC's Service Area

	(Fiscal Year In acre-feet)							
	1970	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2004**
Municipal & Industrial	220,500	272,800	341,100	413,600	447,100	417,700	500,800	498,900
Ag	64,700	53,700	40,800	41,900	20,800	10,700	20,600	12,800
Total Water Demands	285,200	326,500	381,900	455,500	467,900	428,400	521,400	511,700

Sources:
[1] Metropolitan Water District of Southern California, *Annual Report*
[2] Orange County Water District, *Annual Engineer's Report*

Figure 2-1-3-2-A: Historical Water Demands for Direct Consumption in MWDOC's Service Area



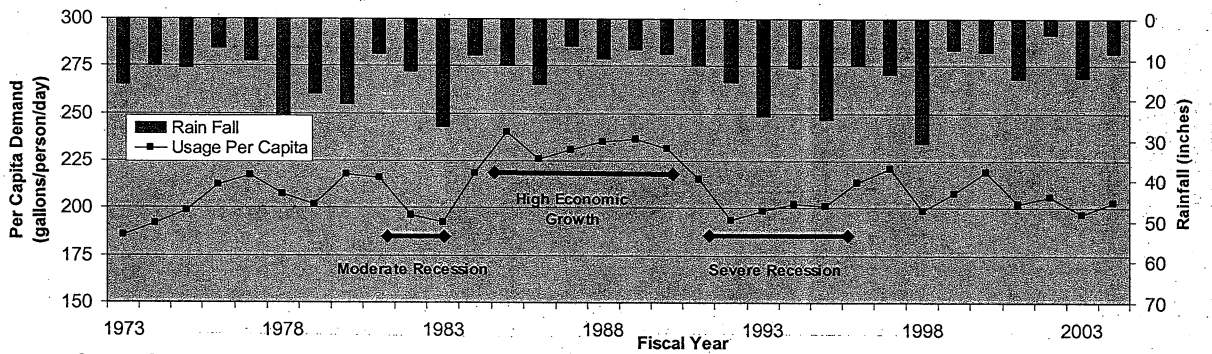
Sources:
1. Metropolitan Water District of Southern California, *Annual Report*
2. Orange County Water District, Annual Engineer's Report

Water demand in the MWDOC service area is influenced by a number of factors, including:

1. population growth;
2. conversion of agricultural areas to urban;
3. health of the economy;
4. weather; and
5. water use efficiency.

To illustrate some of these factors, it is useful to plot municipal and industrial per capita water use (in gallons per person per day). This normalizes for population growth. Any fluctuation in per capita use is, therefore, attributed to weather, the economy, and conservation. Figure 2-1-3-2-B shows the municipal and industrial per capita water use as well as rainfall, a leading indicator for weather, in the MWDOC service area. The same figure also shows periods of economic recession.

Figure 2-1-3-2-B: Historical Per Capita Water Use in MWDOC's Service Area



Source: Orange County Public Facilities and Resources Department, Rainfall Record at Santa Ana Civic Center

Per capita water use increased significantly from 1973 to 1977, with 186 gallons per person per day (gpcd) to 217 gpcd. This increase in per capita water use was most likely a result of urbanization and development trends in which residential homes were becoming more water-use intensive and industry was moving into the area. This was a time in which defense-related and aerospace industries were booming. Rainfall during this period was generally normal. An El Nino event in 1978 reduced per capita use by about 6%. As rainfall normalized, per capita use rose quickly to just above 215 gpcd. A moderate economic recession followed by an El Nino in 1983 reduced per capita use to about 190 gpcd, a decrease of 11%.

A period of high economic growth and lower-than-average rainfall from 1984 to 1990 resulted in per capita water use rising to an average of 230 gpcd. A severe economic recession (from 1991 to 1995) and several years of greater-than-average rainfall resulted in the sharpest reduction in per capita use. This was also a time in which many defense-related and aerospace industries left the MWDOC service area (and the Southern California region). Furthermore, in 1991 the region saw significant water conservation savings as a result of a massive public education/information campaign on the impact of the drought. During this period per capita use averaged about 200 gpcd.

Normalizing for weather, per capita use at present time is averaging around 207 gpcd (the dip in per capita use in 1998 was due to another El Nino rain event). The implementation of long-term water use efficiency measures is credited with reducing per capita use from an average of 230 gpcd in the late 1980s to its current average of 207 gpcd. Please see Section 5 of this Plan for details of conservation programs implemented in MWDOC's service area.

Indirect Use

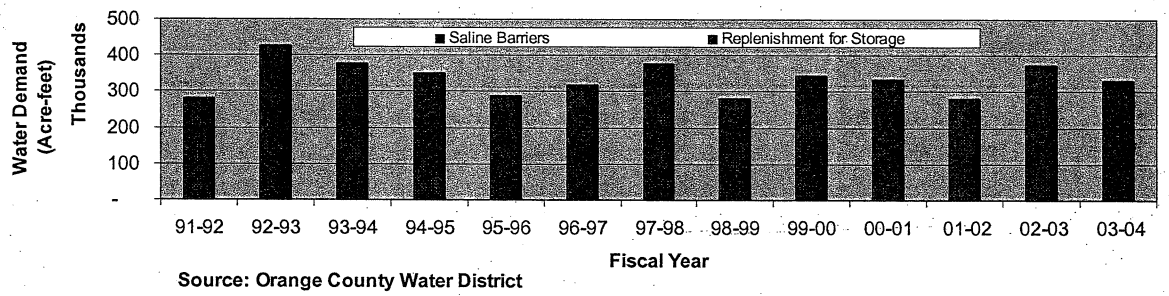
Demands in the past 13 years for replenishing the Orange County groundwater basin are shown in Table 2-1-3-2-B and Figure 2-1-3-2-C. Demands for groundwater storage replenishment in the past were driven by availability of natural supply from the Santa Ana River, incidental recharge, and surplus supply from Metropolitan.

Table 2-1-3-2-B: Historical Water Demands for Indirect Consumption in MWDOC's Service Area

	(Fiscal Year In acre-feet)												
	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04
Replenishment for Storage	280,924	426,125	376,220	351,336	287,894	318,884	376,538	280,961	343,873	331,947	279,566	371,237	325,373
Saline Barriers	-	-	-	-	-	-	-	-	2,000	942	2,673	1,463	5,087

Source: Orange County Water District

Figure 2-1-3-2-C: Historical Water Demand for Indirect Consumption



Source: Orange County Water District

2.1.3.3 Future Demand

2.1.3.3.1 Municipal and Industrial Demand Forecast

Directly consumed Municipal and Industrial (M&I) demands represent the full spectrum of water use within a region, including residential, commercial, industrial, institutional, and un-metered uses. Within the water industry, there are numerous approaches for projecting future retail M&I water demands. These approaches include per capita projections, trend extrapolation, land use build-out estimates, and econometric models.

During the process of developing this Plan, MWDOC considered two alternatives of forecasting M&I demands. They are described below:

Forecast by MWD-MAIN

MWD-MAIN is an econometric-based model developed by Metropolitan. MWD-MAIN combines statistical and end-use methods that have been adapted to conditions in Southern California. The statistical portion of the model incorporates projections of demographic and economic variables from regional planning agencies – the Southern California Association of Governments (SCAG) and the San Diego Association of Governments (SANDAG) – into statistically estimated water demand models to produce forecasts of water demand. The end-use portion of the model derives estimates of conservation by adding additional information on how that water is used – the end uses.

The MWD-MAIN system features a separate unique model for each sector. Table 2-1-3-3-1-A depicts these key relationships in the MWD-MAIN model. In the residential sector, the forecasts of water demand per dwelling unit are ultimately combined with the forecasts of dwelling units from the regional planning agencies to yield an estimate of total sector water demand. Similarly, in the nonresidential sector, water use per employee is combined with forecasts of employment to yield an estimate of total nonresidential water demand. Table 2-1-3-3-1-B Part A shows the projected demographic and economic variables for the MWDOC service area for the next 25 years. Immediately following it, Table 2-1-3-3-1-B Part B shows the projected water use by sector for the MWDOC service area in the same period of time.

Table 2-1-3-3-1-A: MWD-MAIN Relationships by Demand Sector

Demand Sector	Dependent Variable	Explanatory Vairables
Single Family Residential	Demand per household	Service area location Household size Weather conditions Household income Price and conservation
Multifamily Residential	Demand per household	Service area location Household size Weather conditions Household income Price and conservation
Industrial, Commercial, and Institutional	Demand per employee	Employment by S.I.C grouping Price and conservation Service area location
System Losses/Other	Demand per population	Percentage of total use

Source: Metropolitan Water District of Southern California, *Draft 2005 Regional Urban Water Management Plan, September Draft*

In addition to accounting for future demographic trends, this forecast system also incorporates current and future conservation. The forecasting approach embeds a detailed account of water conservation, distinguishing between:

- Passive Conservation – Water saved as a result of changes in water efficiency requirements for plumbing fixtures in plumbing codes. This form of conservation would occur without any water agency action;

- Active Conservation – Water saved directly as a result of conservation programs by water agencies (includes implementation of Best Management Practices – further description will be provided in later paragraphs). However, please note that the model only accounts for savings from active conservation programs implemented through 2003; and

- Price-effect Conservation – Water saved by retail customers attributable to the effect of changes in the inflation-adjusted price of water.

In 1991, MWDOC signed a *Memorandum of Understanding Regarding Urban Water Conservation in California*. The MOU commits MWDOC to implement a number of long-term water conservation measures referred to as Best Management Practices (BMPs). A more detailed discussion of MWDOC's effort at implementing BMPs is presented in

Section 5 of this Plan. Because MWDOC is fully committed to the implementation of the BMPs, the demand projections account for the effects of conservation resulting from the implementation of BMPs to date. The forecast embeds expected BMP participation, recognizing that some of MWDOC's member agencies are not signatories and that some BMPs are not cost effective in the MWDOC service area. The projected savings by conservation sources as described above are provided in Table 2-1-3-3-1-B Part C. By 2030, it is projected that passive and active water use efficiency will result in conservation savings of about 77,900 acre-feet per year. The conservation savings in each sector is shown in Table 2-1-3-3-1-B Part D.

Outputs of the model include "Base Demand' and "With Conservation" forecasts. "Base Use" forecasts show water demand without any conservation. Table 2-1-3-3-1-B Part E presents the calculated Base Demand by multiplying demographic and economic information in part A to the water use by sector in part B of this table. Finally, on Table 2-1-3-3-1-B Part F, the water demands forecasted with conservation as shown by sectors are calculated by subtracting water demand in part E from the conservation value in part D. The model projects, under normal weather and economy, the total water demand for MWDOC to increase from approximately 502,000 acre-feet in 2005 to approximately 584,000 acre-feet in 2030, a 16.3 % increase. Among the sectors, single family is expected to increase by 12%, multi-family by 18.5%, non-residential by 23%, and system loss by 15.2%.

Table 2-1-3-3-1-B: MWD-MAIN Forecast of Municipal and Industrial (M&I) Water Demands in MWDOC's Service Area

	2005	2010	2015	2020	2025	2030
PART A - Projected Demographic and Economic Details						
Single Family	502,850	526,231	531,990	542,161	552,623	562,725
Multi-Family	257,821	277,740	286,860	292,240	297,512	302,936
Employment	1,198,707	1,306,183	1,349,422	1,389,566	1,424,369	1,455,281
Population	2,241,744	2,414,620	2,480,012	2,535,523	2,588,802	2,640,319
PART B - Projected Water Use by Sector						
Single Family	484	486	497	505	508	511
Multi-Family	269	273	280	284	287	289
Non-Residential	114	118	117	118	118	118
System Loss / Other	16	16	16	16	16	17
PART C - Projected Water Savings by Conservation Sources						
Active	8,858	8,281	7,579	2,904	22	1
Passive	30,707	41,091	48,440	59,163	67,164	71,777
System Losses/Other	3,347	4,177	4,739	5,251	5,684	6,072
Total Active & Passive	42,912	53,549	60,758	67,318	72,871	77,851
PART D - Projected Water Savings by Sector						
Single Family	23,155	28,740	33,040	36,718	39,822	42,600
Multi-Family	10,189	13,003	14,239	15,645	16,861	17,960
Non-Residential	6,221	7,629	8,740	9,705	10,503	11,218
System Losses	3,347	4,177	4,739	5,251	5,684	6,072
PART E - Projected Base Demand (Water Use without Conservation)						
Single Family	272,831	286,548	296,083	306,742	314,683	322,252
Multi-Family	77,663	85,058	89,900	93,100	95,504	97,939
Non-Residential	153,668	172,681	177,482	184,111	188,607	192,531
System Losses	40,529	43,518	45,033	46,640	47,802	48,899
PART F - Projected Demand With Conservation						
Single Family	249,676	257,808	263,043	270,024	274,860	279,652
Multi-Family	67,474	72,055	75,661	77,455	78,643	79,979
Non-Residential	147,447	165,052	168,742	174,406	178,103	181,313
System Losses	37,182	39,341	40,294	41,389	42,118	42,827
Total ProjectedM&I Demand	**501,780**	**534,257**	**547,739**	**563,274**	**573,724**	**583,771**

Source: Metropolitan Water District of Southern California, Output of MWD-MAIN Model

Forecast by MWDOC Member Agencies

In meeting the required information exchange between wholesale and retail water agencies (California Water Code Section 10631(k)), MWDOC requested 25-year retail demand projections from its 30 member agencies. Methodologies and assumptions underlying these projections vary from agency to agency, but all projections reflect an in-depth knowledge of the agencies' service areas. In most cases, the projections are closely correlated to the general plans prepared by the County of Orange or cities within MWDOC's service area. Table 2-1-3-3-1-B shows the M&I demands as projected by each member agency. The sum of agencies' projections shows that the M&I demand is expected to increase from approximately 504,000 acre-feet in 2005 to approximately 614,000 acre-feet in 2030, an increase of 21.9%.

Table 2-1-3-3-1-C: MWDOC Member Agencies Forecast of Municipal and Industrial (M&I) Water Demands

	2005	2010	2015	2020	2025	2030
Brea, City of	11,796	12,345	12,845	13,328	13,640	13,640
Buena Park, City of	18,153	18,904	20,334	23,659	23,659	23,659
East Orange CWD	16,143	16,622	16,627	16,647	16,647	16,647
El Toro Water District	11,536	11,559	11,728	11,898	12,068	12,220
Fountain Valley, City of	12,519	12,745	12,851	12,985	12,985	12,985
Garden Grove, City of	29,671	30,264	30,869	31,486	32,116	32,687
Huntington Beach, City of	33,941	34,714	35,060	35,411	35,765	36,085
Irvine Ranch Water District	87,468	101,589	114,599	123,675	130,450	134,150
La Habra, City of	11,272	11,825	12,077	12,213	12,284	12,299
La Palma, City of	2,617	2,623	2,653	2,706	2,729	2,741
Laguna Beach CWD	4,768	4,853	4,903	4,953	4,998	4,998
Mesa Consolidated Water District	21,849	21,982	22,083	22,193	22,303	22,401
Moulton Niguel Water District	42,752	44,914	45,235	45,735	46,235	46,681
Newport Beach, City of	18,648	19,791	21,555	21,640	21,716	21,716
Orange, City of	35,081	36,588	37,244	37,244	37,244	37,244
San Clemente, City of	11,458	12,162	12,859	13,394	13,394	13,394
San Juan Capistrano, City of	10,950	12,691	13,253	13,776	14,130	14,175
Santa Margarita Water District	34,480	39,937	43,686	48,340	51,363	51,387
Santiago County Water District	429	2,165	2,304	2,354	2,404	2,449
Seal Beach, City of	4,498	4,620	4,735	4,878	4,878	4,878
Serrano Water District	3,379	3,430	3,651	3,721	3,763	3,796
South Coast Water District	8,298	9,063	9,062	9,196	9,306	9,306
Golden State Water Company	30,214	31,431	32,371	33,367	32,920	33,101
Trabuco Canyon Water District	4,301	5,593	5,914	6,153	6,363	6,495
Westminster, City of	14,190	14,475	14,611	14,911	15,005	14,986
Yorba Linda Water District	24,587	25,995	26,795	27,273	27,494	27,637
Total	**504,997**	**542,881**	**569,905**	**593,137**	**605,858**	**611,757**

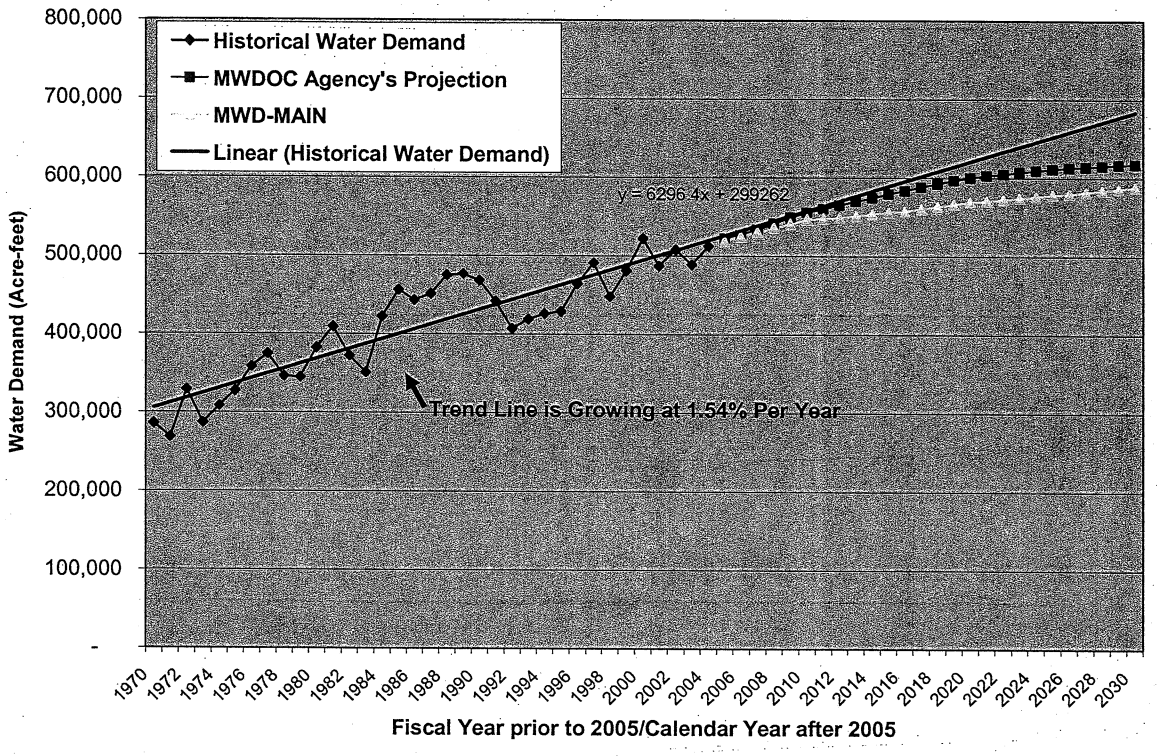
Source: Municipal Water District of Orange County, *Annual 25-Year Survey (Spring 2005)*

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Describing the future trend and concluding which Analysis Approach will be used for this Plan.

Figure 2-1-3-3-1-A shows the historical water demand and the projected water demand using two aforementioned alternatives. Both alternatives project demand based on normal weather and economy.

Figure 2-1-3-3-1-A: Comparison of Projections for Direct Consumed M&I Demand in MWDOC's Service Area



As discussed in the previous section on historical water demand, MWDOC is expecting a slower rate of growth due to build-out within its service area. Both projection alternatives reflect slower rates of growth, but at different levels. A trend line, plotted through historical demand from 1970 to 2004, indicates an average compounded annual growth rate of 1.54%. The aggregate forecast done by MWDOC member agencies follows a similar growth rate for another five years. The growth in water demand then slowly decreases to less than 1% per year from 2010 to 2020 and to less than 0.5% per year from 2020 to 2030. On the other hand, the demand forecasted by the MWD-MAIN model shows a much more rapid decrease in growth rate. MWD-MAIN projected the growth rate of water demand in the MWDOC service area decreasing to 1% per year over the next five years. The growth rate is then projected to decrease to approximately 0.5% per year from 2010 to 2020 and to less than 0.5% per year from 2020 to 2030.

Although the different methodologies used in the two alternatives lead to different growth rates for the projections,

the results are close. The projected demands from 2015 to 2030 are within approximately 5% of each other.

Since both alternatives generate close results, the member agencies' projections were selected for use in this Plan for the following reasons:

1. They yield to a higher water demand projection and, hence, this is a more conservative approach;

2. California Water Code Section 10631(k) requires that a wholesale agency (such as MWDOC) identifies and quantifies supply available to meet the demands of the retailers (such as MWDOC's member agencies). By using the projection done by its member agencies, MWDOC can address the reliability of its supply to meet the demand of its member agencies as specified by the Code; and

3. To maintain "consistency" in regional planning.

2.1.3.3.2 Agriculture Demand Forecast

As part of its demand survey, MWDOC requested its member agencies provide water demand forecasts for agriculture uses. Table 2-1-3-3-2-A shows agriculture demand projected by each member agency, assuming normal conditions. By 2030, agricultural demands will be approximately 4,800 acre-feet per year, a decrease of 71% from year 2005. It is projected that agricultural demands will make up less than 0.8% of the total demand by 2030.

Table 2-1-3-3-2-A: MWDOC Member Agencies Forecasts of Agricultural Water Demands in MWDOC's Service Area

	2005	2010	2015	2020	2025	2030
Brea, City of	265	152	147	101	101	101
Buena Park, City of	-	-	-	-	-	-
East Orange CWD	-	-	-	-	-	-
El Toro Water District	-	-	-	-	-	-
Fountain Valley, City of	-	-	-	-	-	-
Garden Grove, City of	-	-	-	-	-	-
Huntington Beach, City of	-	-	-	-	-	-
Irvine Ranch Water District	16,064	11,572	7,757	5,779	4,391	4,352
La Habra, City of	-	-	-	-	-	-
La Palma, City of	-	-	-	-	-	-
Laguna Beach CWD	-	-	-	-	-	-
Mesa Consolidated Water District	-	-	-	-	-	-
Moulton Niguel Water District	-	-	-	-	-	-
Newport Beach, City of	-	-	-	-	-	-
Orange, City of	61	61	61	61	61	61
San Clemente, City of	-	-	-	-	-	-
San Juan Capistrano, City of	127	124	101	101	101	101
Santa Margarita Water District	-	-	-	-	-	-
Santiago County Water District	-	-	-	-	-	-
Seal Beach, City of	-	-	-	-	-	-
Serrano Water District	-	-	-	-	-	-
South Coast Water District	-	-	-	-	-	-
Southern Calif. Water Company	-	-	-	-	-	-
Trabuco Canyon Water District	221	142	142	142	142	142
Westminster, City of	-	-	-	-	-	-
Yorba Linda Water District	44	44	44	44	44	44
Total	**16,781**	**12,094**	**8,252**	**6,229**	**4,840**	**4,801**

Source: Municipal Water District of Orange County, *Annual 25-Year Survey (Spring 2005)*

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

2.1.3.3.3 Demand Forecast for Replenishment for Storage and Saline Barriers

Since demands for replenishment for groundwater basin storage and saltwater barriers are driven by the availability of supply to the groundwater basin in Orange County, the demand forecast for this type of use is based on the projection of the following supplies under normal conditions:

- Santa Ana River Flows;
- Incidental Recharge;

- Replenishment (surplus) supplies from Metropolitan; and
- Recycled Supplies for replenishment use.

Table 2-1-3-3-3-A shows the projected demand for replenishment for storage and saline barriers.

Table 2-1-3-3-3-A: Projected Demand for Indirect Use in MWDOC's Service Area – Replenishment for Storage and Saline Barriers

	(Demand in Acre-feet per Calendar Year)					
	2005	2010	2015	2020	2025	2030
Saline Barriers	14,000	40,000	36,000	36,000	36,000	36,000
Replenishment for Groundwater Basin	311,080	348,934	349,993	356,169	365,223	372,479

Source: Municipal Water District of Orange County, output of "Water Balance" Model

2.1.3.4 Conclusion

Overall, MWDOC's water demands will continue to increase, although not as rapidly as in the past. Future demand growth will average just under 0.5% per year, as compared to historical demand growth of about 1.54% per year. This is due to more limitations in new land development (e.g., cost and environmental restrictions) and the continued commitment to water conservation in the region.

M&I demands will continue to grow, while agricultural demands will continue to decline through 2030. By 2030, agricultural demands will represent less than 0.8% of the total direct use demand.

Long-term conservation measures are expected to continue, but current demand projections do not include water savings from active conservation programs planned after 2003. M&I per capita use is projected to remain at approximately 210 gpcd.

Table 2-1-3-4-A summarizes the historical and projected water demand in the MWDOC service area by usage.

Table 2-1-3-4-A: Summary Table of Water Demand in MWDOC's Service Area – Past, Present, Future

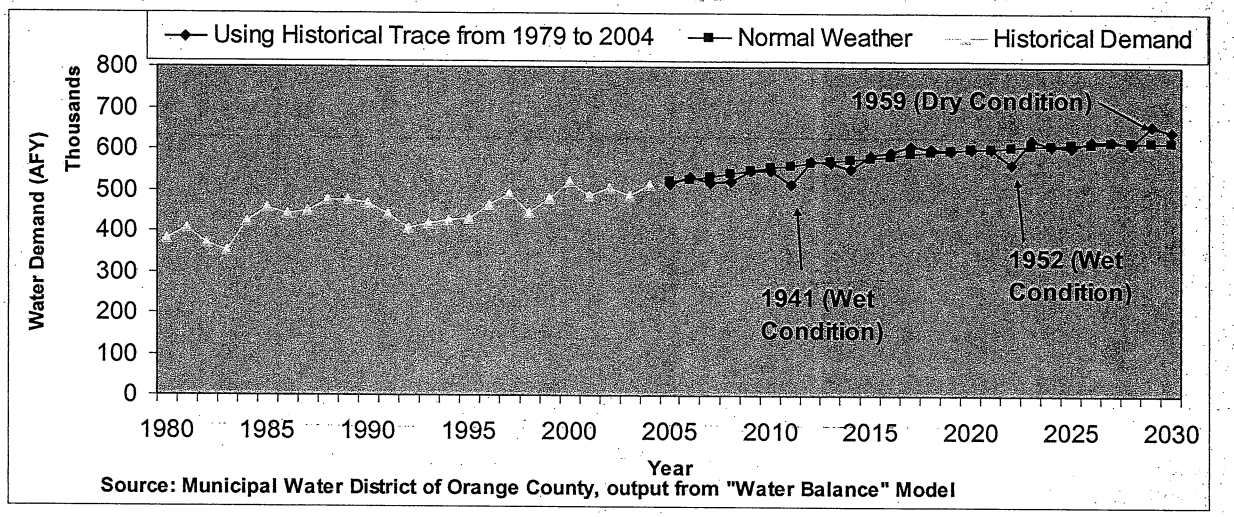
	Historic Fiscal Year					Present Calendar Year	Future Calendar Year				
	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
I. Direct Use (AFY)											
Municipal & Industrial	341,100	413,600	447,100	417,700	500,800	504,997	542,881	569,905	593,137	605,858	611,757
Agricultural	40,800	41,900	20,800	10,700	20,600	16,781	12,094	8,252	6,229	4,840	4,801
Total Direct Use	381,900	455,500	467,900	428,400	521,400	521,778	554,975	578,157	599,366	610,698	616,558
II. Indirect Use (AFY)											
Sea Barriers	NA	NA	NA	-	2,000	14,000	40,000	36,000	36,000	36,000	36,000
Replenishment for Groundwater I	NA	NA	NA	351,336	343,873	311,080	348,934	349,993	356,169	365,223	372,479
Total Indirect Use	NA	NA	NA	351,336	345,873	325,080	388,934	385,993	392,169	401,223	408,479
III. Total Water Use (*see Note)											
	NA	NA	NA	779,736	867,273	846,858	943,909	964,150	991,535	1,011,922	1,025,037
Note: Direct use and indirect use are sum as shown for complying with DWR guideline requirement. But the two uses are typically not summed.											
M&I Per Capita Use (gpcd)	218	240	231	201	219	201	201	205	210	210	207

2.1.3.5 Forecast Variability in Demand Due to Weather

Up to this point, we have illustrated the demand projection based on normal weather. However, in order to estimate supply reliability, variations in future demand due to temperature and rainfall must be developed.

In the analysis of water service reliability, MWDOC adapted the climate factors developed by Metropolitan to estimate the variability of demands due to weather. Metropolitan built a model called "MWDFORE" that uses 83 years (1922 to 2004) of climate history recorded at the Los Angeles Civic Center weather station. During the analysis, historical climate traces were superimposed over future demand projections under normal conditions. Wet and cool weather would result in lower-than-normal demands, while dry and hot weather would result in greater-than-normal demands. To illustrate this variation, a climate trace from 1979 to 2004 was superimposed over the projected demand from 2005 to 2030. Figure 2-1-3-5-A shows the two projected demands, one that is based on normal weather and the other that is based on climate traces from 1979 to 2004. In the historic climate sequence, 1941 (a record wet year) falls on the projection year 2011 – indicated by the lower-than-average projected demand. In the same sequence, 1959 (a record dry year) falls on the projection year 2022 – indicated by the greater-than-average projected demands.

Figure 2-1-3-5-A: Retail Demand Projection with Weather Variation in MWDOC's Service Area



Based on 83 different historic climate sequences occurring in any given forecast year, the variation of demand due to weather has been estimated to be about +6.7% (in dry) and -8.4% (in wet).

2.2 Water Supply

2.2.1 Current and Planned Water Supplies

Direct-use water (see Section 2.1.3.1 for definition of direct versus indirect water use) 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. The primary groundwater basin is located in the northern half of MWDOC's service area. 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. Sources of Metropolitan's imported water include the Colorado River Aqueduct and the State Water Project. Total MWDOC direct water use demand in 2030 is projected to increase only 18 percent from 2005 due to the established plumbing code and aggressive water use efficiency effort.

MWDOC and its member agencies are collectively working to improve the water service reliability within the service area by continuously developing local supplies.

To quantify available supply within MWDOC Service area, MWDOC incorporated the following efforts:

- Collect forecast of retail demands and local supply, except for groundwater supply from Orange County Basin, from its member agencies; and

- Develop a computer model called "Water Balance Model" that forecasts groundwater supply from Orange County Basin and imported demand in Orange County under various types of water year. Section 2.2.1.1.1 has detailed discussion on this computer modeling.

Table 2-2-1-A identifies existing and planned water supply sources and quantities available to meet the direct use demand in the MWDOC's service area. According to this Plan, under normal condition member agencies within MWDOC's service area are expected to increase their reliance on local supply from 53% to 60% in 2030, and decrease their dependence on imported supply from 47% to 40% in 2030.

Table 2-2-1-A: Current and Planned Water Supplies for Direct Consumption in MWDOC's Service Area

Acre-feet Per Year						
Water Supply Sources	2005	2010	2015	2020	2025	2030
Water Imported from:						
Metropolitan	245,232	208,006	230,494	243,030	245,322	246,981
Groundwater:						
OCWD (Lower Santa Ana Basin)	212,909	259,440	257,192	260,804	266,473	270,610
California Domestic Water Company	13,953	13,700	13,700	13,700	13,700	13,700
Supplies from other groundwater basins	7,157	10,978	11,499	12,124	12,124	12,124
Surface Water	10,908	11,476	10,749	10,500	10,462	10,525
Recycled Water (projected use)	31,619	51,375	54,521	59,208	62,618	62,618
Total	521,778	554,975	578,156	599,365	610,699	616,558

Source: Municipal Water District of Orange County, output of "Water Balance" Model

Indirect water use (groundwater replenishment and saltwater barrier injection) in the MWDOC service area also comes from both local and imported supplies. As indicated in Table 2-2-1-B, the planned supplies for meeting the demand for replenishment and saltwater barriers are expected to increase from approximately 325,000 acre-feet in 2005, to 408,000 acre-feet in 2030. Two main reasons for the increase are:

- Increase in recycled water supply – OCWD is currently constructing a recycling plant called the Groundwater Replenishment System (GWR System). When completed in 2007-08, it is expected to deliver 72,000 acre-feet per year of recycled supply to meet the demands for replenishment and saltwater barriers; and

- Increase in supply from the Santa Ana River – As population increases in the upper Santa Ana Watershed, more municipal discharge (non-storm related flow) is expected and will result in higher flows for stream recharge in the lower Santa Ana River Basin.

According to a study done by the Santa Ana Watershed Project Authority in March 2004, the estimated municipal discharge will increase from 145,000 acre-feet per year at present time to 190,000 acre-feet per year in 2025. Such increases lead to higher projections of total flows (municipal plus storm flow) to be captured in the future.

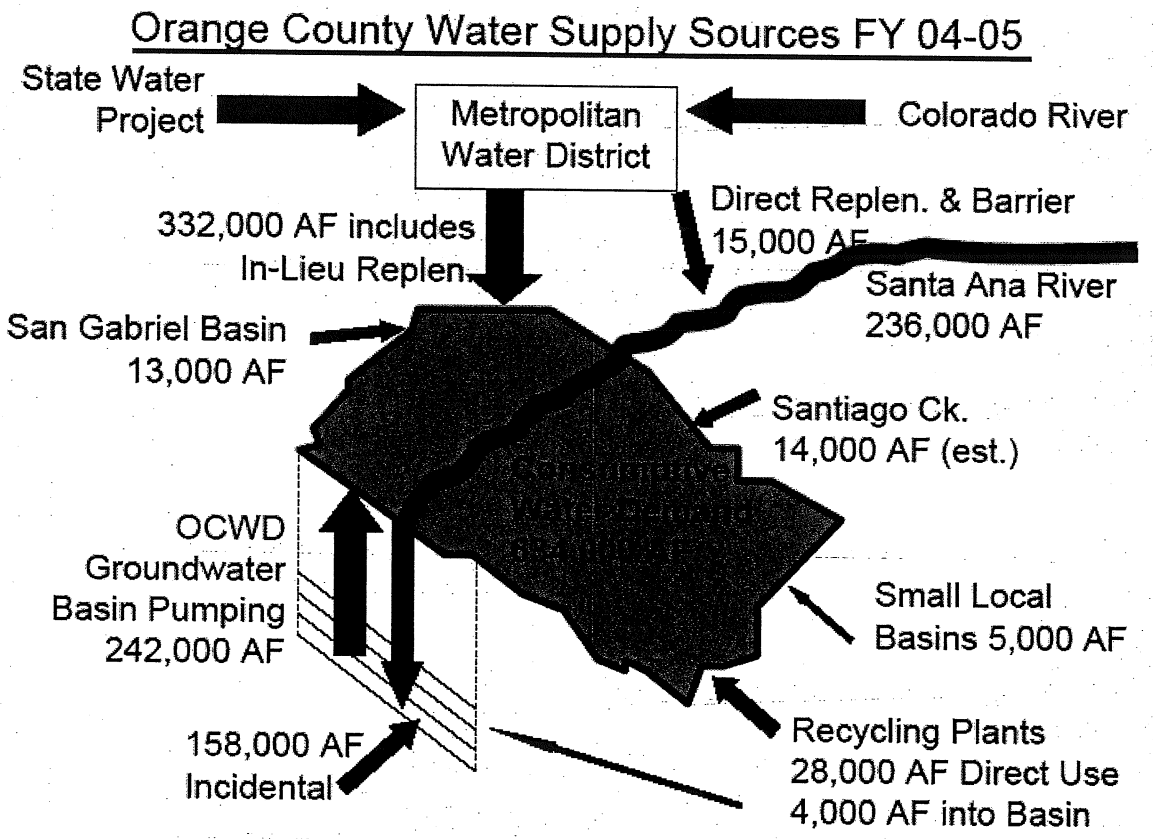
Table 2-2-1-B: Current and Planned Water Supplies for Indirect Consumption in MWDOC's Service Area- Groundwater Replenishment and Saline Barrier

Acre-feet per Year						
Water Supply Sources	2005	2010	2015	2020	2025	2030 - opt
Water purchased from Metropolitan						
For Sea Barrier	8,000	4,000	0	0	0	0
For Replenishment	55,181	57,739	58,734	56,685	57,048	50,700
Purchased from Others						
For Sea Barrier	2,000	2,000	2,000	2,000	2,000	2,000
For Replenishment	2,000	2,000	2,000	2,000	2,000	2,000
Recycled Water						
For Sea Barrier	4,000	34,000	34,000	34,000	34,000	34,000
For Replenishment	0	38,000	38,000	38,000	38,000	38,000
Santa Ana River (Storm and Base Flows)	217,116	202,057	211,339	219,633	227,616	235,913
Incidental Recharge	99,389	47,006	43,745	42,051	41,348	41,826
Withdraw/Deposit to Basin Storage	(62,606)	2,132	(3,825)	(2,201)	(789)	4,041
Total	325,080	388,934	385,993	392,169	401,223	408,479

Source: Municipal Water District of Orange County, output of "Water Balance" Model

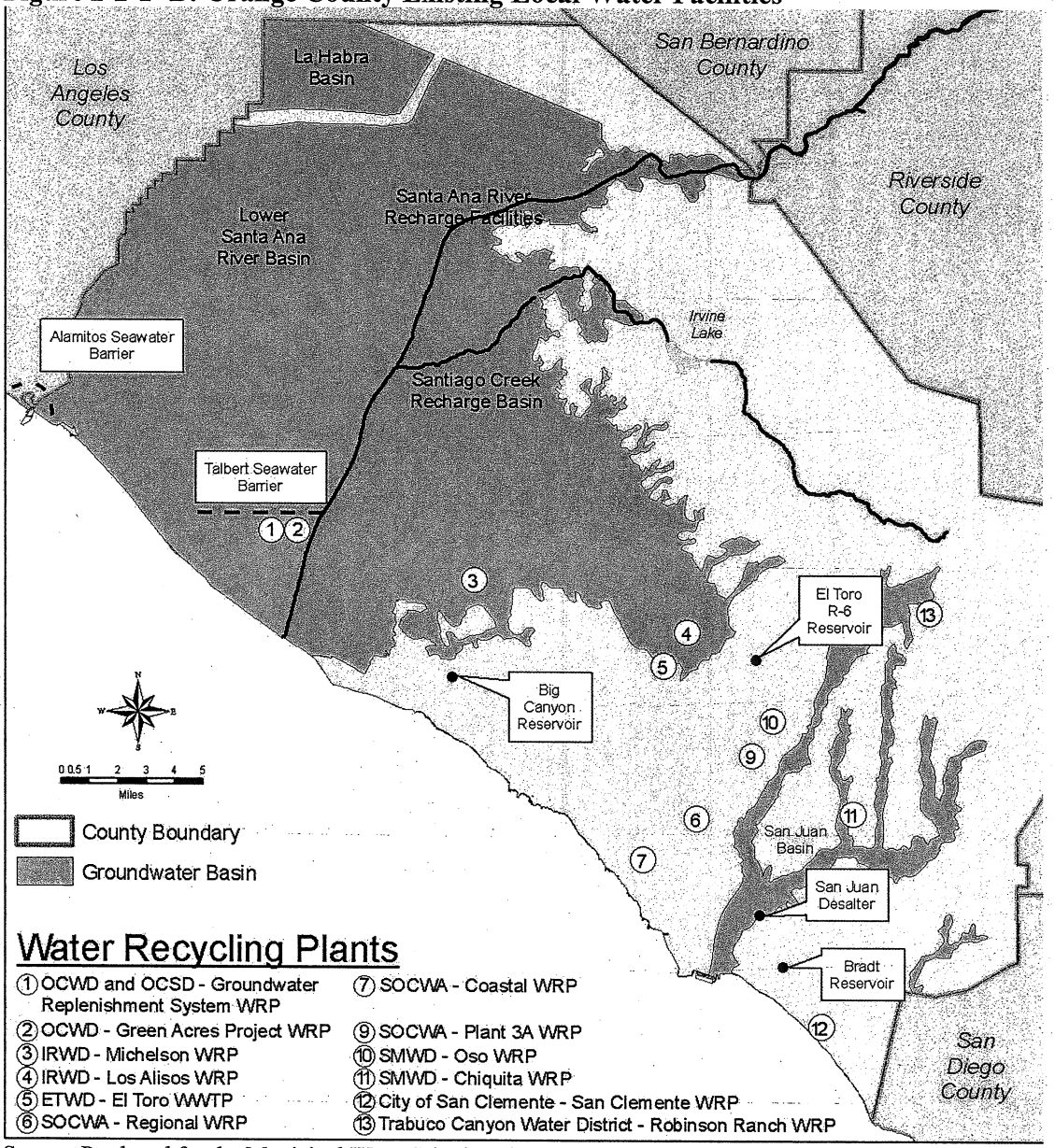
A schematic of all supply sources is shown in Figure 2-2-1-A; Figure 2-2-1-B shows existing local supply facilities within Orange County.

Figure 2-2-1-A: Schematic of Water Supply Sources in Orange County



Source: Municipal Water District of Orange County

Figure 2-2-1- B: Orange County Existing Local Water Facilities



Source: Produced for the Municipal Water District of Orange County by the Center for Demographic Research (CDR), CSU Fullerton

The following section discusses in detail each source of supply available to the MWDOC service area.

2.2.1.1 Groundwater

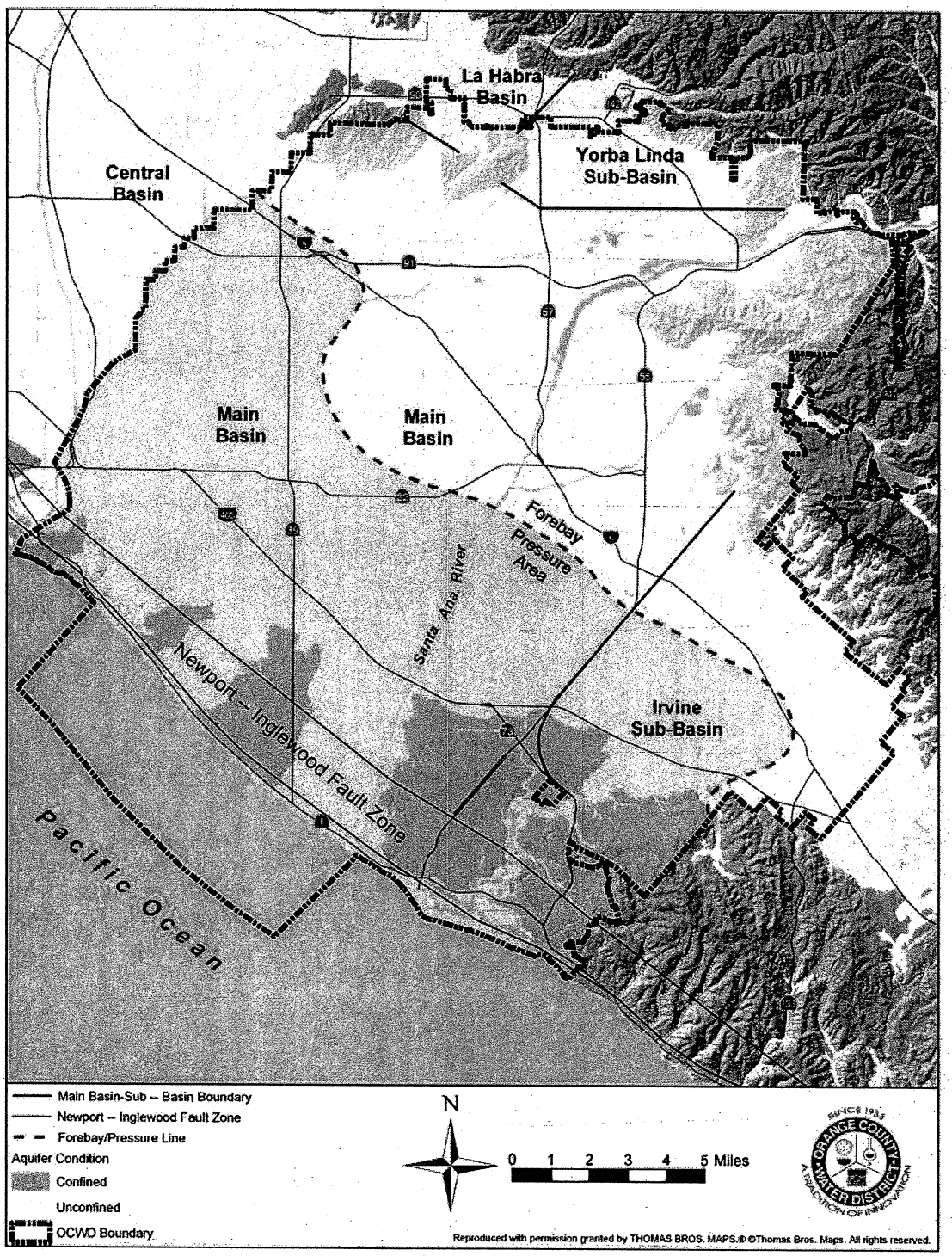
Among all local supplies available to MWDOC's member agencies, groundwater supplies the most water. The water supply resources in MWDOC's service area are enhanced by the existence of the following three groundwater basins, which are used as reservoirs to store water during wet years and storage to draw on during dry years.

2.2.1.1.1 Lower Santa Ana River Basin (Orange County Basin)

Basin Hydrogeology

This basin, also known as Orange County Groundwater Basin (Orange County Basin), underlies a coastal alluvial plain in the northwestern portion of Orange County. It covers an area of approximately 350 square miles beneath broad lowlands known as the Tustin and Downey Plains (Figure 2-2-1-1-1-A). The Basin is bounded by consolidated rocks exposed in the north in the Puente and Chino Hills, in the east in the Santa Ana Mountains, and in the south in the San Joaquin Hills. The Basin is bounded by the Pacific Ocean in the southwest and by the Orange County-Los Angeles County line in the northwest. The Basin underlines the lower Santa Ana River Watershed.

Figure 2-2-1-1-1-A: Map of the Orange County Groundwater Basin



Source: Orange County Water District, *Groundwater Management Plan*, ES-3

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. The proportion of fine material generally increases toward the coast, dividing the Basin into forebay and pressure areas. Consequently, most surface water recharge is through the coarser, more interconnected and permeable forebay deposits. Strata in this Basin are faulted and folded, and may show rapid changes in grain size. The Newport-Inglewood fault zone parallels the coastline and generally forms a barrier to groundwater flow. Erosional channels filled with permeable alluvium break this barrier in selected locations called "Gaps'. In addition to this geologic feature, increased pumping from inland municipal wells causes the coastal gaps at Talbert, Bolsa, Sunset, and Alamitos to be susceptible to seawater intrusion.

The sediments containing easily recoverable fresh water extend to about 2,000 feet in depth near center of the Basin. Although water-bearing aquifers exist below that level, water quality and pumping lift make these materials economically unviable at present. Well yields range from 500 to 4,500 gallons per minute, but are generally 2,000 to 3,000 gallons per minute.

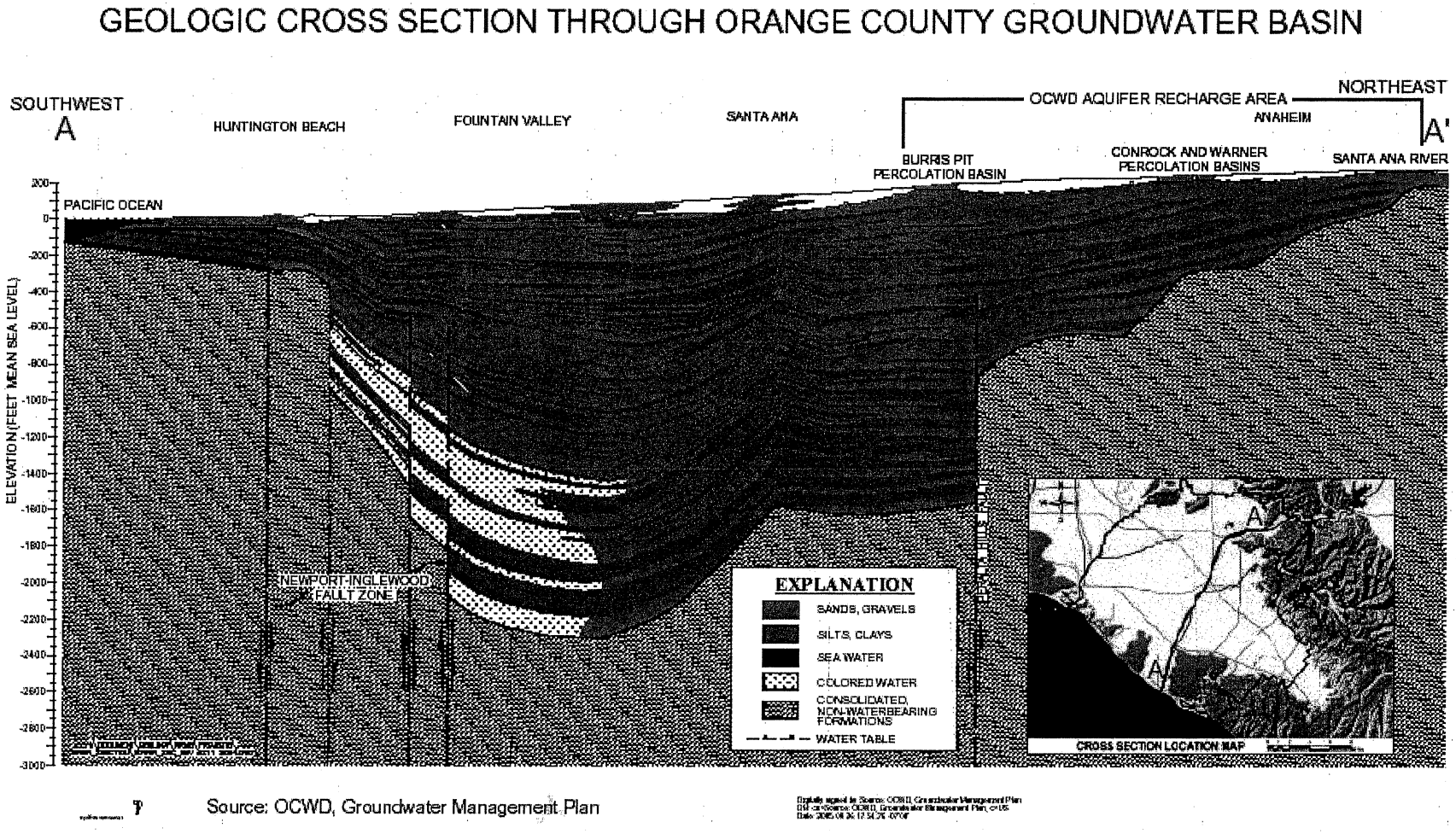
Upper, middle, and lower aquifer systems are recognized in the basin. The upper aquifer system, also know as the "shallow" aquifer system, includes Holocene alluvium, older alluvium, stream terraces, and the upper Pleistocene deposits represented by the La Habra Formation. It has an average thickness of about 200 to 300 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. With the exception of a few large-system municipal wells in the cities of Garden Grove, Anaheim, and Tustin, wells producing from the shallow aquifer system predominantly have industrial and agricultural uses. Production from the shallow aquifer system is typically about five percent of total Basin production.

The middle aquifer system, also known as the "principal" aquifer system, includes the lower Pleistocene Coyote Hills and San Pedro Formations, which have an average thickness

of 1,000 feet and are composed of sand, gravel, and a minor amount of clay. The primary recharge of the middle aquifer system is derived from the Santa Ana River channel in the northeast of the County. The middle aquifer system provides 90 to 95 percent of the groundwater for the Basin.

The lower aquifer system (or deep aquifer) 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, but this zone has been found to contain colored water, and the aquifer is too deep to economically construct production wells. With the exception of four colored water production wells constructed by Mesa Consolidated Water District (MCWD) and Irvine Ranch Water District (IRWD), few wells penetrate the deep aquifer system. Figure 2-2-1-1-1-B presents a geologic cross-section through the Basin along the Santa Ana River.

Figure 2-2-1-1-1-B: Geologic Cross Section through Orange County Basin

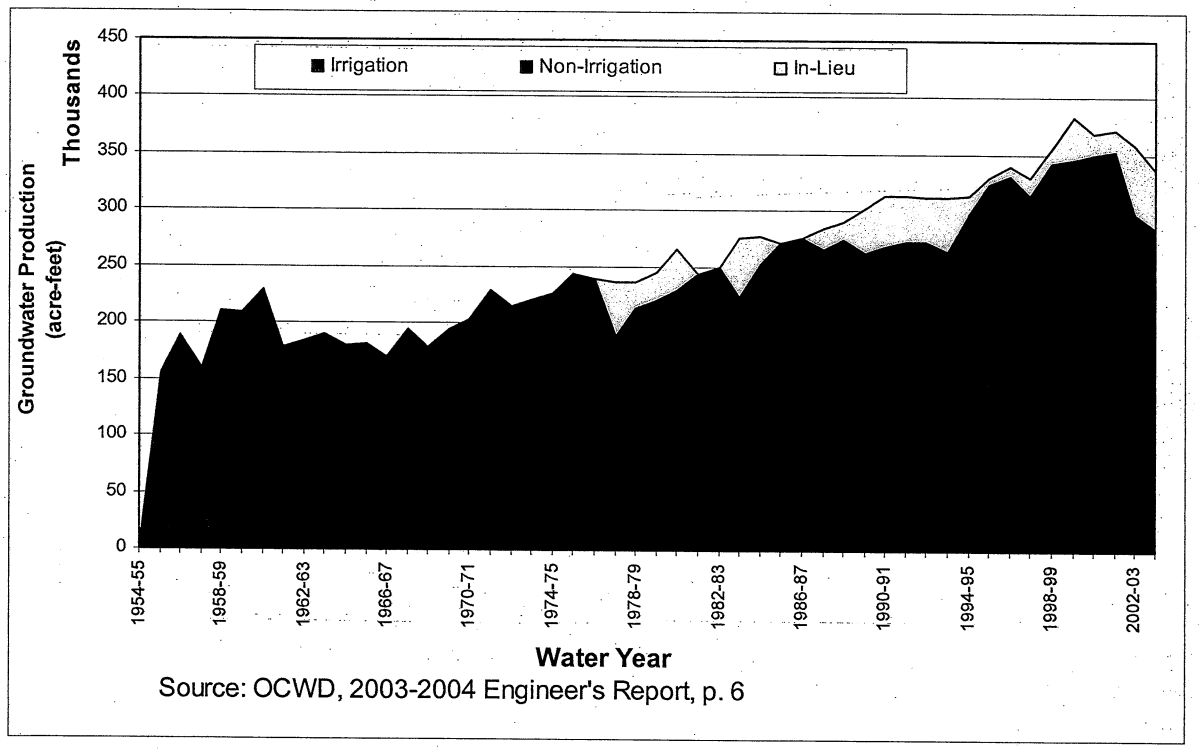


Source: OCWD, Groundwater Management Plan

Basin Groundwater Production Management

OCWD manages the Orange County Basin. Since OCWD was formed in 1933, the Basin has played a key role in meeting the water supply needs of north Orange County. For the past 50 years, OCWD has implemented a management policy to provide for uniformity of cost and access to Basin supplies without respect to how long an entity has been producing from the Basin. As shown in Figure 2-2-1-1-1-C, total groundwater production has approximately doubled since 1954. Groundwater consumption from this Basin has increased from 150,000 acre-feet per year to a maximum of 384,000 acre-feet per year.

Figure 2-2-1-1-1-C: Historical Groundwater Production from Orange County Basin



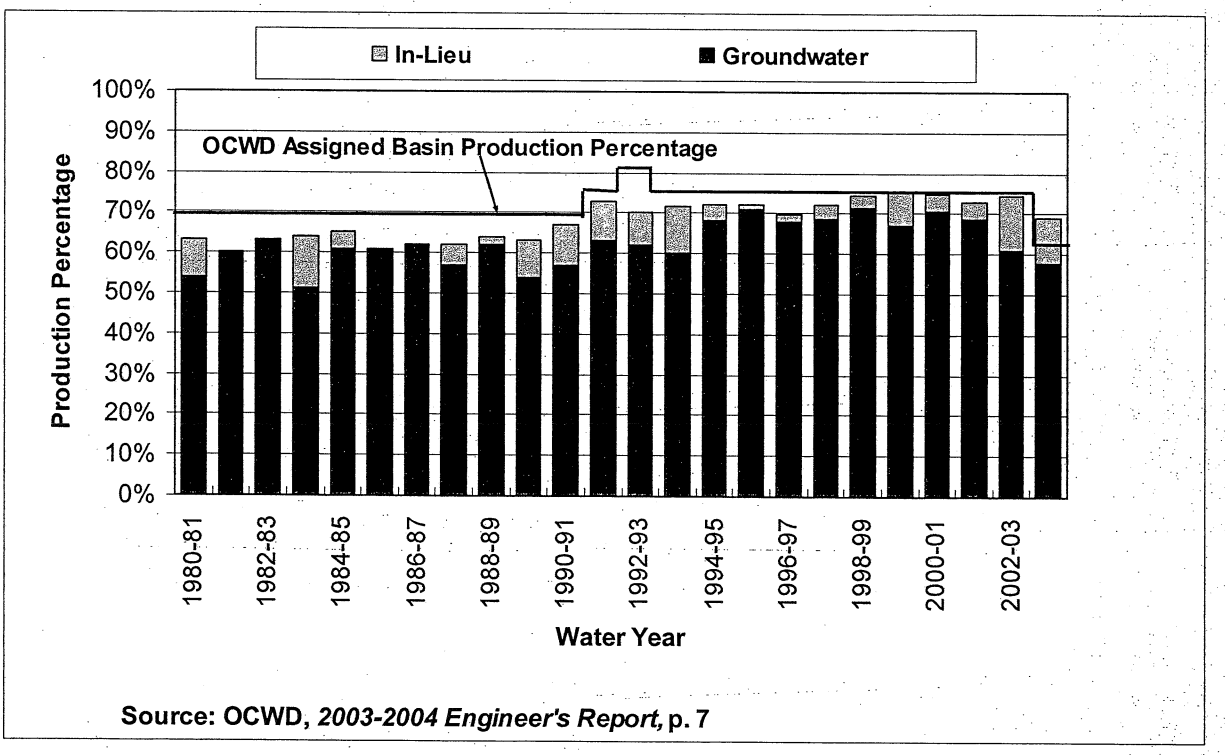
Source: OCWD, 2003-2004 Engineer's Report, p. 6

Historically, OCWD managed the Basin based upon seeking to increase supply rather than restricting demand. No pumping restrictions exist. Because the Basin is not operated on an annual safe-yield basis, the net change in storage in any given year may be positive or negative; however, over the long term, the Basin must be maintained in an approximate balance to ensure the long-term viability of Basin supplies. OCWD manages the amount of production through financial incentives. The framework for the financial incentives is based on establishing the Basin Production Percentage

(BPP). The BPP is the ratio of groundwater production to total water demands, expressed as a percentage. Pumping below the BPP is charged an assessment on a per acre-feet basis. This assessment is called the Replenishment Assessment (RA). Groundwater production above the BPP is charged the RA and the Basin Equity Assessment (BEA), which is typically set so that the cost of groundwater production above the BPP is similar to the cost of purchasing alternative supplies.

OCWD's general goal is to maintain the BPP as high as possible without negatively impacting the basin to allow producers to maximize their groundwater production, thereby lowering their overall water supply cost. Figure 2-2-1-1-1-D shows the history of the BPP along with the actual BPP that was achieved by the producers. Until recently, the actual BPP has sometimes been approximately five percent lower than the allowable BPP. This is primarily due to IRWD, the Yorba Linda Water District (YLWD), and the city of Buena Park, which have been unable to pump up to the BPP.

Figure 2-2-1-1-1-D: Historical Assigned Groundwater BPP and Actual Groundwater BPP Achieved



Source: OCWD, *2003-2004 Engineer's Report*, p. 7

Increasing accumulated overdraft of the Basin since the late-1990s has prompted increased evaluation of the Basin's yield and how the yield can be optimized through projects and programs. As a response to various factors, including a series of years with below-average precipitation and the increased accumulated overdraft, in 2003 OCWD reduced the BPP to decrease pumping from the Basin. As shown on Figure 2-2-1-1-1-D, this was the first BPP reduction since 1993.

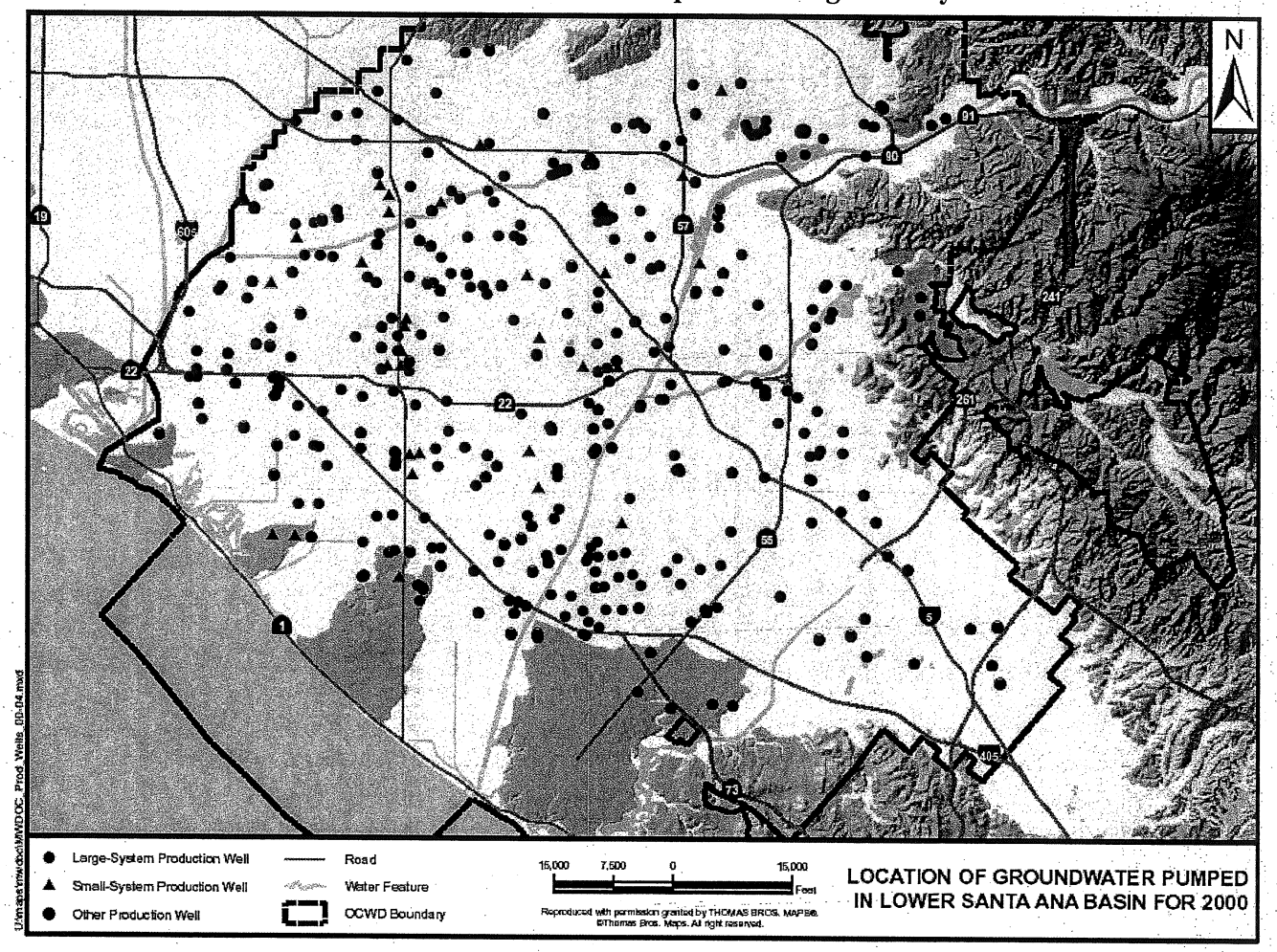
Currently, groundwater is produced from approximately 500 active wells within the Basin, approximately 300 of which produce less than 25 acre-feet per year. Groundwater production from approximately 200 large-capacity or large-system wells operated by the 21 largest water retail agencies accounted for an estimated 97 percent of the total production. All but three of these large retail agencies, the cities of Anaheim, Fullerton, and Santa Ana, are within the MWDOC service area. Table 2-2-1-1-1-A shows the groundwater produced from this Basin for the past five years. Figures 2-2-1-1-1-E to 2-2-1-1-1-I show the location of groundwater pumped during the same period of time. Figure 2-2-1-1-1-J shows the groundwater elevation contour map as measured in November 2004.

Table 2-2-1-1-1-A: Historical Production in Orange County Basin

	Acre-feet				
	2000	2001	2002	2003	2004
Inside of MWDOC Service Area	200,456	200,721	185,390	176,427	170,150
Outside of MWDOC Service Area (Anaheim, Fullerton, and Santa Ana)	119,028	118,979	101,872	107,609	92,007
Total	**319,484**	**319,700**	**287,262**	**284,036**	**262,157**

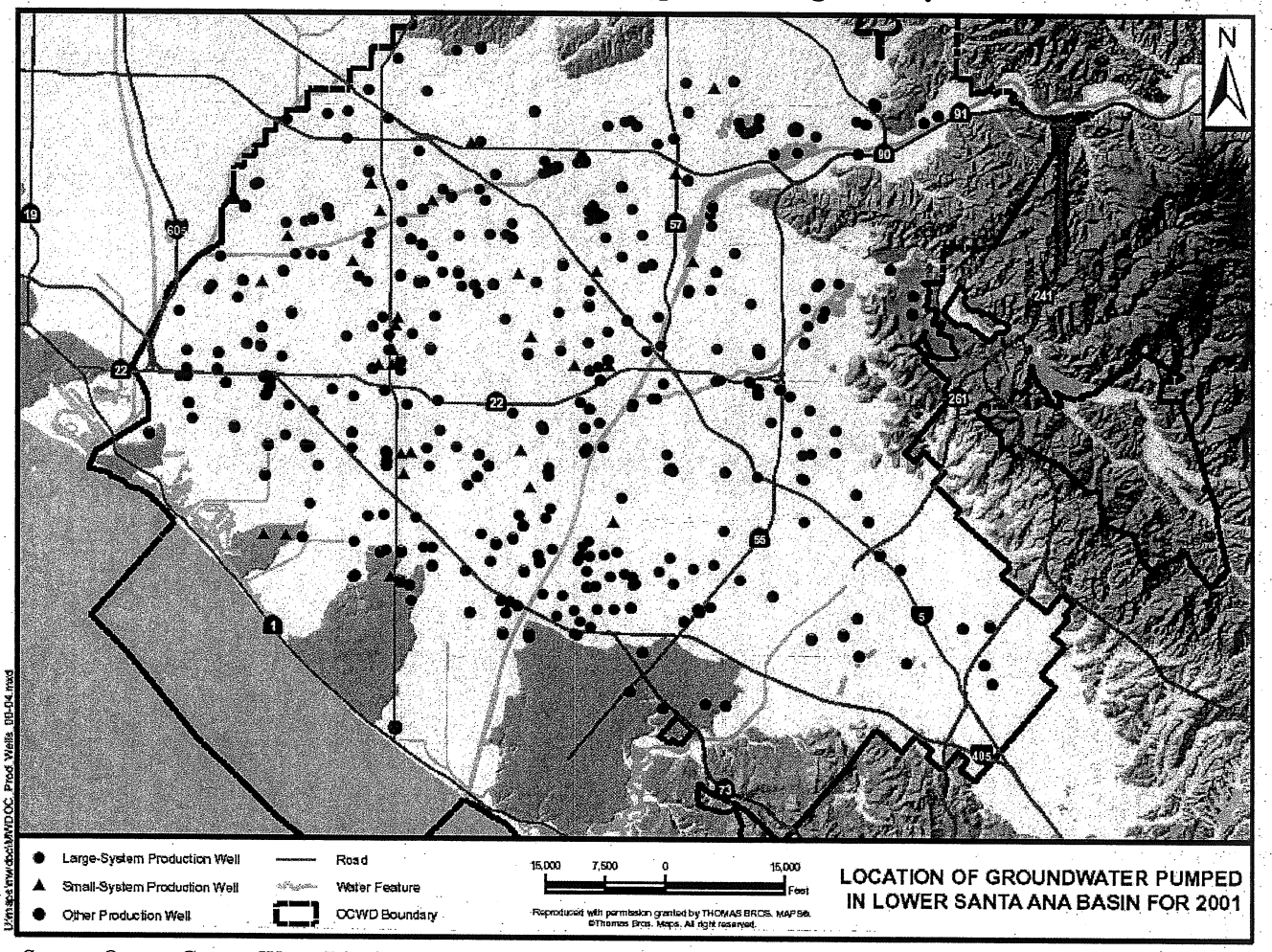
Source: Orange County Water District; Production shown excludes "in-lieu" delivery.

Figure 2-2-1-1-1-E: Location of Groundwater Pumped in Orange County Basin in 2000



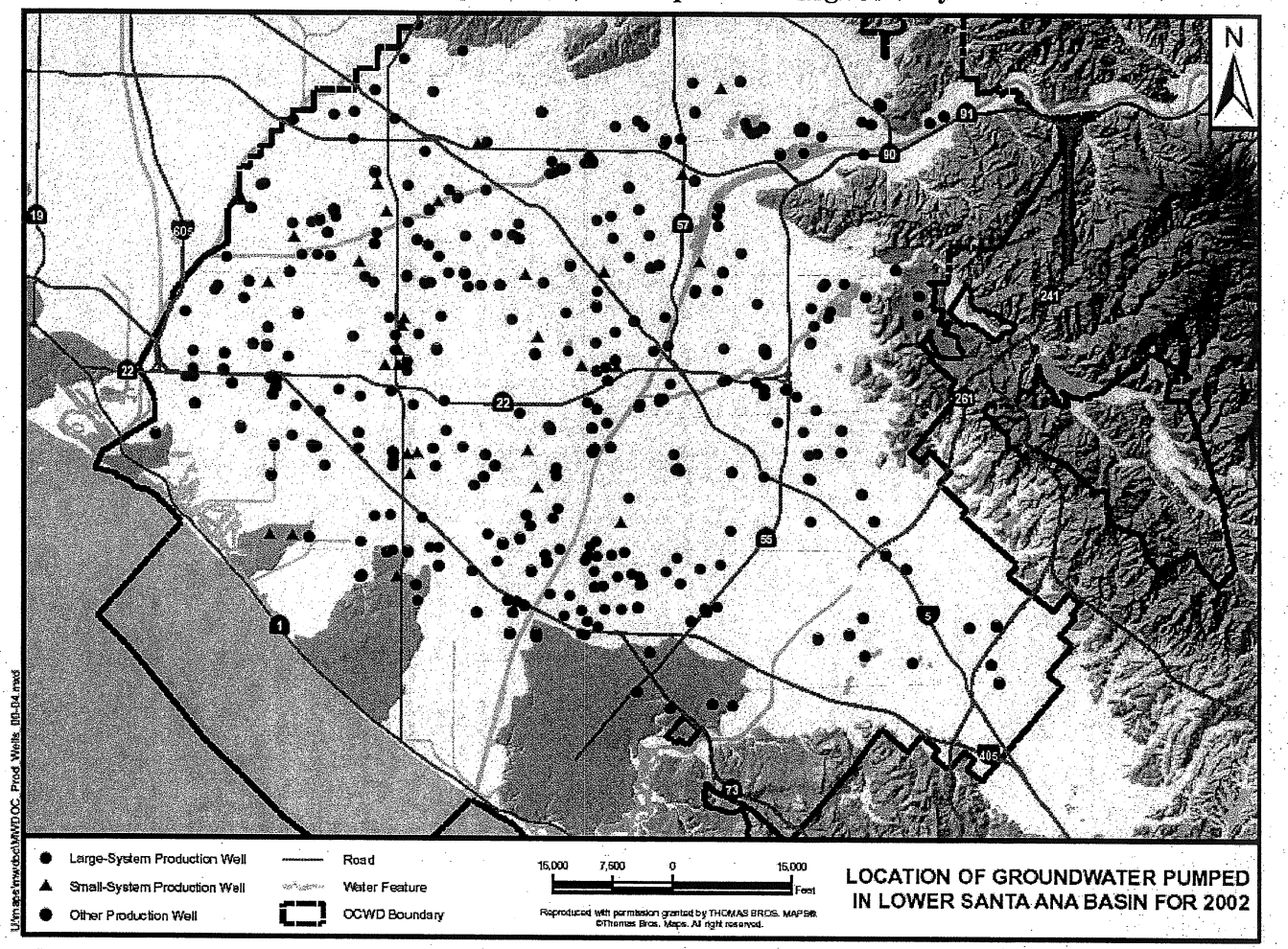
Source: Orange County Water District

Figure 2-2-1-1-1-F: Location of Groundwater Pumped in Orange County Basin in 2001



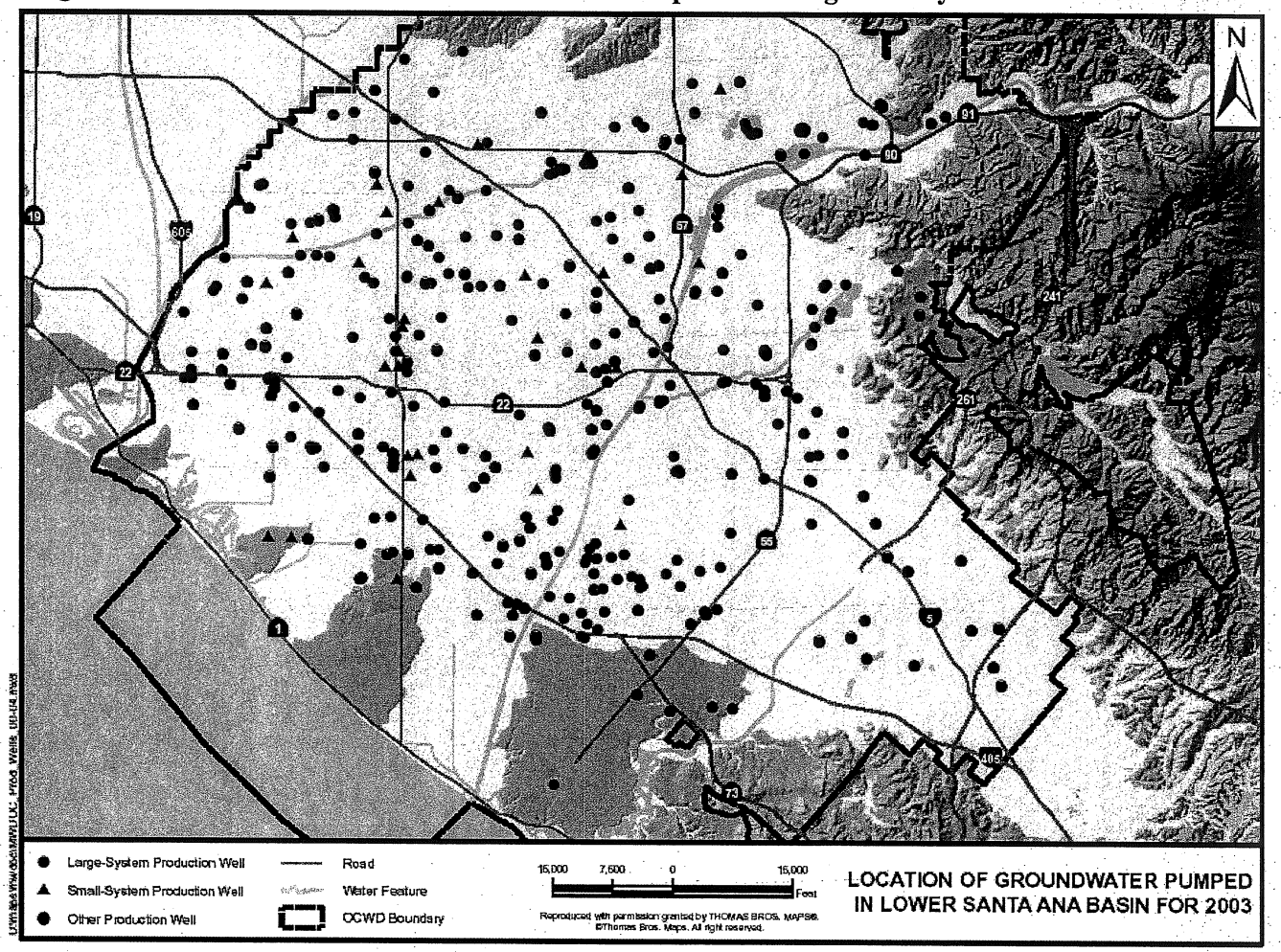
Source: Orange County Water District

Figure 2-2-1-1-1-G: Location of Groundwater Pumped in Orange County Basin in 2002



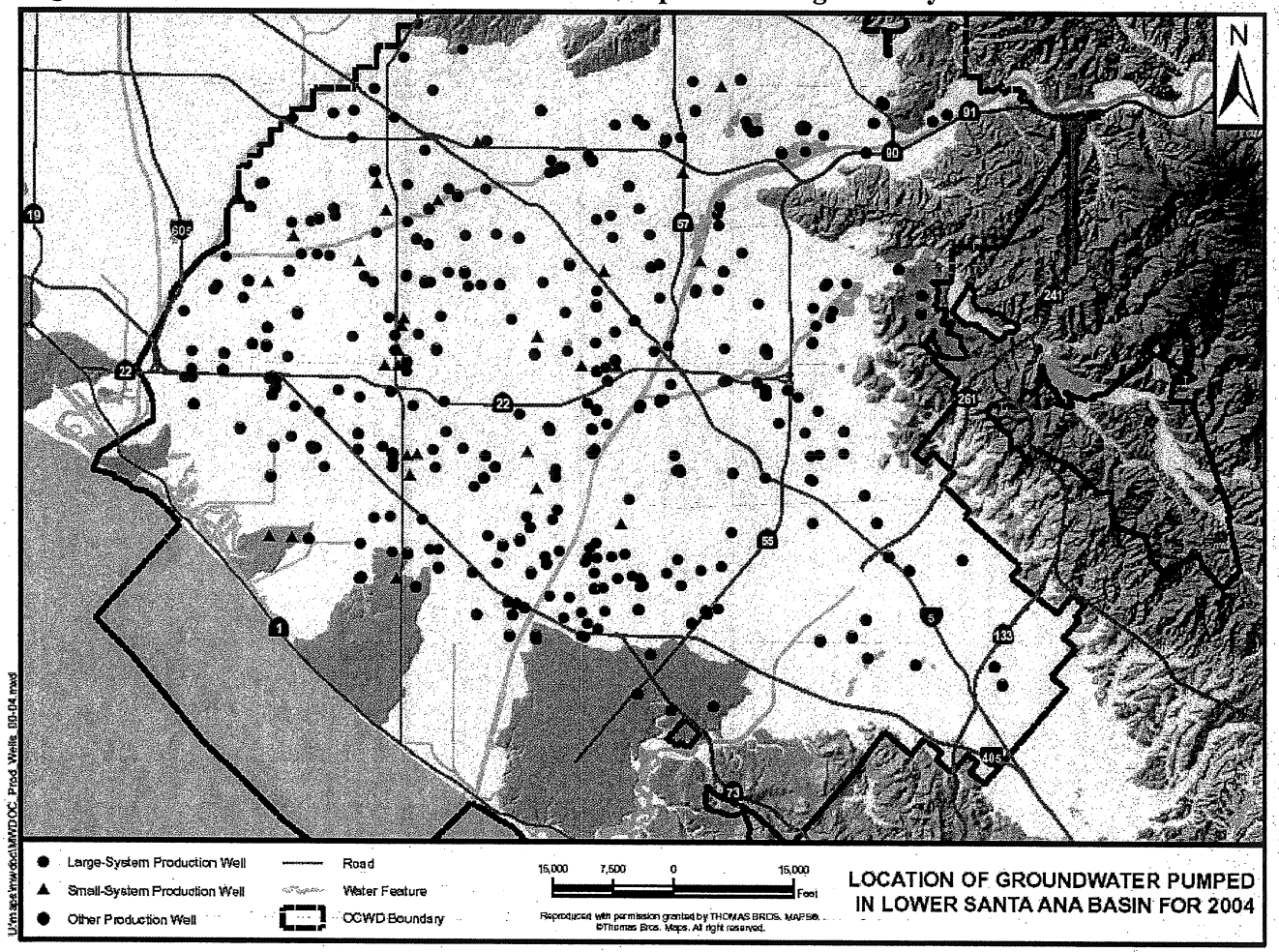
Source: Orange County Water District

Figure 2-2-1-1-1-H: Location of Groundwater Pumped in Orange County Basin in 2003



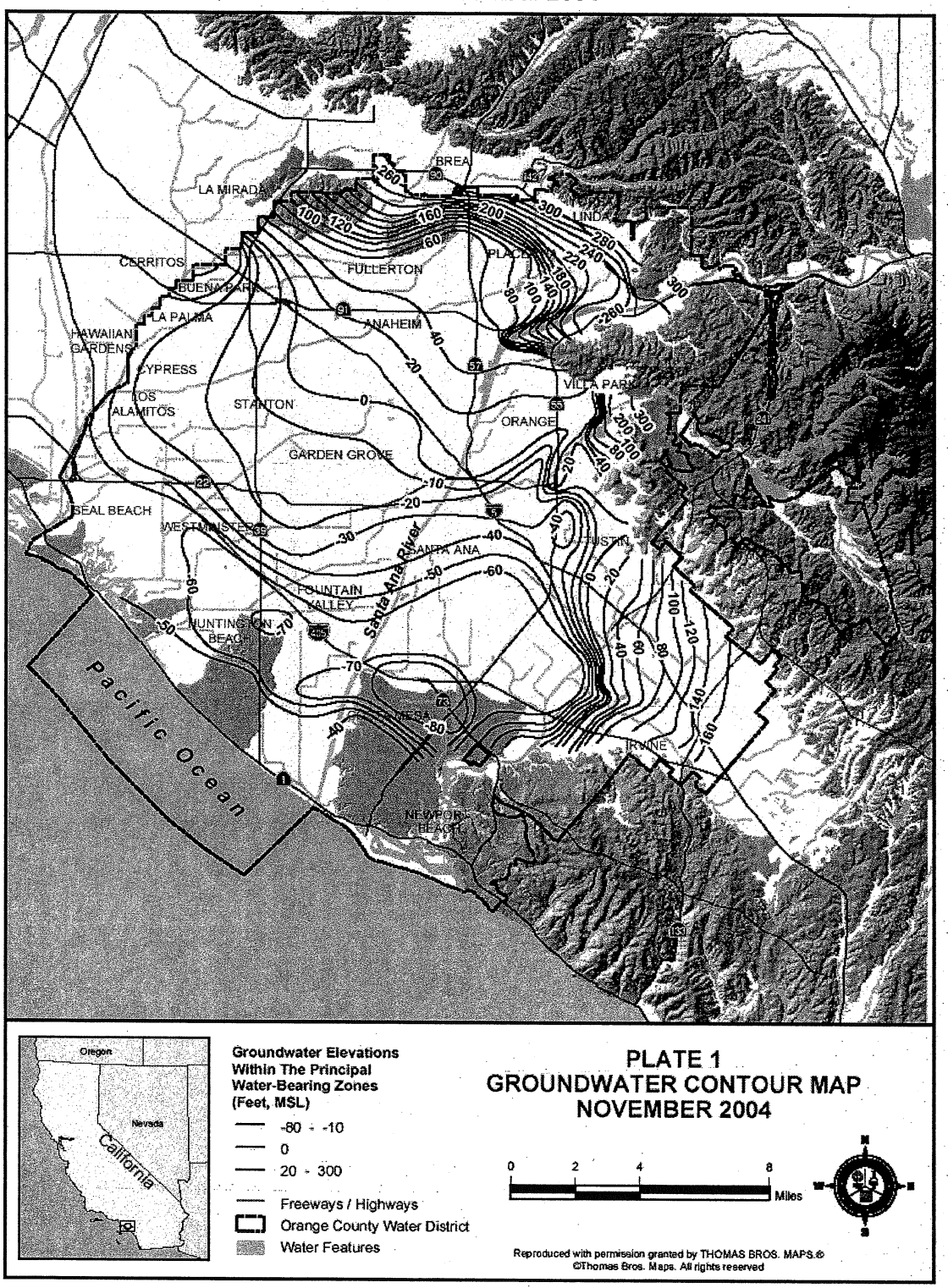
Source: Orange County Water District

Figure 2-2-1-1-1-I: Location of Groundwater Pumped in Orange County Basin in 2004



Source: Orange County Water District

Figure 2-2-1-1-1-J: Orange County Groundwater Elevation Contour Map Measured as of November 2004



Source: Orange County Water District

Groundwater production is generally distributed uniformly throughout the majority of the Basin with the exceptions of the Irvine and Yorba Linda sub-basins, the immediate coastal areas, and the foothill margins of the Basin, where little to no production occurs. Increases in coastal production would lead to increased stress on the Talbert and Alamitos Barriers, requiring additional barrier capacity.

Working closely with OCWD, MWDOC has developed a water balance model, which incorporates OCWD's operating policies in managing the Basin. It is used to project the groundwater production for each producer in this Basin based on a range of assumptions provided by OCWD. A copy of the model run is enclosed in *Appendix 2-A(i)*. Most of the assumptions involve the future condition of replenishment supplies to the Basin, which will be discussed in detail in the next subsection. The variables used to project the groundwater production are:

- Amount of Santa Ana River base flow;
- Amount of Santa Ana River storm flow;
- Amount of Basin incidental recharge;
- Relationship of basin storage and subsurface outflow;
- Basin percolation capacity;
- Basin well production capacity;
- Refill/maintain basin level approach;
- Replenishment purchases from imported sources; and
- Future annexation activities (note: the run used for this Plan assumes no future annexation for IRWD and the City of Anaheim; however, a supplemental run assuming annexation for both producers occurring in 2006-07 is also enclosed in *Appendix 2-A(ii)* for reference).

As a service to its member agencies, some of which are also producers in this Basin, MWDOC has distributed the results of the model run to each producer. Producers may use the information provided to update their Urban Water Management Plans.

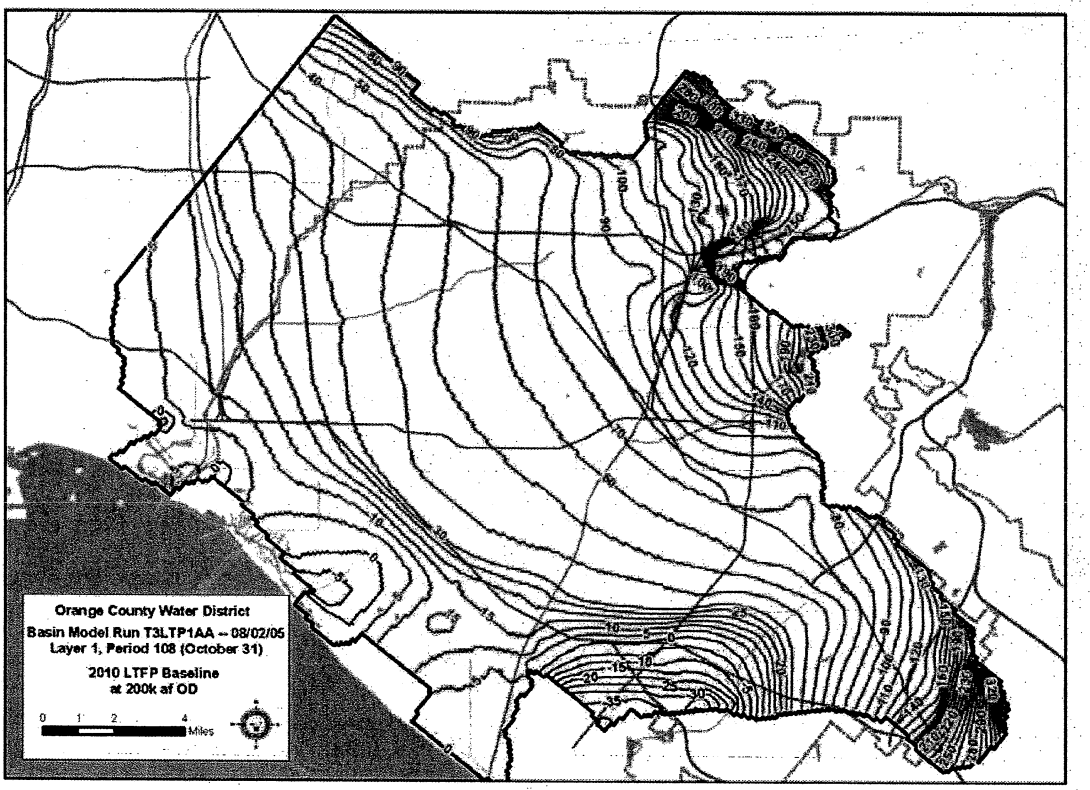
Taking from the aforementioned groundwater modeling effort, Table 2-2-1-1-1-B shows the projected groundwater production from the Basin in five-year increments for the next 25 years based on a normal water year (details of the determination of hydrologic water years are discussed in Section 2.3 of this Plan). Figures 2-2-1-1-1-K to 2-2-1-1-1-M show the projected groundwater elevation contours with location of cone of depression for 2010 according to the projected level of production. Figures 2-2-1-1-1-N to 2-2-1-1-1-P provide the same information for 2025.

Table 2-2-1-1-1-B: Projected Groundwater Production in Orange County Basin – Based on Normal Water Year

	Acre-feet				
	2010	2015	2020	2025	2030
Inside of MWDOC Service Area	257,415	255,167	258,779	264,448	268,585
Outside of MWDOC Service Area (Anaheim, Fullerton, and Santa Ana)	132,315	132,678	133,017	136,172	138,050
Total	**389,729**	**387,845**	**391,797**	**400,619**	**406,635**

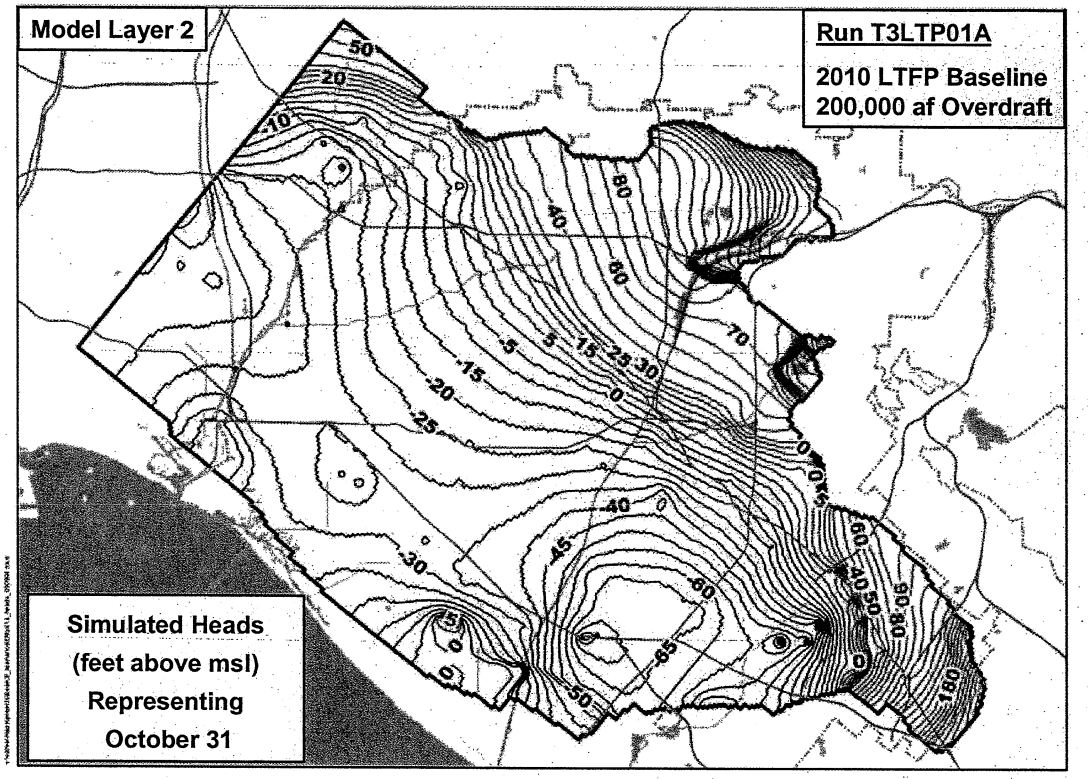
Source: Output from MWDOC's Water Balance Model; Production shown includes "in-lieu" delivery.

Figure 2-2-1-1-1- K: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 1 in 2010



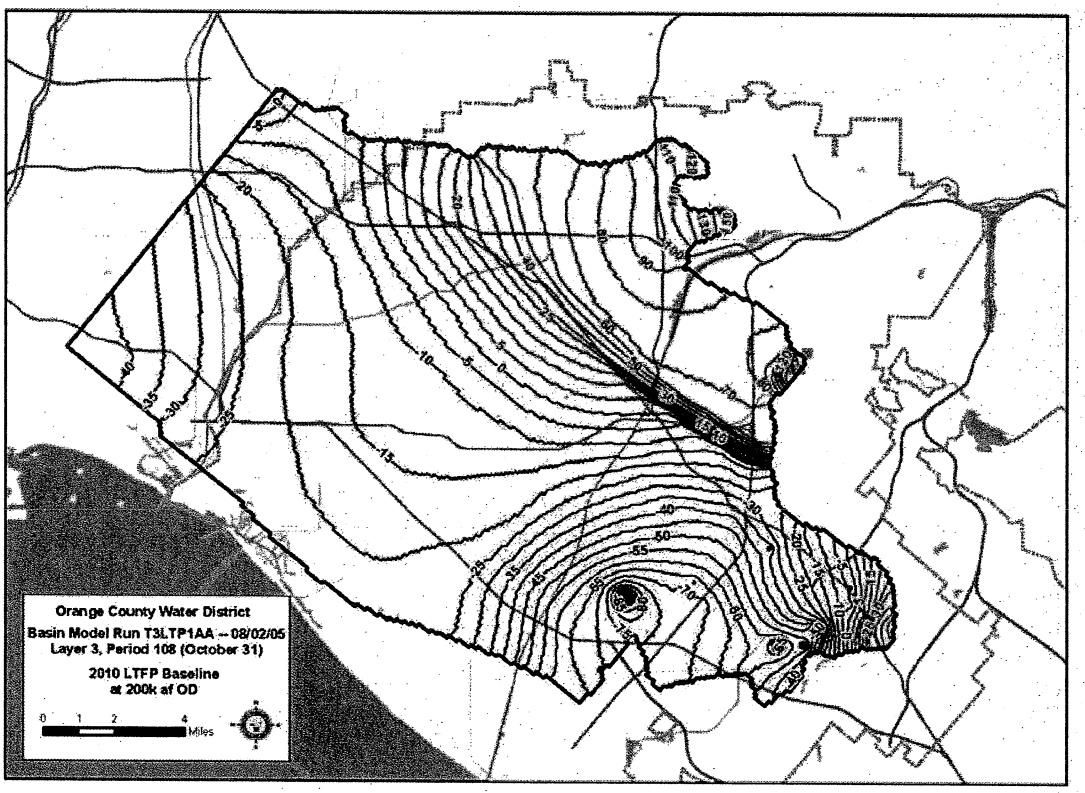
Source: Orange County Water District

Figure 2-2-1-1-1-L: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 2 in 2010



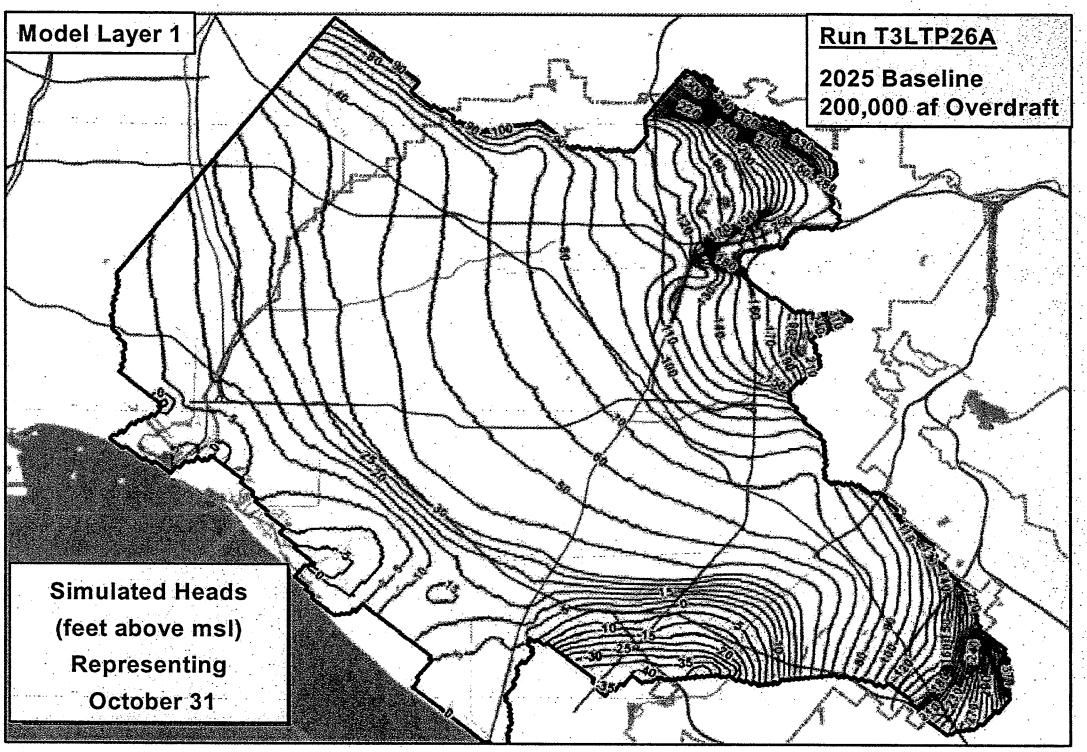
Source: Orange County Water District

Figure 2-2-1-1-1-M: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 3 in 2010



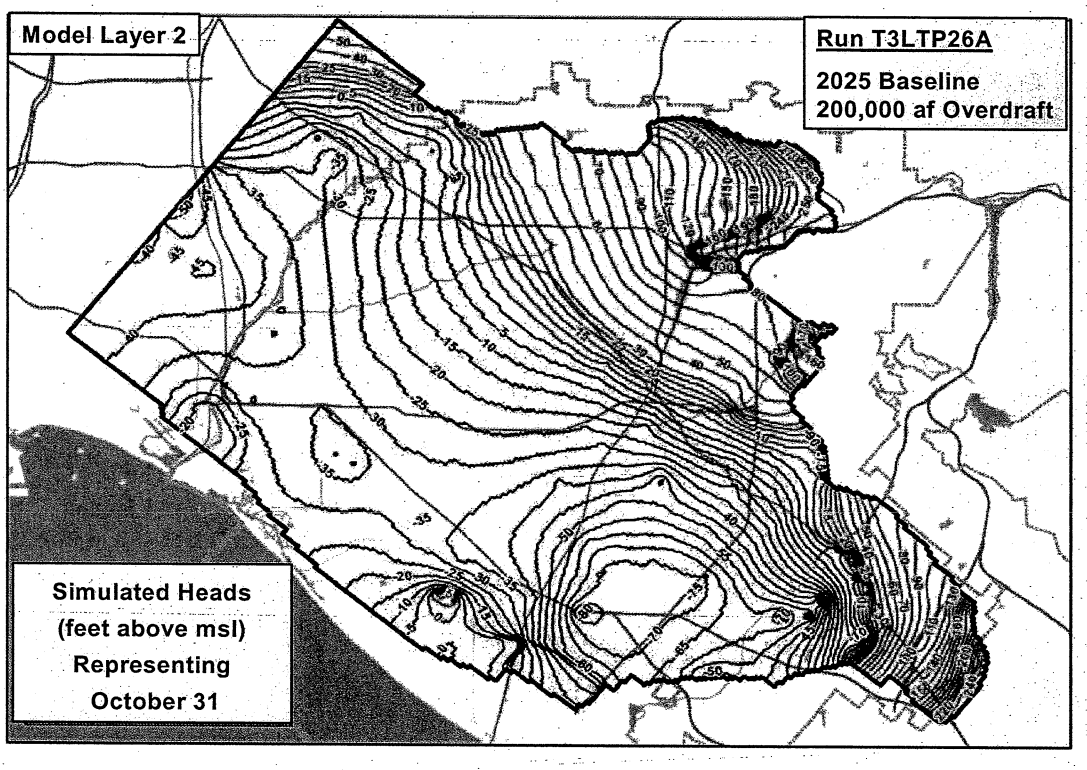
Source: Orange County Water District

Figure 2-2-1-1-1-N: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 1 in 2025



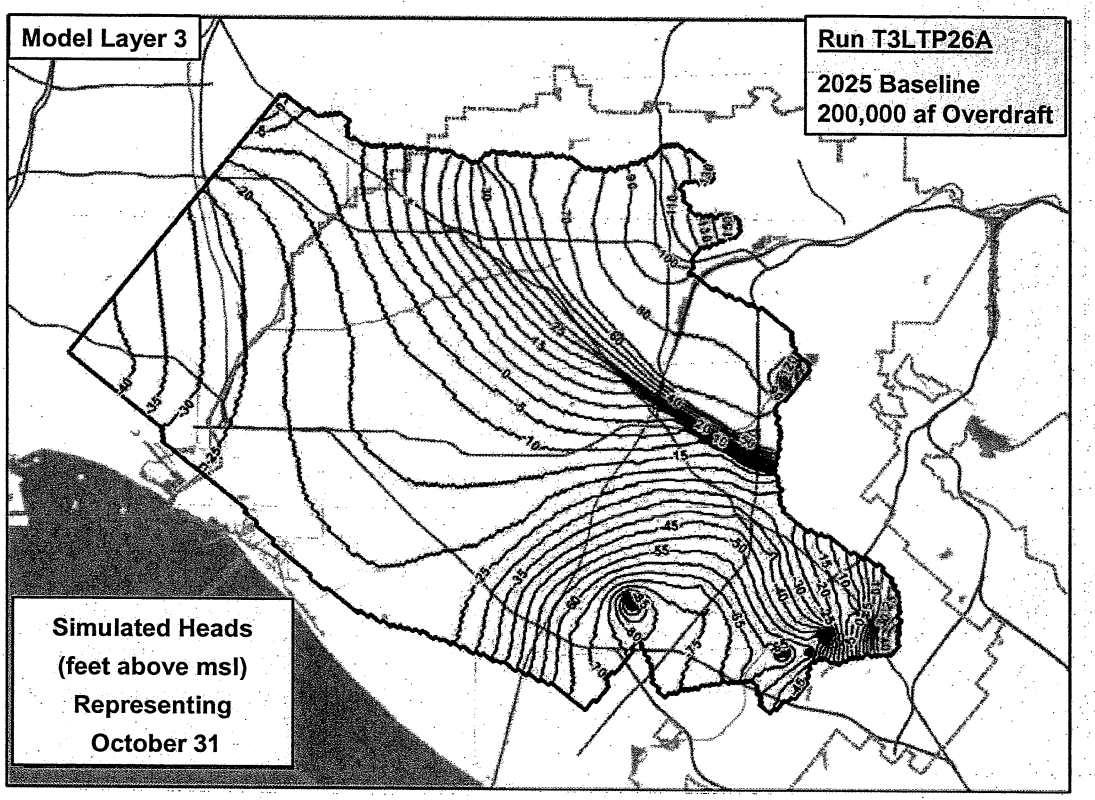
Source: Orange County Water District

Figure 2-2-1-1-1-O: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 2 in 2025



Source: Orange County Water District

Figure 2-2-1-1-1-P: Projected Groundwater Elevation Contour Map at Orange County Basin Layer 3 in 2025



Source: Orange County Water District

Basin Recharge Management

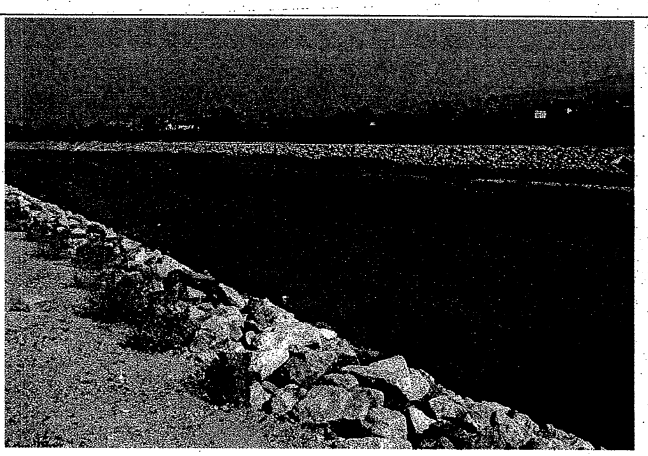
The Basin is recharged by multiple sources. These include artificial, i.e., man-made systems, and incidental or natural recharge. One of OCWD's core activities is refilling or replenishing the Basin to balance the removal of groundwater by pumping.

OCWD currently owns and operates more than 1,000 acres of recharge facilities in and adjacent to the Santa Ana River and Santiago Creek. Table 2-2-1-1-1-C shows the four main systems of the percolation programs, which consist of 17 major facilities. This table also shows how percolation rates tend to decrease with time as the spreading basins develop a thin clogging layer from fine-grained sediment deposition and from biological growth.

Table 2-2-1-1-1- C: Four Main Systems of OCWD Percolation Program

MAIN RIVER SYSTEM
(ImperialHighway to Ball Road)
Area: 245 acres
Storage capacity: 480 af
PERCOLATION RATE:

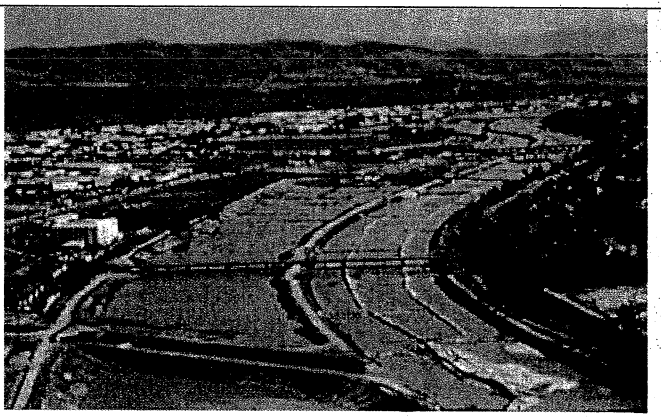
Clean	115 cfs
Clogged	87 cfs



North View of SAR Near Imperial Highway

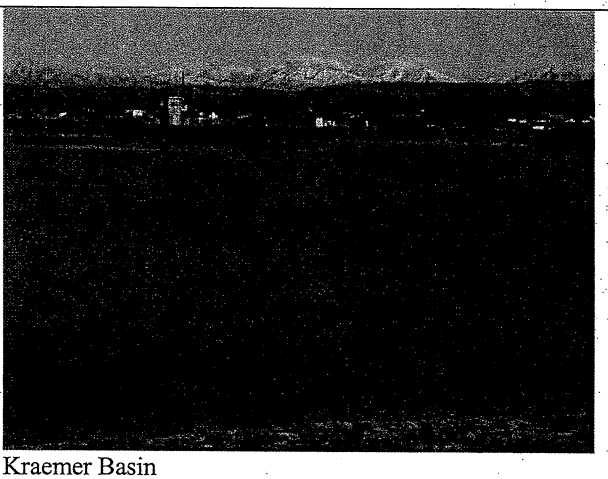
OFF-RIVER SYSTEM
Weir Ponds
1, 2, 3, and 4
Off-River between Weir Pond 4 and Carbon Creek Diversion Channel
Area: 126 acres
Storage capacity: 394 af
PERCOLATION RATE:

Clean	40 cfs
Clogged	15 cfs



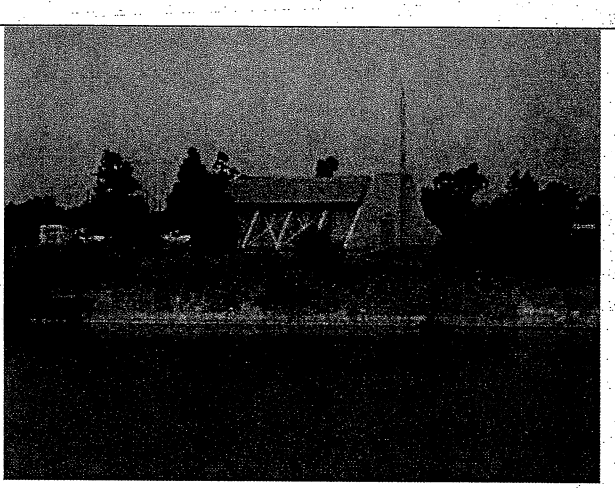
Off-River (on left side of main river channel)

Deep Basin System
Huckleberry Basin
Conrock Basin
Warner Basin
Little Warner Basin
Anaheim Lake
Mini Anaheim
Miller Basin
Kraemer Basin
Placentia Basin
Raymond Basin
Area: 280 acres
Storage Capacity: 8,484 af
PERCOLATION RATE:
Clean 300 cfs
Clogged 89 cfs



Kraemer Basin

Burris Pit/Santiago Basin System
Five Coves Basins
Lincoln Basin
Burris Pit
Ball Road Basin
Blue Diamond Pit
Bond Pit
Smith Pit
Area: 373 acres
Storage Capacity: 17,500 af
PERCOLATION RATE:
Clean 210 cfs
Clogged 106 cfs



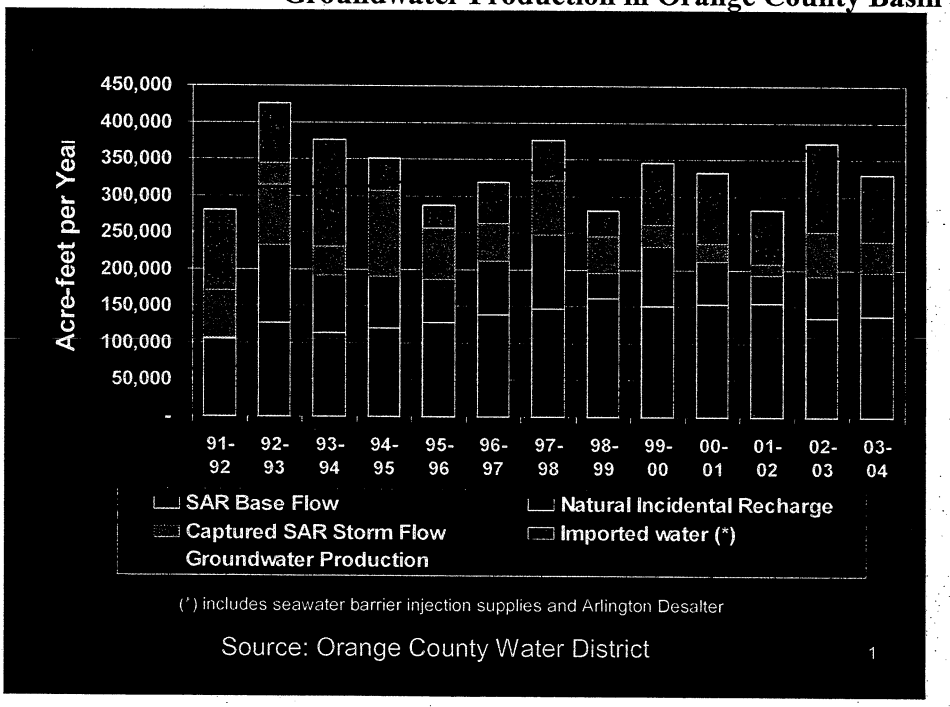
Burris Pit Station

Source: Orange County Water District, *Groundwater Management Plan*, ES-11

Historical groundwater flow was generally toward the ocean in the southwest, but modern pumping has caused groundwater levels to drop below sea level inland of the Newport-Inglewood fault zone. This trough-shaped depression encourages sea water to migrate inland, which if unchecked, could contaminate 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. In addition to operating the percolation system, OCWD also operates the Talbert Barrier in Fountain Valley and Huntington Beach, and participates in the financing operation of the Alamitos Barrier in Seal Beach and Long Beach. The barriers help prevent seawater intrusion and also help refill the Basin.

Sources of recharge water include Santa Ana River (SAR) baseflow and storm flow, Santiago Creek Flows, imported supplies purchased from Metropolitan, supplemental supplies from the upper SAR Watershed, and purified water from recycled plants. Figure 2-2-1-1-1-Q shows the historical amount of replenishment with respect to production.

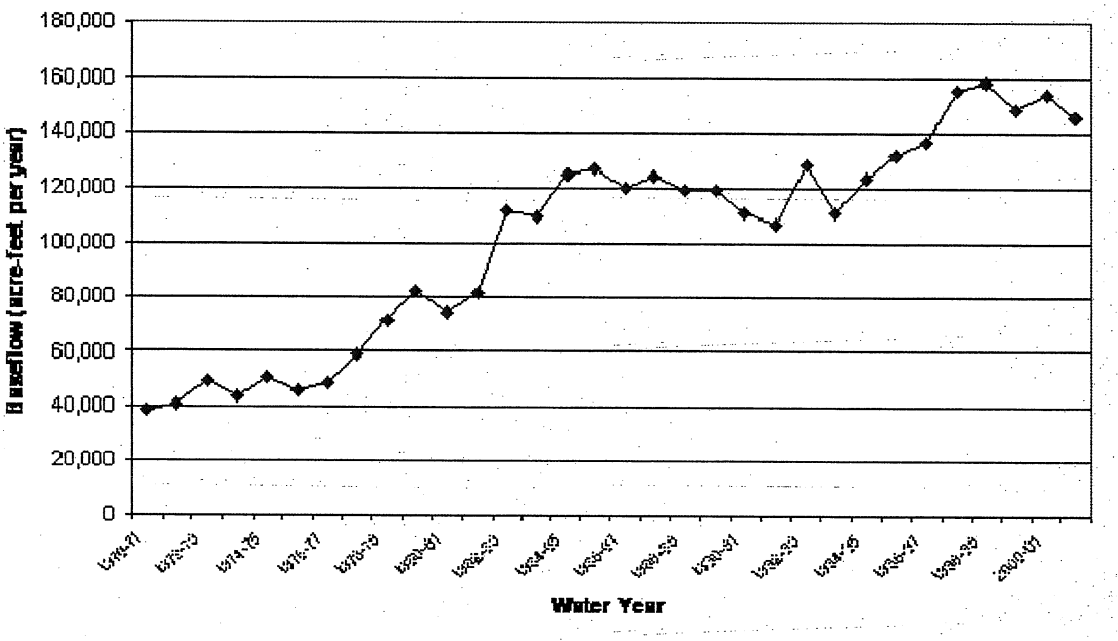
Figure 2-2-1-1-1-Q: Historical Sources of Replenishment and Total Groundwater Production in Orange County Basin



MWDOC has done an extensive and detailed study on each of the following sources when conducting the modeling work for projecting groundwater production for Orange County Basin:

1) Santa Ana River Baseflow - The primary source of replenishment for the basin is SAR flows. SAR flows below Prado Dam consist of a perennial baseflow component and a seasonal stormflow component. The majority of baseflow is composed of tertiary-treated wastewater discharges from wastewater treatment facilities upstream of Prado Dam. Future estimated increases in population in the upper SAR Watershed will result in baseflow increases. Since the 1970s, SAR baseflow has increased with additional runoff and treated wastewater discharges from the establishment of upstream residential communities. Baseflow increases are a replenishment source to the Basin. Figure 2-2-1-1-1-R illustrates historic baseflow in the SAR at Prado Dam for the period of 1970-2002. Reclamation programs, water conservation, and regulatory requirements could affect the amount of wastewater discharged into the SAR. While upstream urbanization and population growth would increase SAR baseflow, reclamation programs in the upper SAR Watershed could reduce SAR baseflows and impact the amount of water captured and spread in Orange County. The projected groundwater production prepared by MWDOC is based on the projection of wastewater discharge estimated by the Santa Ana Watershed Project Authority (SAWPA) in March 2004. According to the study, SAWPA estimates the baseflow, based on the projected level of growth and reclamation at the upper SAR Watershed, to be increased from 145,000 acre-feet per year at present time to 190,000 acre-feet per year in 2025;

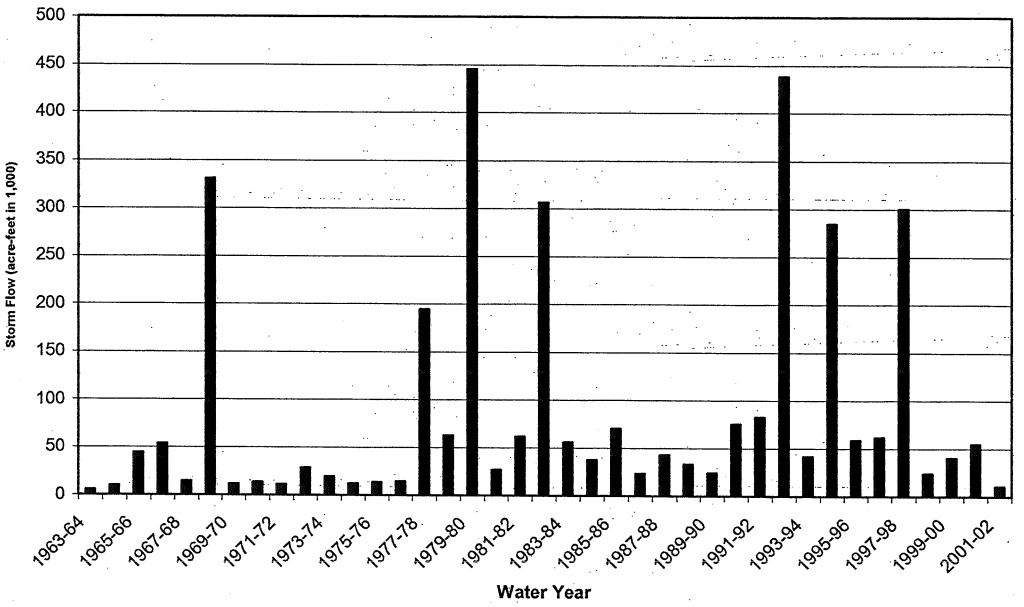
Figure 2-2-1-1-1-R: Santa Ana River Baseflow at Prado Dam



Source: Orange County Water District, Groundwater Management Plan, P. 5-8

2) Santa Ana River Stormflow – The volume of groundwater replenished from SAR stormflows is a function of precipitation intensity, duration, impervious area, and distribution over a given year. Although stormflows average approximately 33 percent of the total SAR flows, they average a lower percentage of the total water recharged at OCWD's spreading facilities. This is primarily because the magnitude of stormflow releases from Prado Dam often greatly exceeds the percolation capacity of the spreading basins. Figure 2-2-1-1-1-S illustrates the amount of SAR stormflow at Prado Dam (measured at the gauging station below Prado Dam). As shown in the figure, the maximum flow from storm runoff can reach above 400,000 acre-feet per year. However, according to OCWD's recharge records, the maximum annual amount of storm flow recharge between 1963-64 and 2002-03 was 117,000 acre-feet and the minimum was 16,000 acre-feet;

Figure 2-2-1-1-1-S: Santa Ana River Stormflow at Prado Dam



Source: Orange County Water Districtc, *Groundwater Management Plan*, P. 5-9

3) Incidental Recharge – This natural recharge to the Basin occurs from local mountain-front recharge, precipitation and irrigation water infiltration, and groundwater underflow to/from Los Angeles County and the ocean. For the most part, natural incidental recharge occurs outside the OCWD's control.

   Net incidental recharge refers to the net amount of incidental recharge that occurs after accounting for subsurface outflow to Los Angeles County. Groundwater outflow from the basin across the Los Angeles/Orange County line has been estimated to range from approximately 1,000 to 14,000 acre-feet per year based on groundwater elevation gradients and aquifer transmissivity. Underflow varies annually and seasonally depending upon hydrologic conditions on both side of the county line. Modeling by OCWD indicates that, assuming groundwater elevations in the Central Basin remain constant, underflow to Los Angeles County increases approximately 8,500 acre-feet per year for every 100,000 acre-feet of increased groundwater in storage in Orange County between 500,000 to zero accumulated overdraft.

4) Imported Water from Metropolitan via MWDOC- Metropolitan sells groundwater replenishment water, via MWDOC, to OCWD when surplus water is available.

This water is delivered by either the in-lieu program or direct spreading. OCWD is able to increase allowable pumping from the Basin, above the natural safe yield, with the purchase of replenishment water. Delivery of replenishment water is interruptible and is frequently turned off throughout the year depending upon firm demands on available delivery and treatment capacity in the Metropolitan system. When surplus replenishment water is unavailable for extended periods, OCWD continues to allow pumping above the Groundwater Basin's natural safe yield. Under this operation, the Orange County Basin would draw on stored water to sustain this level of pumping. Depending on the severity of the drought and local supply conditions, this operation can be sustained for two to three years before the Basin reaches significant overdraft (below 500,000 acre-feet storage level). OCWD must then refill the Basin when the replenishment supply becomes available from Metropolitan. This close coordination of the Basin's operation with the Metropolitan replenishment program benefits the local service area with enhanced pumping levels in normal and wet years, and the entire region by storing surplus water that can be produced via sustained pumping during times of tighter supply availability. Metropolitan also sells treated non-interruptible water to OCWD for injection into the Talbert Seawater Barrier. This water assists in the protection of the Basin from seawater intrusion.

Direct replenishment water is received at OCWD's recharge facilities in the cities of Anaheim and Orange and is physically recharged into the Basin through percolation. In-lieu supplies are physically recharged into the Basin when participating producers turn off their wells and receive excess Metropolitan water in-lieu of pumping groundwater. This reduces the amount of water taken from the Basin. Injection water into Talbert Barrier has been supplied by potable water purchased from Metropolitan since 2002. It is anticipated that potable Metropolitan water will be used to make up a portion of the injection water at the Talbert Barrier until about 2009, when the second year of operation of the GWR System is complete. After this time, the GWR SYSTEM should provide all of the water injected into the Talbert Barrier.

To forecast the availability of Metropolitan's surplus supply for replenishment, MWDOC worked with Metropolitan staff to derive the average replenishment

supply available to MWDOC based on forecasts of Metropolitan's imported supplies and regional demands. The average replenishment supply available to OCWD is reported as shown on Table 2-2-1-1-1-D.

Table 2-2-1-1-1-D: Current and Projected Water Supplies for Groundwater Replenishment and Saline Barrier in Orange County Basin

Acre-feet						
Water Supply Sources	2005	2010	2015	2020	2025	2030 - Opt
Water purchased from MWDOC:						
For Sea Barrier	8,000	4,000	0	0	0	0
For Replenishment	55,181	57,739	58,734	56,685	57,048	50,700
Direct Spreading	19,176	19,792	21,634	18,801	17,667	10,590
In-Lieu	36,005	37,947	37,100	37,884	39,381	40,110
Santa Ana River(Storm and Base F	217,116	202,057	211,339	219,633	227,616	235,913
Incidental Recharge	99,389	47,006	43,745	42,051	41,348	41,826
Withdraw/Deposit to Basin Storag	(62,606)	2,132	(3,825)	(2,201)	(789)	4,041
Recycle Water For Sea Barrier	4,000	34,000	34,000	34,000	34,000	34,000
Recycle Water For Replenishment	0	38,000	38,000	38,000	38,000	38,000
Purchase from Others	0	0	0	0	0	0
For Sea Barrier	2,000	2,000	2,000	2,000	2,000	2,000
For Replenishment	2,000	2,000	2,000	2,000	2,000	2,000
Total	325,080	388,934	385,993	392,169	401,223	408,479

Source: Municipal Water District of Orange County, output from MWDOC's Water Balance Model

5) Recycled Water – In 1975, OCWD built a treatment plant called "Water Factory 21" that purified up to approximately 15 MGD of clarified secondary wastewater effluent using lime clarification pretreatment, multi-media filtration, and reverse osmosis (RO). Recently, ultraviolet light (UV) treatment was added. Water Factory 21 was deplaced in 2004 with the first 5 MGD phase of the GWR System.

GWR System is jointly sponsored by OCWD and the Orange County Sanitation District (OCSD). The first phase of the GWR System will increase the reliability and sustainability of local groundwater supplies through the creation of a new source of water, producing a total of 72,000 acre-feet per year for groundwater recharge. The GWR System will be operational in mid-2007. The GWR System will augment existing groundwater supplies through indirect potable reuse, providing a reliable, high-quality source of recharge water for the basin. Additionally, direct injection of project water into the Talbert Barrier will protect the coastal aquifer from seawater intrusion. GWR System consists of three major components: 1) Advanced Water Treatment (AWT) facilities and pumping stations, 2) a pipeline connection from the treatment facilities to existing recharge basins, and 3) expansion of the Talbert Barrier. The heart of the

GWR System is the advanced water purification plant, which purifies the water with microfiltration (MF), Reverse Osmosis (RO), and advanced oxidation processes (AOP), which consist of UV and hydrogen peroxide.

Following filter screening, OCSD-clarified secondary effluent, normally disposed to the ocean, receives MF membrane treatment. MF is a low-pressure membrane process that removes suspended matter from water. MF filtrate will be fed to RO, and MF reject streams will be returned to OCSD's Plant No.1 for disposal. The RO process will reject dissolved contaminants and minerals. Particularly, RO treatment will reduce dissolved organics, pesticides, TDS, silica, and viruses from MF filtrate. The RO concentrate will be discharged into the ocean via the existing OCSD ocean outfall. Following RO, the water will undergo UV along with hydrogen peroxide treatment. UV treatment involves the use of UV light to penetrate cell walls of microorganisms, preventing replication and often inducing cell death. UV thus provides an additional barrier of protection against bacterial and viral organisms and, combined with RO treatment, increases removal efficiency. More importantly, UV with hydrogen peroxide oxidizes many organic compounds for ultimate removal from water. After RO treatment, the product water is so low in mineral content that it has a corrosive nature, which can be mitigated with the addition of lime. If lime addition did not take place, the concrete transmission pipe would corrode in the presence of the unstabilized water. The GWR System will provide roughly 38,000 acre-feet per year for recharge in Kraemer Basin and 34,000 acre-feet per year of injection water to Talbert Barrier.

Up to 2,000 acre-feet per year of purified water will be used for injection to Alamitos Barrier. This purified water is produced by a plant constructed by the Water Replenishment District of Southern California. OCWD purchases purified water from this plant for Injection into the Alamitos Barrier; and

6) Arlington Desalter – When potable consumption does not match the output of the Arlington Desalter in Riverside, OCWD purchases the excess water for groundwater recharge. Water from this project flows to the OCWD recharge facilities through the Santa Ana River. It is

projected that approximately 2,000 acre-feet per year of water is available for OCWD recharge facilities.

Based on the aforementioned sources, MWDOC projects the replenishment supply for Orange County Basin for the next 25 years in 5-year increments (see Table 2-2-1-1-1-D).

Basin Storage and Elevation Trend

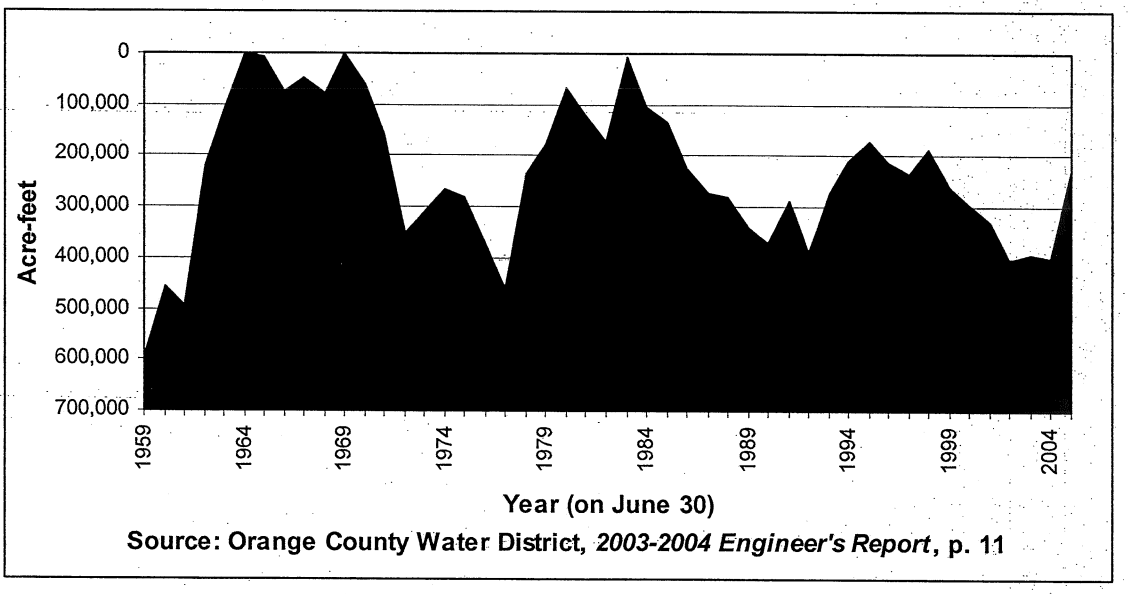
In most years, groundwater levels are generally lower than the level in 1969, when the basin is considered to have been full. Groundwater levels in the forebay have generally stabilized, whereas the southern coastal area has declined steadily through time. Since 1990, the magnitude of yearly groundwater level fluctuation has approximately doubled near the coast because of seasonal pumping patterns and short-term storage programs, but has generally stayed the same in the forebay.

The accumulated overdraft, as defined in OCWD's District Act, is the quantity of water needed to be replaced at OCWD's intake area to prevent landward movement of ocean water into the fresh groundwater body. For the purpose of estimating accumulated overdraft, groundwater levels as measured on November 1, 1969, are assumed to represent a full basin condition (a condition under which seawater intrusion would not occur). Landward movement of ocean water can only be prevented if groundwater levels near the coast are several feet above sea level. Groundwater levels along the coast are related to the volume of water stored in the intake area, water pumped from the entire basin, and the pattern or location of pumping. Seawater intrusion control projects, however, have been constructed and others are under construction or planned that together will be effective in preventing landward movement of ocean water into the fresh groundwater body. These facilities will allow greater utilization of the Basin's storage capacity. Based on these opportunities, a "target" dewatered storage of 200,000 acre-feet has been implemented for the past several years as the appropriate accumulated overdraft level for the Basin. This level allows OCWD the flexibility to fully utilize supply opportunities – even when the groundwater basin is considered "full" at the target dewatered storage of 200,000 acre-feet. Using the 1969 reference year, the groundwater level as of November 1, 2004, shows an accumulated overdraft of approximately 439,000 acre-feet. For the 2003-04 water year, which ended June 30, it is estimated (by

means of back-calculating from November 1, 2004 to June 30, 2004) that the accumulated overdraft totaled 400,000 acre-feet as shown in Figure 2-2-1-1-1-T. This increased trend of increasing Basin overdraft was caused by a cycle of below average rainfall in the region from 1998 to 2004.

As shown in Figure 2-2-1-1-1-T, for the 2004-05 water year, which ended June 30, it is estimated that the accumulated overdraft totaled 250,000 acre-feet. The recent storm in later 2004 and early 2005 brought significant amount of replenishment supply to refill the basin back in such rapid pace.

Figure 2-2-1-1-1-T: Accumulated Basin Overdraft in Orange County Basin



Source: Orange County Water District, *2003-2004 Engineer's Report*, p. 11

This previous increased accumulated overdraft of the Basin prompted evaluation of the Basin's yield and how the yield can be optimized through projects and programs. As a response to various factors, including a series of years with below average precipitation and the increased accumulated overdraft, in 2003 OCWD reduced the BPP to decrease pumping from the Basin. OCWD also updated its management approach to manage the amount of water supply provided by the Basin.

The Basin management approach, approved by OCWD in December 2002, is based upon developing a base amount of groundwater production the Basin can annually sustain utilizing dependable water supplies the Basin can count on receiving given average conditions. The base amount of

dependable replenishment water is derived from the sources described in Table 2-2-1-1-1-E.

Table 2-2-1-1-1-E: Sources of Recharge Water Supplies for Orange County Basin

Can Count on to Determine Sustainable Groundwater Production [Note 3]	
Source	**Methodology for Estimating** [Note 1]
SAR Base Flows	3-year moving average
Captured SAR Storm Flows	10-year moving average
Natural Net Incidental Recharge (Incidental recharge minus Los Angeles County outflow)	5-year moving average, with adjustment to account for storage level in basin
Talbert Seawater Barrier Injection	Annual review and estimate
GWRS Phase 1 water pumped to Kraemer Basin (beginning in 2007)	Annual review and estimate
Alamitos Seawater Barrier Injection	Annual review and estimate
Arlington Desalter Supplies	Annual review and estimate
Other upstream supplies discharged to the SAR	Annual review and estimate
Metropolitan Replenishment Water	Annual review and estimate [Note 2]

Note:

1. Estimated amount of water from each source to be reviewed annually at a minimum (more frequent analysis as conditions warrant)

2. In years when the accumulated basin overdraft is less than 500,000 acre-feet, OCWD uses a constant 65,000 acre-feet of Metropolitan replenishment supply to estimate its sustainable groundwater production for the year. In years when the accumulated basin overdraft is greater than 500,000 acre-feet, OCWD will determine the sustainable groundwater production based on "anticipated" replenishment supply forecast by Metropolitan.

3. Sustainable Groundwater Production is determined by withholding a pre-determined amount of supply to refill the basin.

Source: Orange County Water District, *Groundwater Management Plan*, p. 9-10

In addition to the change of operation approach, completion of GWR System in 2007 will provide 72,000 acre-feet per year of recharge water. Assuming that 12,000 acre-feet per year of water was injected in the Talbert Barrier in the years prior to the GWR System becoming operational, the GWR System will provide a net increase of 60,000 acre-feet per year to the basin.

OCWD's recently adopted management approach for establishing the basin BPP, as described in its Groundwater Management Plan, March 2004 (*see Appendix 2-B*), uses the following principles:

- Set a base production amount at a level utilizing an average amount of replenishment water that can be secured from all sources (Table 2-2-1-1-1-E);

- Account for water quality improvement project pumping that is above the BPP;

- Adjust the BPP annually based upon the previous year's performance relative to the Average Hydrology/Normal Replenishment (AH/NR) condition and current overdraft situation. This approach would allow adjustments for

short-term variables and account for long-term trend changes;

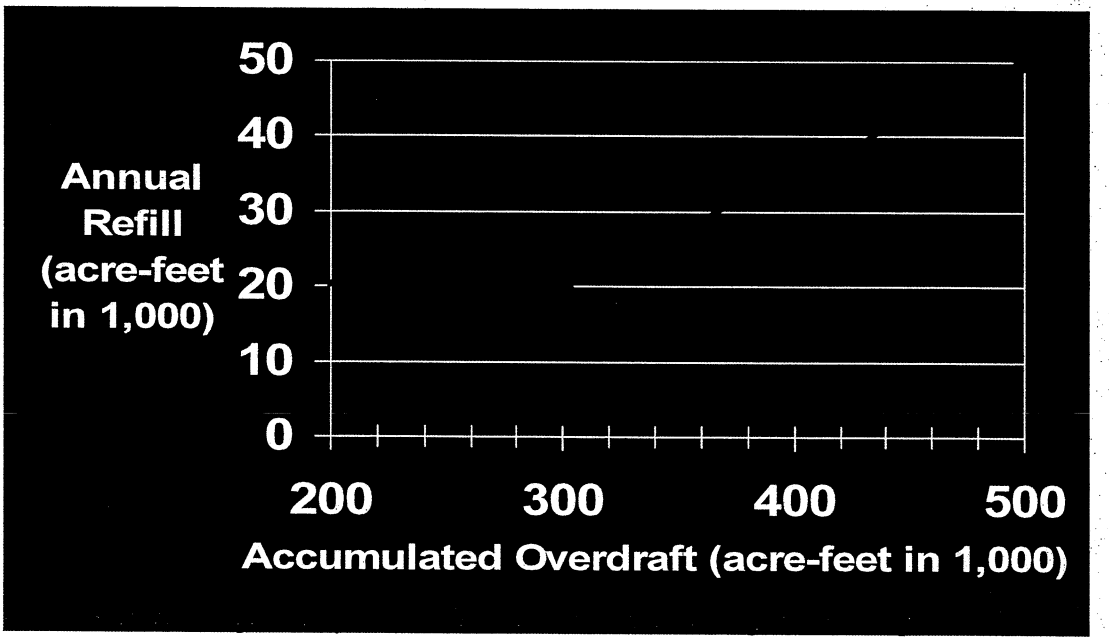
- Adjust the AH/NR condition using a 3-10 year rolling average (as shown in Table 2-2-1-1-1-E);

- To mitigate financial impacts on producers, make all efforts to not reduce the BPP more than five percent in any one year, unless health and safety issues or other emergency circumstances prevail;

- In the event of a drought or curtailment of imported water supplies, OCWD Board may authorize changes to the BPP as necessary to address the circumstances;

- Ensure that the accumulated overdraft is reduced by a minimum of 20,000 acre-feet each year until the accumulated overdraft is 250,000 acre-feet or less. The recommended basin refill rate is shown in Figure 2-2-1-1-1-U, which would refill the basin from 400,000 to 200,000 acre-feet of overdraft in nine years.

Figure 2-2-1-1-1- U: Recommended Basin Refill Rate for Orange County Basin



Groundwater Quality

For the major inorganic ions, water within the basin is primarily sodium-calcium bicarbonate in character. The average Total Dissolved Solid (TDS) content of the 240 public supply wells is 507 mg/L with a range of 196 – 1,470 mg/L.

Current quality issues are seawater intrusion near the coast, colored water from natural organic materials in the lower aquifer system, salinity, nitrates, and local volatile organic compound.

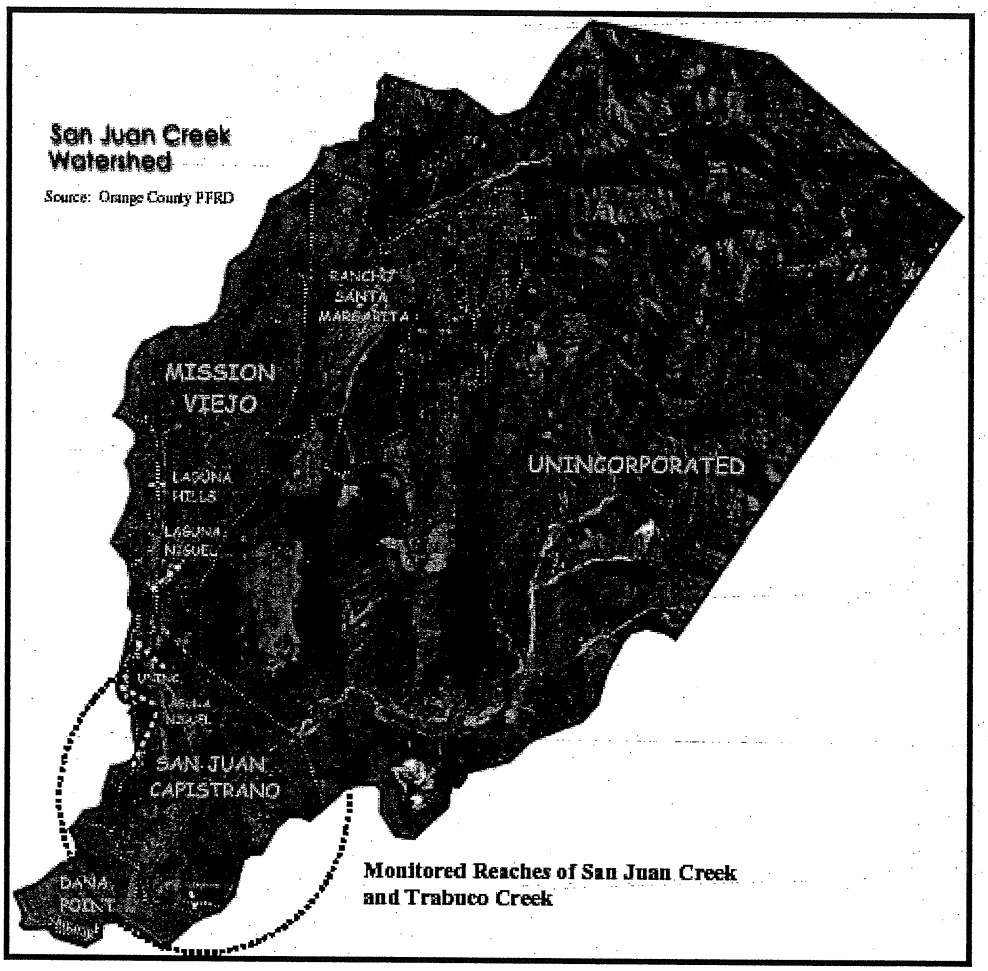
A detailed discussion of water quality relating to this basin is available in Section 3.

2.2.1.1.2 San Juan Basin

Basin Boundaries and Hydrology

This groundwater basin underlies the San Juan Valley and several tributary valleys in southern Orange County. The basin is bounded on the west by the Pacific Ocean and otherwise by tertiary semi-permeable marine deposits. San Juan Creek drains the San Juan Valley, and several other creeks drain valley tributaries to the San Juan. (Figure 2-2-1-1-2-A). Average annual precipitation ranges from 11 to 15 inches.

Figure 2-2-1-1-2-A: Map of San Juan Creek Basin



Source: San Juan Basin Water Authority

Water Bearing Formations

The primary water-bearing unit within the San Juan Valley Groundwater Basin is Quanternary alluvium. This alluvium ranges from a heterogeneous mixture of sand, silt, and gravel in the eastern portion of the basin, to coarse sand near the center, to fine-grained lagoonal sediments in the western portion of the basin. Thickness of the alluvium average about 65 feet and may reach more than 125 feet. Specific yield of the alluvium is estimated to average about 13 percent and range from 3 to 22 percent. Wells typically yield from 450 to 1,000 gpm. Sand layers of the Tertiary Santiago Formation may be water bearing within the region and beneath the basin, and minor amounts of water are extracted from fractured basement rock beneath the basin.

Restrictive Structures

At the confluence of San Juan Creek and Canada Chiquita, near the middle portion of the basin, the Cristianitos fault forms a barrier to subsurface outflow. Forester, Mission Viejo, and Aliso faults are not known to form barriers to groundwater flow, but they are mapped as crossing the basin.

Recharge Areas

Recharge of the basin is from flow in San Juan Creek, Oso Creek, and Arroyo Trabuco and precipitation to the valley floor. Water from springs flows directly from Hot Spring Canyon into San Juan Creek, adding to recharge.

Groundwater Level Trends

Groundwater levels in 1987 were similar to water levels in 1952. Hydrographs show seasonal cycles with average declines related to drought cycles that recover during more plentiful seasons. Groundwater flows southwest toward the Pacific Ocean.

Groundwater Storage Capacity

The total storage capacity has been estimated to be 90,000 acre-feet.

Groundwater Budget

A study by NBS Lowry (1994) investigated and modeled the groundwater basin for 1979 through 1990. They determined a mean pumpage of 5,621 acre-feet per year and a mean subsurface inflow of 2,246 acre-feet per year. Average subsurface outflow to the ocean is estimated to be about 450 acre-feet per year.

Groundwater Historical and Projected Extraction

Up until 2004, there has been a limited amount of supply extraction from this basin. Table 2-2-1-1-2-A shows groundwater produced from the basin from 2000 to 2004.

Table 2-2-1-1-2-A: Historical Groundwater Production in San Juan Basin

Acre-feet Per Year				
2000	2001	2002	2003	2004
2,079	2,161	1,663	1,884	2,224

Source: Data Collected from the following Agencies: City of San Clemente, City of San Juan Capistrano, Santa Margarita Water District, South Coast Water District, and Trabuco Canyon Water District

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

In 2000, the California State Water Resources Control Board granted a water rights permit (*Appendix 2-C(i)*) of 9,227 acre-feet per year to San Juan Basin Authority for diversion and use from San Juan Basin. Member agencies of the San Juan Basin Authority are: City of San Juan Capistrano, Moulton Niguel Water District, Santa Margarita Water District, and South Coast Water District. San Juan Basin Authority completed Phase I of San Juan Basin Desalter Project in December 2004. The current capacity of the plant is projected to reach 4,900 acre-feet per year. Depending on the condition of the basin after the implementation of the San Juan Basin Groundwater Management and Facility Plan (*Appendix 2-D*), future expansion of the production may be possible. Another desalter project (see Section 2.2.3 for details) is currently under construction by South Coast Water District. When complete, the project is expect to extract up to 2,000 acre-feet per year from the basin (see *Appendix 2-C (ii)* for the corresponding water permit from State Water Resource Control Board). Table 2-2-1-1-2-B shows projected groundwater production in San Juan Basin.

Table 2-2-1-1-2-B: Projected Groundwater Production in San Juan Basin

Table 2-2-1-1-2-B: Projected Groundwater Production in San Juan Basin Acre-feet Per Year				
2010	2015	2020	2025	2030
8,378	8,899	9,524	9,524	9,524

Source: Data Collected from the following Agencies: City of San Clemente, City of San Juan Capistrano, Santa Margarita Water District, South Coast Water District, and Trabuco Canyon Water District

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Groundwater Quality

Groundwater mineral content is variable in this basin. Groundwater in the basin typically has calcium bicarbonate or bicarbonate-sulfate character below the upper reaches of

the valleys, and calcium-sodium sulfate or sulfate-chloride near the coast. In general, TDS content in groundwater increases from below 500 mg/L in the upper reaches of the valley to near 2,000 mg/L near the coast. TDS content of water from three public supply wells averages 760 mg/L and ranges from 430 mg/L to 1,250 mg/L.

Groundwater in the western part of the basin has a high TDS content, and water coming from springs in Thermal Canyon has high fluorine content.

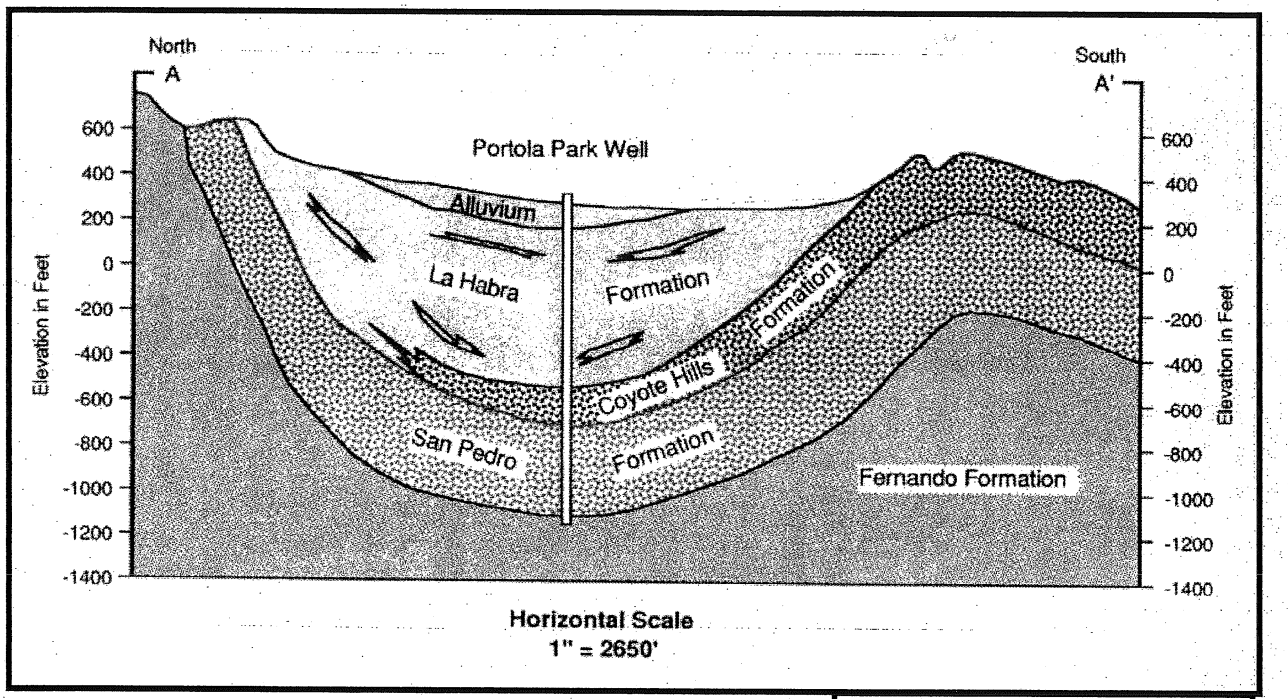
2.2.1.1.3 La Habra Basin

At the preparation of this Plan, there has not been a groundwater management plan available for this groundwater basin. However, the following sections are written, with assistance from City of La Habra, to describe the basin.

Basin Geology

From a structural geology standpoint, the La Habra Basin area is dominated by the northwest trending La Habra Syncline (a U-shaped down-fold), which is bounded on the north by the Puente Hills and on the south by the Coyote Hills. The fold is a naturally occurring trough, or valley, where significant quantities of groundwater have accumulated over the past 150,000 years. The La Habra Basin consists of four major formations, which include bearing zones or aquifer units. These are the alluvium, the La Habra formation, the Coyote Hills formation, and the San Pedro formation, all shown on the cross-section contained in Figure 2-2-1-1-3-A.

Figure 2-2-1-1-3-A: Cross-section of La Habra Basin



Source: City of La Habra

The alluvium is found along the surface stream courses and is composed of unconsolidated silt, clay, sand, and gravel. Thickness of the alluvium ranges from a few feet to over 100 feet.

The La Habra Formation lies below the alluvium, but it can be seen where it is uplifted and exposed in both the Coyote Hills and in the Puente Hills. The La Habra Formation consists of mudstone, siltstone, sandstone, and conglomerate. It ranges in thickness from 300 to nearly 1,200 feet. Water levels of wells in the La Habra Formation have been measured between 100 and 200 feet below ground surface across the La Habra Basin area.

Immediately underneath the La Habra Formation lies the Coyote Hills Formation. The Coyote Hills is made up of mudstone interbedded with sandstone and pebbly conglomerate, which are 300 to 1,200 feet thick. Water levels in wells of the Coyote Hills Formation have been measured at about 120 feet below the ground surface.

The deepest water bearing unit is the San Pedro Formation. The San Pedro Formation is comprised of cemented and non-

cemented sands, silty sandstone, sandy conglomerate, and pebbly conglomerates. The San Pedro Formation ranges between 200 and 400 feet in thickness and produces the best quality groundwater of all the water bearing zones. Pressure levels of confined groundwater in wells of the San Pedro aquifer zone range from about 100 to 200 feet below ground surface.

Groundwater Exploration and Water Quality

Currently, this non-adjudicated basin is serving the city of La Habra. The estimated long-term extraction supply is 4,500 acre-feet per year; however, the historical city of La Habra extraction rate is approximately 1,074 acre-feet per year (averaged over the past 15 years), which is considerably less than the potential yield. Thus, the La Habra Basin has not been identified to be in overdraft. In fact, the City plans to utilize the additional groundwater supply by increasing the capacity on the existing Idaho Street Well.

In 1977, the city commenced an exploration program for local groundwater production in which three test wells were drilled. Only one site was considered satisfactory to complete production facilities. This well was placed into service in 1984 and continued service until it collapsed in January of 1997. In August that same year, the Department of Health Services, Drinking Water Field Operation Branch, Santa Ana District approved the well construction plans for the Idaho Street Well, which is located 30 feet southwest of the original well. The Idaho Street Well is currently the only production of potable domestic water within the boundaries of the city of La Habra.

Additionally, in December of 1994, the City Council authorized the drilling of two new wells (one test well and one production well). Initial water quality tests indicated that the water these wells produced was not suitable for potable usage (high sodium and TDS). As a result, the city has given consideration to treatment and blending for potable use and/or blending for irrigation purposes; however, at this time these alternatives are not considered cost-effective.

Groundwater Recharge and Expected Yield

Based upon recorded stream run-off yields, it is estimated that approximately 2,100 acre-feet of water would percolate during the average year. For direct percolation of rainfall and resulting run-off within the valley itself, it is estimated that

an average of 1,600 acre-feet annually would percolate. Thus, the groundwater recharge is estimated at approximately 3,700 acre-feet per year. Subsurface flow estimates are about 5,500 acre-feet annually. Therefore, it is estimated that an average long-term supply which can be extracted is approximately 4,500 acre-feet (an average of the two values) without severe or sustained changes in the amount of groundwater in storage. Current groundwater production by the city of La Habra at the Idaho Street Well produces approximately 1,200 acre-feet per year, which is only about 25% of its potential yield. Additional development of groundwater resources could significantly increase the available water supply for La Habra. Full development of the La Habra Basin could eventually supply up to 40% of the city's current water demands.

The city of La Habra currently plans to double production capacity for the Idaho Street Well from 1,200 to 2,400 acre-feet per year, which will increase reliance on local sources from 11% to 22% of total demands.

Historical La Habra Groundwater Basin Extraction

Table 2-2-1-1-3-A and 2-2-1-1-3-B detail the history and projection of the water extracted from the La Habra Groundwater Basin.

Table 2-2-1-1-3-A: Historical Groundwater Extraction in La Habra Basin

YEAR	ACRE FEET
1983-84	155
1984-85	807
1985-86	1,279
1986-87	706*
1987-88	1,238
1988-89	1,061
1989-90	1,212
1990-91	1,812
1991-92	1,651
1992-93	1,084
1993-94	1,069

1994-95	1,553
1995-96	1,100
1996-97	47**
1997-98	502
1998-99	1,132
1999-00	930
2000-01	1140
2001-02	1207
2002-03	534
2003-04	1346
2004-05	1006

*1986-87 production down due to major well modifications.
**1996-97 Well No. 2 collapsed.
Source: City of La Habra

Table 2-2-1-1-3-B: Projected Production in La Habra Basin

Acre-feet Per Year				
2010	2015	2020	2025	2030
2,400	2,400	2,400	2,400	2,400

Source: City of La Habra

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

2.2.1.1.4 San Mateo Basin

According to information provided by City of San Clemente (One of MWDOC's retail member agencies), MWDOC concludes that no groundwater has been produced or projected to be produced from this basin.

2.2.1.1.5 Laguna Canyon Basin

As of the preparation of this Plan, there has not been a groundwater management plan available for this groundwater basin. However, the following description is written, with assistance from Laguna Beach County Water District, to describe the basin.

The Laguna Creek watershed lies in the San Joaquin Hills of southern Orange County. The drainage area of approximately 5,412 acres includes the Laguna Creek and Niguel Creek basins and is the largest stream basin to drain

exclusively from the San Joaquin Hills into the ocean. The drainage basin is roughly 6.5 miles long and averages 1.5 miles wide between its boundaries. The upper or northern half of the basin is relatively wide with low subdued hills, whereas the lower half is narrow, with steep slopes forming Laguna Canyon. Elevations reach 1,000 feet above sea level in parts of the drainage basin.

The average annual rainfall is about 12 inches at Laguna Beach at the mouth of Laguna Creek and, at times, rainfall in the San Joaquin Hills is sufficient to cause sharp, damaging floods along Laguna Creek. In general, however, the drainage basin is dry with only sufficient water discharge to reflect losses from groundwater sources and urban runoff.

Historically, no groundwater has been produced from this basin. However, as augmenting local supply is becoming increasingly critical, Laguna Beach County Water District has proposed a project that will utilize the groundwater from this basin. The following table shows the projected groundwater production from the basin provided by Laguna Beach County Water District:

Figure 2-2-1-1-5-A : Projected Production in Laguna Beach County Water District

Acre-feet Per Year				
2010	2015	2020	2025	2030
200	200	200	200	200

Source: Laguna Beach County Water Authority

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

2.2.1.2 Surface Water

Surface water supplies in Orange County are captured mostly from Santiago Creek into Santiago Reservoir (a.k.a. Irvine Lake) and some reclaimed from local streams and urban runoff in south Orange County (in the Santa Margarita Water District service area).

There are a few other dams located on the smaller streams throughout the County; however, these are generally only for flood control or local agricultural use. Effort has been made in exploring the opportunity for increasing utilization of water in San Juan Basin in south Orange County through the development of desalters and percolation basins.

Table 2-2-1-2-A shows the projected surface supply in 5-year increments from 2005 to 2030.

Table 2-2-1-2-A: Projected Surface Water Production in MWDOC's Service Area

Acre-feet Per Year					
2005	2010	2015	2020	2025	2030
10,908	11,476	10,749	10,500	10,462	10,525

Source: Municipal Water District of Orange County, Annual 25-Year Survey (Spring 2005)

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

2.2.1.3 Recycled Water

Orange County is the leader in water recycling in the State of California, in both quantity and innovation. Water supply and wastewater treatment agencies in Orange County have received well-deserved recognition in the field of water reclamation and reuse.

Recycled water is widely accepted as a water supply source throughout MWDOC's service area. In the past, recycled water was mainly used for landscape irrigation. Irvine Ranch Water District, a MWDOC member agency, is also at the forefront of using recycled water not only for irrigation, but also for other uses such as toilet flushing and commercial needs. The GWR System, currently under construction, is expected to be completed in 2007. This jointly operated OCSD/OCWD project will result in a dramatic increase in the use of recycled water in Orange County. Proposed uses for GWR SYSTEM include injection for seawater barriers and groundwater recharge. Groundwater recharge will surpass landscape irrigation as the greatest consumer of recycled water in Orange County. Recycled water in MWDOC's service area is treated to various levels dependent upon the ultimate end use and in accordance with Title 22 regulation. More details on the recycled projects in the MWDOC service area are discussed in Section 6 of this Plan.

Table 2-2-1-3-A lists the current recycled water use, and Table 2-2-1-3-B summarizes the projected recycled water use in five-year increments from 2010 to 2030.

Table 2-2-1-3-A: Current Recycled Water Supplies in MWDOC's Service Area

Acre-feet Per Year		
User Type	Treatment Level	2005
I.		
Green Acre Project	Title 22	2,577
City of San Clemente	Title 22	552
El Toro Water District	Title 22	430
Irvine Ranch Water District	Title 22	15,296
Moulton Niguel Water District	Title 22	7,868
Santa Margarita Water District	Title 22	4,270
South Coast Water District	Title 22	890
Trabuco Canyon Water District	Title 22	850
	Subtotal	32,733
II. Seawater Barriers		
Interim GWRS Pilot Plant	Micro-filtration/Reverse	4,000
	Subtotal	4,000
	Total	36,733

Note: All recyled water is treated to meet Title 22 standards. Treatment levels vary depending upon the sources.
Source: Interviews conducted by Camp Dresser and McKee for Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Table 2-2-1-3-B: Projected Recycled Water Supplies in MWDOC's Service Area

Acre-feet Per Year					
User Type	2010	2015	2020	2025	2030
I.					
Green Acre Project	3,175	3,218	3,240	3,240	3,240
City of San Clemente	1,256	1,767	2,300	2,300	2,300
City of San Juan Capistrano	2,056	2,556	3,039	3,350	3,350
El Toro Water District	575	575	575	575	575
Irvine Ranch Water District	26,203	26,091	27,948	29,231	29,231
Moulton Niguel Water District	9,800	9,800	9,800	9,800	9,800
Santa Margarita Water District	6,367	8,306	10,162	12,122	12,122
South Coast Water District	1,000	1,000	1,000	1,000	1,000
Trabuco Canyon Water District	956	1,000	1,000	1,000	1,000
Subtotal	**51,388**	**54,313**	**59,064**	**62,618**	**62,618**
II. Groundwater Recharge					
Groundwater Replenishment System	**38,000**	**38,000**	**38,000**	**38,000**	**38,000**
II. Seawater Barriers					
Groundwater Replenishment System	34,000	34,000	34,000	34,000	34,000
Alamitos	2,000	2,000	2,000	2,000	2,000
Subtotal	**36,000**	**36,000**	**36,000**	**36,000**	**36,000**
Total	125,388	128,313	133,064	136,618	136,618

Note: All recyled water is treated to meet Title 22 standards. Treatment levels vary depending upon the sources.
Source: Municipal Water District of Orange County, Annual 25-Year Survery (Spring 2005)

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Direct non-potable recycled water usage totaled 32,733 acre-feet in the MWDOC service area in 2005, while seawater barrier used about 4,000 acre-feet.

In 2030, direct non-potable recycled water usage is projected to reach nearly 63,000 acre-feet, an increase of 91% from 2005. The indirect usage non-potable water usage for groundwater recharge and seawater barriers is expected to reach 74,000 acre-feet, almost 19 times its current use. Such an increase is due to the forthcoming of GWR System. This single recharge project will ultimately supply 72,000 acre-feet per year, which is currently lost to the ocean as a result of wastewater discharges.

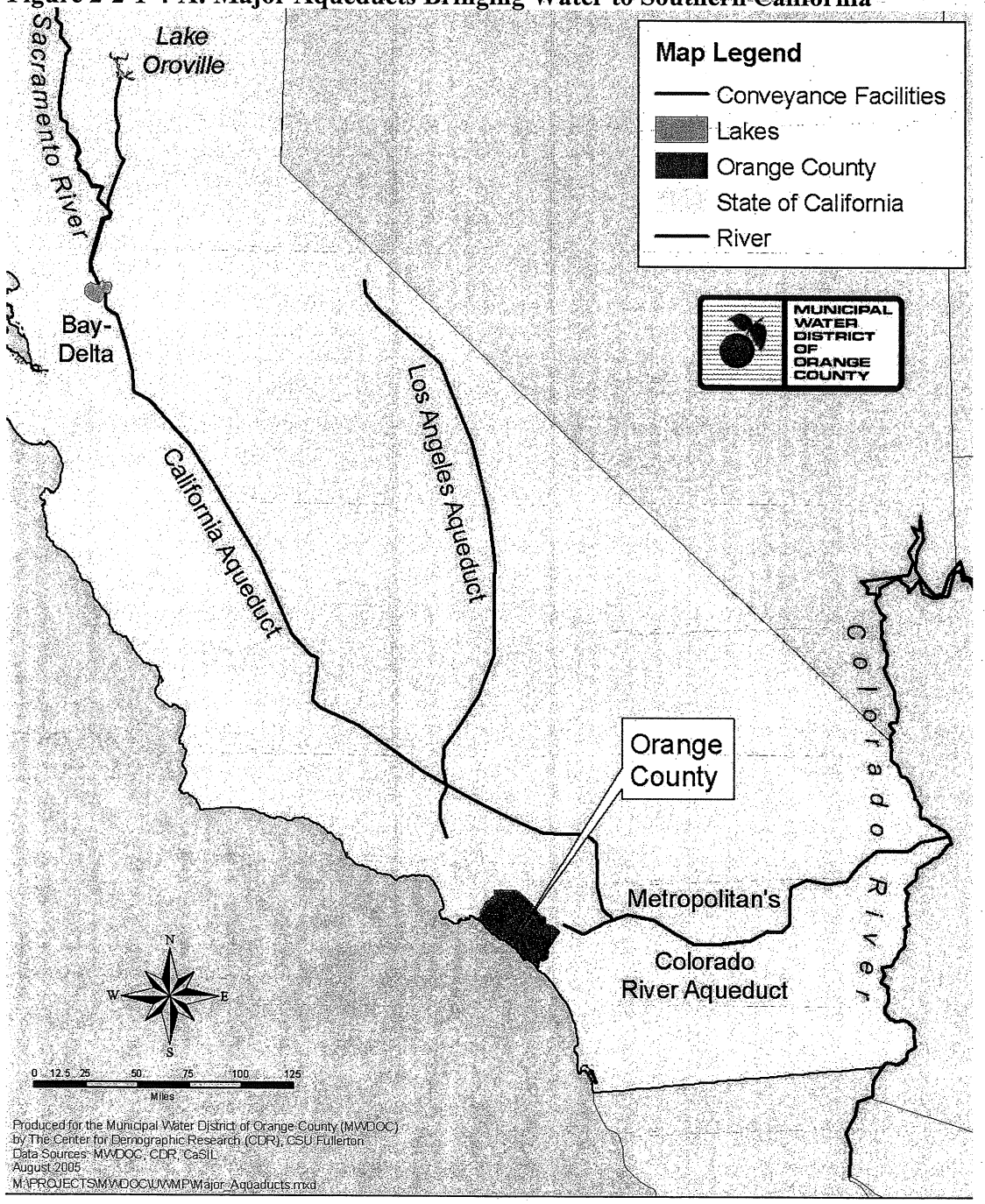
2.2.1.4 Imported Water

Importing Water from Metropolitan Water District of Southern California

Approximately 17.7 million Southern Californians rely on Metropolitan for imported water. Metropolitan wholesales imported water supplies to member cities and water districts in six Southern California counties. Since 1983, the total regional retail water demands within Metropolitan's service area has increased from about 3.0 million acre-feet to 4.1 million acre-feet in 2004. Metropolitan has provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its nearly 5,200-squre-mile service area. The remaining supply comes from local wells, local surface water, recycled water supplies, and from the City of Los Angeles's aqueduct in the eastern Sierra Nevada.

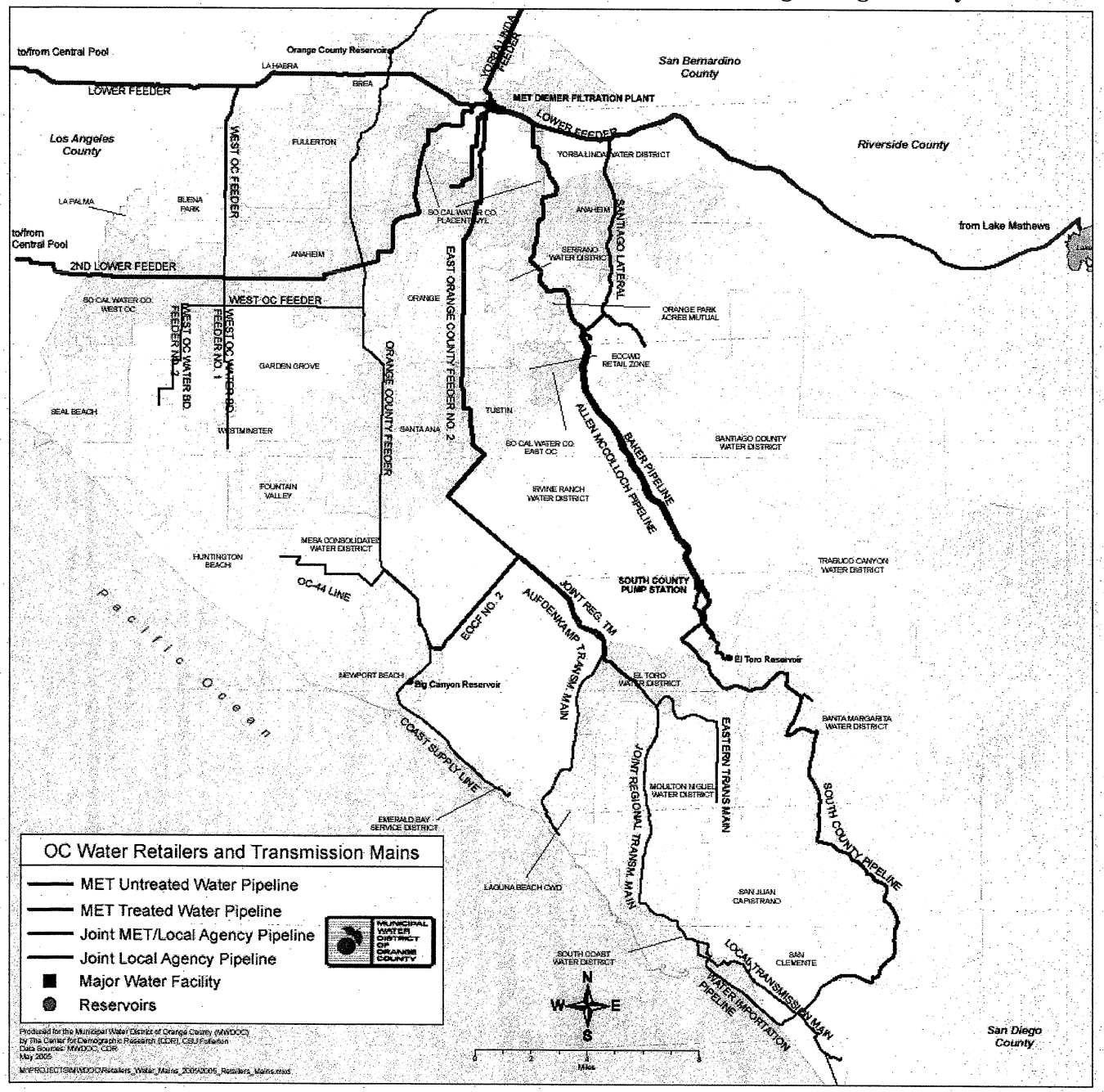
Historically, Metropolitan has been responsible for importing water into the region through its operation of the Colorado River Aqueduct and its contract with the State of California for State Water Project supplies. Major imported water aqueducts bringing water to Southern California are shown in Figure 2-2-1-4-A. Over the past decade supplies from the Colorado River have averaged 1.2 million acre-feet. Supplies from the State Water Project over the same period have averaged 700,000 acre-feet of water. The future reliability of these supplies is increasingly uncertain; however, Metropolitan has increased its ability to supply water, particularly in dry years, through the implementation of storage and transfer programs. The adopted Metropolitan 2005 Regional Urban Water Management Plan provides detailed documentation of Metropolitan facilities and imported water deliveries. A copy of Metropolitan's 2005 Regional Urban Water Management Plan is included in *Appendix 2-E.*

Figure 2-2-1-4-A: Major Aqueducts Bringing Water to Southern California



In Orange County, MWDOC and the cities of Anaheim, Fullerton, and Santa Ana, receive imported water from Metropolitan. Metropolitan feeders supplying Orange County and the alignment of the major water transmission mains within Orange County are shown in Figure 2-2-1-4-B.

Figure 2-2-1-4-B: Metropolitan Feeders and Transmission Main Serving Orange County



Source: Produced for the Municipal Water District of Orange County by the Center for Demographic Research, CSU Fullerton

MWDOC Imported Demand

To aid in planning future water needs, MWDOC works with its member agencies each year to develop a forecast of future water demand. With this process, MWDOC collects forecasts of total retail demands and local supply, with the exception of forecast of groundwater production from Orange County Basin, from each of its member agencies. MWDOC has developed a computer model that projects the groundwater production from Orange County Basin (please refer to Section 2-2-1-1-1 for a detailed discussion on the modeling effort). The result of this coordination effort allows MWDOC to forecast the imported demand by subtracting total demand from available local supplies. MWDOC then advises Metropolitan annually (in April of each year) of how much water MWDOC anticipates to purchase during the next five years.

In spring of 2005, MWDOC conducted this annual coordination effort by extending the planning horizon specifically to 2030. This is done so MWDOC can use the obtained information to complete this Plan and to comply with *California Water Code* 10631(k), which requires an urban water supplier to provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 25 years.

Table 2-2-1-4-A shows the projected imported water demand in the MWDOC service area for both direct and indirect use. As discussed in Section 2-1-3-1, the term "direct use" refers to water consumed directly by users, and "indirect use" refers to the water used for replenishment storage or for saline barriers.

Table 2-2-1-4-A: Projected Imported Water Demand in MWDOC's Service Area

Acre-feet Per Year					
From Metropolitan	2010	2015	2020	2025	2030
For Direct Consumptive Use					
Brea, City of	5,997	6,491	6,930	7,242	7,242
Buena Park, City of	4,536	5,982	7,203	7,028	6,799
East Orange County Water District	2,947	3,064	3,092	3,076	3,055
El Toro Water District	10,984	11,153	11,323	11,493	11,645
Fountain Valley, City of	2,697	3,339	3,497	3,413	3,301
Garden Grove, City of	5,122	6,914	7,420	7,375	7,228
Huntington Beach, City of	8,327	10,312	10,781	10,625	10,370
Irvine Ranch Water District	31,178	35,358	39,529	40,867	43,714
La Habra, City of	2,225	2,477	2,613	2,684	2,699
La palma, City of	629	780	824	811	788
Laguna Beach County Water District	2,628	2,678	2,728	2,773	2,773
Mesa Consolidated Water District	616	1,634	1,747	1,599	1,443
Moulton Niguel Water District	35,114	35,435	35,935	36,435	36,881
Newport Beach, City of	4,643	6,200	6,436	6,303	6,097
Orange, City of	7,594	9,773	10,157	9,882	9,521
San Clemente, City of	9,806	9,992	9,994	9,994	9,994
San Juan Capistrano, City of	4,839	4,878	4,919	4,961	5,007
Santa Margarita Water District	30,957	32,767	35,565	36,627	36,651
Santiago County Water District	2,015	2,154	2,204	2,254	2,299
Seal Beach, City of	1,108	1,393	1,485	1,449	1,402
Serrano Water District	-	-	-	-	-
South Coast Water District	7,209	6,686	6,196	6,306	6,306
Golden State Water Company	7,540	9,522	10,159	9,780	9,513
Trabuco Canyon Water District	4,543	4,819	5,058	5,269	5,400
Westminster, City of	3,472	4,298	4,540	4,458	4,307
Yorba Linda Water District	11,280	12,394	12,694	12,619	12,546
Subtotal of Imported Demand for Direct Use	208,006	230,494	243,030	245,322	246,981
Subtotal of Imported Demand for Indirect Use (For OCWD)	61,739	58,734	56,685	57,048	50,700
Total Imported Demand	269,745	289,228	299,715	302,370	297,681

Source: Muncipal Water District of Orange County, output of "Water Balance" Model

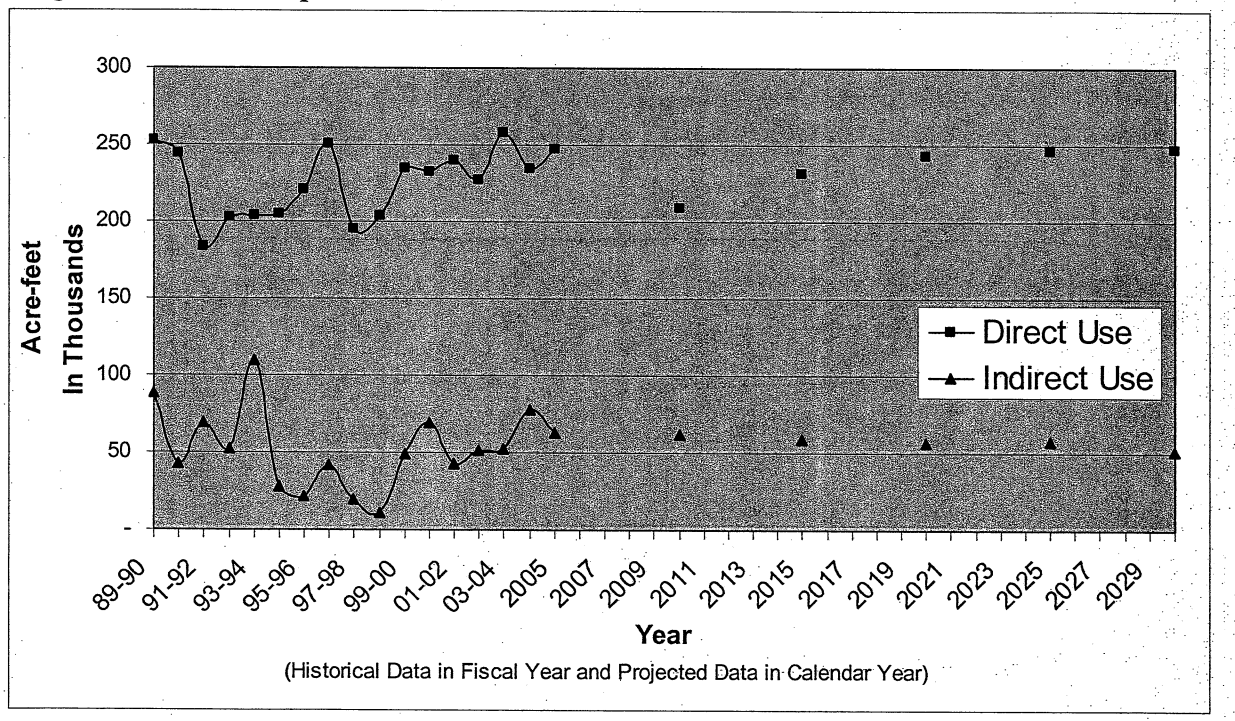
In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

As shown in Figure 2-2-1-4-C, the imported demand was reduced in the mid-90s due to the overall reduction of water demand resulting from post-drought water use efficiency measures. However, the imported demand began to increase again as the overall demands continue to grow. When OCWD reduced its BPP from 75% to 66% in 2003, the imported demand exceeded the pre-drought level as the groundwater supply decreased. The retail demand level is projected to continue to grow in the next 25 years, but local supplies are also expected to increase in the next 25 years. The resulting net demand on Metropolitan would be expected to reduce initially in the next 10

years as local projects become materialized. However, the imported demand will again return to the present level as overall population grows in the region.

Also shown on Figure 2-2-1-4-C is the historical and projected imported demand for indirect use. Historically, the imported water for indirect use has fluctuated based on surplus supply availability. Unlike imported demand for direct use, which is driven by the need of the water use, the imported demand for direct use is driven by the availability of replenishment supply from Metropolitan. To project the availability of replenishment supply from Metropolitan, MWDOC worked with Metropolitan staff to derive the average replenishment supply available to MWDOC based on forecasts of Metropolitan's imported supplies and regional demands. The projected average replenishment supply available is shown in Figure 2-2-1-4-C from 2010 to 2030. The data shown is consistent with MWDOC's projection of local groundwater supply for Orange County Basin, which partially depends on the projected replenishment supply from Metropolitan. If conditions change in the future allowing Metropolitan to provide greater replenishment supply, then the projection for local groundwater supply will increase accordingly.

Figure 2-2-1-4-C: Imported Demand in MWDOC's Service Area



Metropolitan Supply Reliability

In its Draft Regional 2005 Urban Water Management Plan (September, 2005), Metropolitan presents its supply availability at the regional level, rather than at the member agency level. With that, MWDOC is not able to quantify the availability of imported supply from Metropolitan specifically for MWDOC. However, in that draft plan (Section II.2 - *Evaluating Supply Reliability*), Metropolitan was able to show that it can maintain 100% reliability in meeting direct consumptive demand under the conditions that represent normal, single driest, and multi-dry years through 2030.

Inferring from the supply reliability findings stated by Metropolitan, MWDOC concludes that Metropolitan is capable of supplying imported water to meet demand projected by MWDOC under various hydrologic conditions.

2.2.1.5 Transfer and Exchange

Metropolitan currently has a tiered unbundled rate structure. Tier 2 of this rate structure increases the cost of supply to a member agency in order to provide a price signal that encourages development of alternative supply sources. One alternative source of supply may be a transfer or exchange of water with a different agency.

The CALFED program has helped to develop an effective market for water transactions in the Bay-Delta region. This market is demonstrated by the water purchases made by the Environmental Water Account and Metropolitan in recent years. MWDOC and its member agencies plan to take advantage of selected transfer or exchange opportunities in the future. These opportunities can help ensure supply reliability in dry years and avoid the higher Tier 2 cost of supply from Metropolitan. The continued development of a market for water transactions under CALFED will only increase the likelihood of MWDOC's participation in this market when appropriate opportunities arise.

MWDOC is in the process of developing long-term relationships with water suppliers in Northern California. These relationships may lead to transfer agreements in the near future. One example of this is the South Feather Water and Power Agency (SFWPA). MWDOC has discussed a potential transfer of water from SFWPA through the State Water Project and Metropolitan's distribution system into MWDOC's service area. This possible long-term transfer would solidify MWDOC's dry-year supplies while also helping to reduce dry-year costs. Initial discussions indicate this transfer could be in the range of 10,000 acre-feet per year.

A few MWDC member agencies have also expressed interests in pursuing transferring outside of the MWDOC's region. MWDOC will continue to help its member agencies in developing these opportunities and ensuring their success. In fulfilling this role, MWDOC will look to help its member agencies navigate the operational and administrative issues of wheeling water through the Metropolitan water distribution system.

MWDOC may also participate with other Metropolitan member agencies to transfer water across agency boundaries. One such possibility is a purchase of recycled water from the city of Long Beach. This long-term transaction could make up to 10,000 acre-feet per year of recycled water available for delivery in MWDOC's service area. This arrangement will have many benefits including:

- Savings from lower purchases of Metropolitan Tier 2 supplies;
- Reduced Capacity Charges from Metropolitan due to lower demands; and
- Reduced reliance on imported water.

Currently, one of MWDOC's retail member agencies, Santa Margarita Water District has entered into a short-term transfer agreement with Cucamonga Valley Water District. Cucamonga Valley Water District is a retail member agency under Inland Empire Utilities Agency, which is a member public agency of Metropolitan. For details of this exchange agreement, please see Appendix 7-A for a copy of the "Memorandum of Understanding Between MWDOC and IEUA for Exchange of MWD Drought Allocation." According to the agreement, MWDOC and Inland Empire Utilities Agency shall confer with Santa Margarita Water District and Cucamonga Valley Water District to determine the amount of water, which may be up to 4,250 acre-feet per year, called for under the agreement should Metropolitan allocate less than the full amounts of imported supplies to MWDOC and Inland Empire Utilities Agency. Whatever water is reallocated from Inland Empire Utilities Agency to MWDOC under this arrangement would be passed through from MWDOC to Santa Margarita Water District.

2.2.1.6 Desalination

Overview

Water treatment technology has continued to advance, and costs have continued to decrease, providing greater opportunities to develop previously unusable surface water, groundwater, wastewater, and ocean water for potable water supply. One of the

great success stories in advanced water treatment technology since its invention in the mid-1960s at UCLA has been the development and advancement of Reverse Osmosis (RO) membrane systems. Membrane systems have seen increasing application in water supply for removal of salts and other constituents, such as synthetic and natural organic compounds. In addition, many other advanced water treatment technologies, such as advanced oxidation and improved disinfection methods, have been developed and are continuing to be invented and further refined. These unit processes, including membrane systems, can be used in various arrays to meet particular water treatment needs for a given water source.

Today, membrane treatment with RO systems is considered by most practitioners to be the preferred cost-effective technology for desalination and natural organic compound removal (colored groundwater, etc). Most of the earlier seawater desalination projects have been built outside of the United States and were primarily thermal distillation systems. Today, most of the newer plants use RO membrane technology. In addition, a newer membrane technology, microfiltration (MF), is also seeing increased application in surface water treatment and for pretreatment in ocean water desalination projects using open intakes for feedwater supply and RO for desalination.

To accommodate long-term population and economic growth in Southern California, and to protect against long-term trends and more extreme variability in natural water supply, as well as development and depletion of water resources outside of Southern California, continuing regional and local efforts in water resource management and supply development will be necessary. Application of desalination technology is increasingly being recognized as one important supply component to develop new firm water supplies and to bolster water system reliability. Overall supply shortage risks from drought and emergency outages can be lessened with a diversified and disaggregated water supply portfolio that incorporates appropriate desalination projects.

Wastewater Recycling

OCWD initiated research and development activities in water desalination in the late 1960s for the purpose of developing a firm, high quality supply suitable for injection into its seawater intrusion control barrier. By the early 1970s, OCWD had constructed Water Factory 21, an advanced treatment facility that utilized RO and other treatment processes to desalt and purify treated wastewater for seawater barrier injection.

Today, OCWD is in the process of replacing and expanding upon its successful Water Factory 21 project with construction of the GWR System. The GWR System is a water supply project designed to ultimately reuse up to approximately 140,000 acre-feet per year of advanced treated wastewater (recycled water). The initial $487 million project will supply approximately 72,000 acre-feet per year and provide the backbone facilities for future expansion. The purification process consists of MF (microfiltration), RO, AOP (advanced oxidation process) and post-disinfection. This project will increase the capacity and size of the seawater intrusion control barrier through the addition of new injection wells, as well as provide a new, reliable, high quality source of water to replenish the Orange County Basin. It is scheduled to be fully operational in summer 2007. It also provides a major benefit to the OCSD by treating 100 MGD of wastewater through the use of MF during peak wet weather flow conditions, which will defer the need for a new ocean outfall.

Impaired Groundwater

Metropolitan instituted its Groundwater Recovery Program in 1991 to provide financial incentives (up to $250 per acre-foot) to local agencies to develop brackish groundwater impaired from either natural causes or from agricultural drainage. The purpose of the program was to increase utilization of groundwater storage within the region for firm local production, conjunctive use storage, and drought supply. In MWDOC's service area, five groundwater recovery brackish water projects have contracts with MET. Three have been constructed and are now operational, and two are in the process of being implemented. Two additional projects have been constructed to treat groundwater which is unusable due to high levels of color and natural organics.

Two groundwater desalters were constructed and have been successfully in operation for several years by the city of Tustin under a joint agreement with OCWD. Groundwater in the greater Tustin area has high levels of dissolved solids and nitrates due to natural causes and agricultural drainage. Groundwater quality in the Tustin area is showing signs of slow improvement due to the removal of past accumulated salts. The Irvine Ranch Water District is in the process of constructing its Irvine Desalter Project to recover brackish groundwater from the Irvine Subbasin, an area where groundwater has also been impaired from natural causes and agricultural drainage.

The city of San Juan Capistrano has recently constructed a groundwater desalter to treat brackish San Juan Creek underflows which have been impaired primarily due to natural causes. The South Coast Water District is in the process of implementing its San

Juan Creek groundwater desalter project. Both projects utilize RO technology.

The combined yield from these seven projects was 18,632 acre-feet in fiscal year 2004/2005. This supply is expected to increase to 32,380 acre-feet at ultimate development of these projects. Since these projects are recovering groundwater, a similar amount must either be replenished on an average annual basis to maintain water balance or be salvaged from water that otherwise would flow into the ocean as subsurface outflow. The benefit of these projects is to provide a firm base supply, restore utilization of groundwater storage impaired by natural causes and/or agricultural drainage, improve conjunctive use storage operations, and provide a drought supply by the additional capacity to tap groundwater in storage.

Table 2-2-1-6-A summarizes information on groundwater recovery projects in the MWDOC service area.

Table 2-2-1-6-A: Groundwater Recovery Projects in MWDOC's Service Area

	Lead Agency / Name	On-Line Date	Production FY '04-05 (AF/yr)	Production Ultimate (AF/yr)	Capital Cost ($M)	Total Unit Cost [1] $/AF	Metro-politan Subsidy Contract?	Notes on cost
Colored Water	IRWD DATS	Nov-2001	7,652	7,200	16.0	390	N	DATS O&M $300/AF
	Mesa CWD Colored Water, Ph. 1	Jan-2001	5,290	5,650	12.3		Y	Mesa O&M $357/AF plus $200/AF bromate
subtotal			12,942	12,850	28.3			
Brackish Water	IRWD Irvine Desalter- Potable	7/07	[2] -	7,694	29.9	1,092	Y	
	IRWD Irvine Desalter- Non potable	7/06	[2] -	3,898	combined	293	N	
	San Juan Desalter	Dec-2004	1,628	[3] 4,800	32.0	913	Y	
	SCWD Capistrano Beach Desalter	2006-07	[4] -	1,300	9.5	1,400	Y	5.5M is for plant only; 4.0M for access road
	Tustin Desalter (17th St.)	1996	2,062	3,579	8.8		Y	$7.8 M in 1996, and $1.0 M in 2002
	Tustin Nitrate (Main St.)	1989	2,000	2,000	2.8		N	$1.7 M in 1989, and $1.0 M in 2002
subtotal			5,690	23,271	83.0			
Total			**18,632**	**36,121**	**111.3**			

[1] Unit cost is calculated as total cost (annualized capital cost plus Operation & Maintenance cost) divided by ultimate yield. Number shown is before grants or subsidies have been subtracted.

[2] Irvine Desalter Project includes 2 separate sub-projects: TCE-contaminated water treated for non-potable use, and brackish water treated for potable use. Construction contract award August 2005.

[3] FY '04-05 number for San Juan Desalter is only for part of its first year.

[4] Capistrano Beach Desalter construction began in 2005. Facility is being built to produce 1,300 AF/yr although current permit is for 972 AF/yr.

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Ocean Water Desalination

Desalination of ocean water provides a potentially unlimited supply of water if it can be desalinated and treated at reasonable costs. This section addresses previous efforts and current proposals for developing a desalinated ocean water supply in Orange County.

Earlier Initiatives

The first proposed desalination project that was considered for location in Orange County was the Bolsa Island Nuclear Power and Desalination Plant project, a joint project of Metropolitan, the U.S. Government (Office of Saline Water of the Department of Interior and the Atomic Energy Commission), and the three major electric utilities serving Southern California (Los Angeles Department of Water and Power, Southern California Edison Company, and San Diego Gas & Electric Company). This proposed project would have augmented treated water supply to Metropolitan and to Metropolitan's central pool area. Agreements to develop the project were entered into in August 1966 by the parties.

This proposed project included a nuclear power thermal generation sized at 1800 MW and a thermal distillation desalination supply sized at 150 MGD. The proposed project was to be sited on a 40-acre island to be constructed 2800 feet offshore of Bolsa Chica State Beach, with product water piped to the Diemer Filtration Plant for blending with imported Colorado River Water. Initial costs were estimated in 1965 at $444 million and were later revised upwards to $765 million in July 1968. Due to escalating costs, the utilities terminated their participation, and by fiscal year 1969/1970 all project agreements had been terminated. Although not constructed, this project opened the way for continued research in development of a cost-effective desalinated water supply source in Southern California. Metropolitan has continued research and development efforts periodically since that time.

Current Initiatives

In the late 1990s, Poseidon Resources Corporation initiated, at their own expense, investigations to develop an ocean desalination plant in Orange County. In early 2000, MWDOC entered into a letter of intent to examine Poseidon's proposed Huntington Beach Seawater Desalination Project offer. MWDOC rescinded its offer later that year after further evaluation. Poseidon continued with offers from Santa Margarita Water District and Southern California Water Company. Both those offers were later not renewed.

As part of MWDOC's South Orange County Water Reliability Study, and upon request from South Coast Water District, an ocean desalination plant was included for consideration in the reliability study. That study found that an ocean desalination plant in south Orange County would provide needed system reliability as well as providing for a firm regional water supply.

As a result of negotiations from the Colorado River Quantification Settlement Agreement process, Metropolitan initiated a request for proposal in November 2001 from its member agencies for participation in the Seawater Desalination Program. MWDOC submitted a proposal along with four other Metropolitan agencies (Los Angeles Department Water and Power, West Basin Municipal Water District, Long Beach Water Department, and San Diego County Water Authority). These five agencies submitted proposals for 126,000 acre-feet per year in late 2002 which was subsequently adjusted to 142,000 acre-feet per year with Los Angeles Department Water and Power increasing its proposal amount. Metropolitan's *July 2004 Integrated Resource Plan (IRP)* update included a seawater desalination goal of 150,000 acre-feet per year. Metropolitan and the five desalination agencies have been in the process of developing a basic agreement for implementation of this program.

Overview of Proposed Projects

In Orange County, there are three proposed ocean desalination projects that could serve MWDOC and its member agencies with additional water supply. These are the Poseidon Resources proposed Huntington Beach Seawater Desalination Project, the joint San Diego County Water Authority (SDCWA) and MWDOC proposed Regional San Onofre Seawater Desalination Project, and the MWDOC proposed Dana Point Ocean Desalination Project.

Poseidon Resources Corporation Proposed Project

The Poseidon Resources proposed Seawater Desalination Project would be co-located within the AES Generation Power Plant in Huntington Beach. It is being planned to provide 50 MGD of desalinated supply for distribution into coastal and south Orange County. Since this is a privately sponsored project, it will require a conditional use permit from the city of Huntington Beach. The city is the lead agency under the California Environmental Quality Act. In 2003, the city found the project would cause unacceptable environmental impacts as proposed by Poseidon. Consequently, the city disapproved the project. Since that time, Poseidon has submitted a revised Draft Environmental Impact Report for reconsideration by the city. Currently, the project remains in the environmental review and permitting phase. Major issues include co-location with an aging power plant, unavoidable entrainment and impingement impacts from incremental increases in feedwater pumping, distribution water quality impacts to Irvine Ranch Water District's large-scale recycled water system, and questions related to operational reliability and price escalation. At this time, there are no current agreements with water agencies in Orange County for purchase of the product water.

Joint San Diego/Orange County Proposed Regional San Onofre Project

The joint SDCWA and MWDOC proposed Regional San Onofre Seawater Desalination Project is currently being investigated to determine project feasibility. The project size is yet to be determined, but a large facility is being investigated (50 to 150 MGD). The feasibility investigation will be reviewing the potential use of the Southern California Edison decommissioned Unit 1 San Onofre Nuclear Generation Station cooling water inlet and outlet conduits for feedwater and brine disposal. The State Lands Commission has just recently completed its Final Environmental Impact Report for disposition of these conduits. A subsurface intake system will also be investigated. Delivery of the product water into MWDOC and SDCWA service areas will require pumping and connecting pipelines. Joint interest with the U.S. Marine Corps and U.S. Bureau of Reclamation's Santa Margarita Project is being explored through a joint study of a Coastal Delivery Pipeline with Metropolitan, MWDOC and SDCWA. This project's time frame has been estimated by SDCWA for implementation in 2020.

MWDOC Proposed Dana Point Ocean Desalination Project

MWDOC is currently investigating the feasibility of an ocean water desalination plant in Dana Point adjacent to San Juan Creek. At this time, the overall feasibility investigation is focused in three areas: (1) feedwater supply utilizing a subsurface intake system, (2) concentrated RO reject seawater co-disposal through an existing South Orange County Wastewater Authority ocean outfall, and (3) energy supply. Upon completion of this work, an updated project feasibility report will be prepared and a decision will be made.

If completed, this project will provide both system and supply reliability to the south Orange County area. MWDOC commissioned a preliminary feasibility study of the project in 2000, and the results suggested that the site may be feasible for a 25 MGD desalination project. The recommended source of feedwater supply was an open-intake system. Upon further review of the preliminary subsurface intake system study, it was found that a subsurface intake system may be feasible at this location.

Due to environmental issues, including entrainment and impingement impacts to marine organisms, and permitting challenges associated with constructing a new open intake system, a decision was made to conduct a more extensive hydrogeology investigation into the feasibility of subsurface intakes at this location.

The mouth of San Juan Creek is entirely situated within Doheny State Beach and any work or project development will require the approval of the California Department of Parks and Recreation. Also, construction would be limited to the winter months, and the project would need to be configured so as to minimize impacts to the public and the park. One concept being investigated is a buried, passive collection system that would only result in short-term construction impacts to Doheny State Beach. The California State Department of Parks and Recreation has been very cooperative in approving the Phase 1 Hydrogeology Investigation, which was conducted in February 2005. That work found the alluvial channel system to be deeper and more permeable than originally found in the preliminary feasibility study.

MWDOC has received a California Department of Water Resources Proposition 50 Desalination Research and Development grant proposal in the amount of $1,000,000 to investigate combining horizontal directional drilling with water well technology for use in constructing long, larger diameter feedwater supply wells in the marine alluvial channel system.

2.2.2 Reliability of Water Supply

2.2.2.1 Basis of Water Year Data

Reliability of a supply may often be impacted by climatic variation. To analyze the changes of reliability due to climate, this Plan first establishes the hydrologic conditions that define the climatic variations within the MWDOC region – what constitutes the normal water year, the single dry water year, and the multiple dry water years.

Table 2-2-2-1-A shows the basis of water year type.

Table 2-2-2-1-A: Basis of Water Year Data in MWDOC's Service Area

Water Year Type	Basis of Water Year (s)			Based on Historical Sequence
Normal Water Year	Average of 83 Historical Hydrologies			1922 to 2004
Single-Dry Water Year	1961			1922 to 2004
Multiple-Dry Water Year	1959	1960	1961	1922 to 2004

Source: Municipal Water District of Orange County, output of "Water Balance" Model

When deciding on which historical hydrology to best represent the types of water year, MWDOC considered the combination of the followings:

- Total retail demands of the water year;

- Local supply condition of the water year; and

- Imported supply condition of the water year.

Imported-supply demand typically increases during dry years when the weather is hot and there is a decrease in local runoff. Furthermore, in its preliminary draft UWMP plan Metropolitan demonstrated it has developed flexible water supplies through transfers and storage programs designed to increase its resources during dry water year conditions. As a result, the water year is defined by the net difference of total retail demand less local supplies. The greater the net difference, the more critical it is for MWDOC to depend on imported supply.

Using the water balance computer model developed by MWDOC (see *Appendix 2-A(i)*), all three variables – retail demand, local supplies, and imported supplies – were simulated using 83 historical hydrologies from 1922 to 2004. The average of the 83 simulated trials was used to represent a normal condition (normal water year). Of the 83 years, the hydrologic condition of 1961 yields the highest demand for imported supply, and is therefore used to define a single dry year in the MWDOC service area. Similarly, the historical sequence from 1959 to 1961 yields the highest demand in a three-year sequence for imported supply, and is used to define a multiple-dry year in the MWDOC service area. In this modeling analysis, the single dry year is defined as "the year with the highest imported demand in the MWDOC service area". It is also coincided with the last year of a multiple dry-year event (a 3-year event). This analysis indicates that by the end of a multiple dry-year event, local supplies – primarily groundwater from the Orange County Basin -- are predicted to decline as storage is depleted. However, this analysis assumes groundwater production levels are based on the modeled Basin Production Percentage (BPP) from Orange County Basin and does not consider that Orange County Water District could choose to set a BPP that provides for no reduction (or an increase) in local supply. Moreover, the Orange County Water District Act does not restrict individual producers from pumping over the BPP to optimize the use of storage in the Basin during dry water year conditions. This is appropriate given the nature and purpose of the basin.

However, Metropolitan defines its water years with different historical hydrologies. According to its Draft Regional Urban Water Management Plan (September 2005), Metropolitan defines its multiple dry years with 1990-1992 and single dry years with 1977. MWDOC did review its imported demand based on Metropolitan-defined water years. The result indicates that the single year of 1961 and the sequence of 1959 to 1961 are considered to be more

conservative because they yield higher imported demands than any other years in the historical pool.

2.2.2.2 Supply Reliability in Normal, Single Dry, and Multiple-Dry Water Years

Table 2-2-2-2-A shows the reliability of local and imported supplies for direct consumption in MWDOC service area in different water year types from 2005 to 2030 in five-year increments.

Table 2-2-2-2-A: Supply Reliability for Retail Consumption in MWDOC's Service Area

Acre-feet Per Year					
2005-2010	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2008 (1959)	2009 (1960)	2010 (1961)
Local Supply	346,968	332,774	333,125	332,843	332,774
% of Normal		95.9%	96.0%	95.9%	95.9%
Imported Supply	208,006	254,476	244,821	237,614	254,476
% of Normal		122.3%	117.7%	114.2%	122.3%
2010-2015	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2013 (1959)	2014 (1960)	2015 (1961)
Local Supply	347,662	322,569	324,837	319,490	322,569
% of Normal		92.8%	93.4%	91.9%	92.8%
Imported Supply	230,494	288,677	282,844	276,226	288,677
% of Normal		125.2%	122.7%	119.8%	125.2%
2015-2020	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2018 (1959)	2019 (1960)	2020 (1961)
Local Supply	356,336	328,874	329,027	324,399	328,874
% of Normal		92.3%	92.3%	91.0%	92.3%
Imported Supply	243,030	304,510	302,616	294,339	304,510
% of Normal		125.3%	124.5%	121.1%	125.3%
2020-2025	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2023 (1959)	2024 (1960)	2025 (1961)
Local Supply	365,377	334,801	344,291	330,406	334,801
% of Normal		91.6%	94.2%	90.4%	91.6%
Imported Supply	245,322	310,194	302,951	301,248	310,194
% of Normal		126.4%	123.5%	122.8%	126.4%
2025-2030	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2028 (1959)	2029 (1960)	2030 (1961)
Local Supply	369,577	341,783	355,198	337,298	341,783
% of Normal		92.5%	96.1%	91.3%	92.5%
Imported Supply	246,981	309,572	301,024	302,027	309,572
% of Normal		125.3%	121.9%	122.3%	125.3%

Source: Municipal Water District of Orange County, output of "Water Balance" Model

As shown on Table 2-2-2-2-A, the local supply diminishes during the single-dry and multiple-dry water years. Local supplies available during these years range from 90% to 96% of the amount available in normal years. On the other hand, due to its development of flexible water supplies through transfers and storage programs, Metropolitan demonstrated in its draft Regional UWMP that it has increased resources to supply the increasing demand in the region during dry water year conditions. As the result, the reliability of imported supply was shown to increase from 114% to 126% of those in normal years.

Table 2-2-2-2-B shows the reliability of local and imported supplies for indirect consumption in MWDOC service area in different water year types from 2010 to 2030 in 5-year increments.

Table 2-2-2-2-B: Supply Reliability for Groundwater Replenishment & Saline Barrier in MWDOC's Service Area

Acre-feet Per Year					
2005-2010	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2008 (1959)	2009 (1960)	2010 (1961)
Local Supply	327,195	323,279	340,280	340,082	323,279
% of Normal		98.8%	104.0%	103.9%	98.8%
Imported Supply	61,739	52,750	56,750	40,500	52,750
% of Normal		85.4%	91.9%	65.6%	85.4%
2010-2015	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2013 (1959)	2014 (1960)	2015 (1961)
Local Supply	327,259	309,144	312,108	317,101	309,144
% of Normal		94.5%	95.4%	96.9%	94.5%
Imported Supply	58,734	46,245	49,531	32,420	46,245
% of Normal		78.7%	84.3%	55.2%	78.7%
2015-2020	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2018 (1959)	2019 (1960)	2020 (1961)
Local Supply	335,483	339,107	311,771	331,754	339,107
% of Normal		101.1%	92.9%	98.9%	101.1%
Imported Supply	56,685	16,250	48,750	16,250	16,250
% of Normal		28.7%	86.0%	28.7%	28.7%
2020-2025	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2023 (1959)	2024 (1960)	2025 (1961)
Local Supply	344,176	343,029	329,437	335,045	343,029
% of Normal		99.7%	95.7%	97.3%	99.7%
Imported Supply	57,048	16,250	48,750	16,250	16,250
% of Normal		28.5%	85.5%	28.5%	28.5%
2025-2030	Normal	Single	Multiple Dry Water Years		
	Water Year (Average)	Dry Year (1961)	2028 (1959)	2029 (1960)	2030 (1961)
Local Supply	357,779	360,681	344,781	343,998	360,681
% of Normal		100.8%	96.4%	96.1%	100.8%
Imported Supply	50,700	8,283	48,750	16,250	8,283
% of Normal		16.3%	96.2%	32.1%	16.3%

Source: Municipal Water District of Orange County, output of "Water Balance" Model

As shown on Table 2-2-2-2-B, both local and imported supplies diminish during dry water year conditions. Local sources for replenishing storage decrease due to lower runoffs from Santa Ana River and local streams. Imported supply is also shown to be reduced as Metropolitan is allocating all its resources to meet the

direct demand, thereby reducing its surplus supplies for replenishment uses.

Other than climatic variation, MWDOC concludes that there are no other factors contribute to the resulting of inconsistency of supply.

2.2.3 Planned Water Supply Projects and Programs

MWDOC has worked closely with its member agencies to decrease dependence and/or increase their supply reliability on imported water by further developing local supplies. Details on programs undertaken by MWDOC to minimize the dependence of imported demand for the region are discussed in Section 4 of this Plan. Although MWDOC has not carried out specific supply development projects in the region, it follows closely with those currently being developed by its member agencies. The following are brief descriptions of the projects that are in progress to meet the projected water use for the region (presumably, these projects will be discussed in further details in the UWMPs developed by each member agency):

1. El Toro Portion of Advance Wastewater Treatment Joint Project with Irvine Ranch Water District and Moulton Niguel Water District This Advanced Wastewater Treatment Project is a proposed joint project among El Toro Water District, Irvine Ranch Water District, and Moulton Niguel Water District. This regional recycled water project will provide treatment and distribution facilities for a combined demand of 4,313 acre-feet per year within the three districts' service areas. The regional recycled water system will service portions of the cities of Laguna Niguel, Laguna Hills, Laguna Woods, Lake Forest, Irvine, Mission Viejo, and Aliso Viejo.

   The project will develop a 5.0 MGD advanced water treatment plant at the site of the existing El Toro Water District Water Recycling Plant (WRP). The project will also include the construction of a 3,500 gallon per minute (gpm) Recycled Water Effluent Pump Station, rehabilitation of 7,200 linear feet of a 21-inch reinforced concrete transmission pipeline, construction of 3,000 linear feet of a 16-inch high-density polyethylene pipeline, construction a small distribution system pump station, and construction of approximately 22,000 linear feet of distribution pipelines ranging in diameter from 4 to 10 inches.

   The specifics of this project include the reuse of 4,313 acre-feet per year of which 2,730 acre-feet of recycled water would be conveyed to Irvine Ranch Water District (please note that the projected 2,730 acre-feet is currently excluded from Irvine Ranch Water District's supply portfolio), 1,000 acre-feet to Moulton Niguel Water District, and 583 acre-feet to El Toro Water District. This project directly

offsets the need for imported water supplies from Metropolitan, thus providing benefits to the Sacramento-San Joaquin Delta and Colorado River. This project will provide an opportunity for customers that use high valued imported water for non-potable purposes such as landscape irrigation, commercial, and industrial uses to instead take advantage of using recycled water. At this time, the implementation of this project is still subject to grant funding;

2. Irvine Ranch Water District Irvine Desalter – The Irvine Desalter Project (IDP) is a groundwater quality restoration project that will clean groundwater in the vicinity of the former Marine Corps Air Station El Toro base. Because of past chemical disposal and waste handling practices at the former base, volatile organic compounds (VOC) such as trichloroethylene have entered both the shallow and principal aquifers on and adjacent to the former base. In addition, areas just outside the plume of contamination contain elevated salts and nitrates caused by natural geology and past agricultural drainage, which make the water unsuitable for drinking. The IDP proposes to pump and treat groundwater containing salts and nitrates to stop its migration from the Irvine Subbasin into the main Orange County Groundwater Basin and to also prevent VOC-contaminated groundwater from spreading into the main Orange County aquifer.

   The IDP will consist of two water purification plants with separate wells and pipeline systems; one portion of the IDP will produce drinking water, and the other will produce non-potable water. The drinking water purification plant will use reverse osmosis and disinfection, and the non-drinking water plants will purify the VOC contaminated water using air stripping and carbon absorption. During 2003-2004, Wells 76, 77, and 110 were drilled. Wells ET-1, 78, 107, and 113 already exist and will only need to be modified for this project. Wells 106 and 115 are existing Irvine Company wells which have recently been transferred to IRWD. Well 115 has been included, and Well 106 will be added to the system in the future. In addition, Well 75 is a future well which may be drilled if the other wells do not produce sufficient amounts of water;

3. Irvine Ranch Water District Wells – Wells 51, 52, 53, 21, and 22 – collectively are also known as the West Irvine Well Field. Wells 21 and 22 are located outside of the Irvine Ranch Water District boundary (and outside the Irvine Sub-basin) within the city of Tustin, southeast of the Newport and Santa Ana Freeways. Both wells were constructed in 1992. TDS levels for both wells have been measured above 600 mg/l in the past and may require partial desalting. Irvine Ranch Water District owns well 51 located at MacArthur Boulevard and the 55 Freeway. This well has never been placed in service due to high color. The TDS for Well 51 is very low at about 180 mg/L; however color units were found to be high.

Irvine Ranch Water District plans to treat this water for high color. Irvine Ranch Water District owns a site for a second well (well 52) in the vicinity of Alton Parkway and the 5 Freeway, and a third well (well 53) to be constructed north of Barranca Parkway. Groundwater production from well 52 is also expected to require treatment for high color;

4. Irvine Ranch Water District Future Groundwater Wells – IRWD has identified the need to develop additional groundwater supply; however, details of the project are yet to be identified;

5. IRWD Desalter Wells 106 and 115 – Well 115 has been included in the system, and Well 106 will be included in the future system. (See description of Irvine Desalter Project in item #2);

6. Irvine Ranch Water District Michelson and Los Alisos Water Treatment Plant Upgrade – Irvine Ranch Water District produces tertiary-treated recycled water through the District's Michelson Water Recycling Plant and Los Alisos Water Recycling Plant. Irvine Ranch Water District is currently in the process of upgrading both of these treatment plants to allow for increased production to meet growing recycled water demands. The upgrade at Michelson Water Recycling Plant will allow for production to increase from 15 MGD to 18 MGD. The Los Alisos Water Recycling Plant treatment system will be upgraded with tertiary capacity to accommodate flows up to 7.3 MGD. The plan includes pumping and piping facilities to allow Los Alisos WRP recycled water to be delivered to Zone B of the IRWD system and to Zone A areas in the Lake Forest service area. These upgrades are within existing permit authorizations and California Environmental Quality Act compliance;

7. Irvine Ranch Water District Michelson Expansion Phase II – This is a future expansion of the Michelson Water Recycling Plant from 18 MGD to 33 MGD to serve Irvine Ranch Water District's ultimate recycled water demands. IRWD plans to increase the capacity of the existing plant site to produce sufficient recycled water to meet the projected demand in the year 2030;

8. Laguna Beach County Water District Laguna Creek Watershed Project – This project intends to reclaim and treat local runoff and stormwater in Laguna Creek. The treated water would be recharged into the Laguna Canyon groundwater basin and extracted for potable use. The agency is also considering an option that takes the treated water for direct irrigation use;

9. Laguna Beach County Water District Wells in Orange County Basin – Laguna Beach County Water District claims the right to extract

2,025 acre-feet per year from Orange County Basin. The agency is currently exploring options with OCWD to deliver this amount of water to its service area by 2010;

10. Moulton Niguel Water District Reclamation Expansion Phase IV (LRP 98) – This project includes expanding the recycled water distribution system to allow an additional 2,572 acre-feet per year of recycled wastewater to be served throughout the Moulton Niguel Water District. The expansion includes pump stations, reservoirs and pipelines being connected to the existing recycled water distribution system. The source of water is treated wastewater that would otherwise have been discharged to the ocean from a combination of Moulton Niguel Water District Joint Regional Advanced Wastewater Treatment, MNWD 3A Advanced Wastewater Treatment, and purchased from South Coast Water District's Coastal Advanced Wastewater Treatment;

11. Moulton Niguel Water District's portion of SOCWA Advanced Wastewater Treatment – Moulton Niguel Water District is planning to participate in the planned construction of an Advanced Wastewater Treatment plant at the South Orange County Wastewater Authority Jay B. Latham Wastewater Treatment Plant.

    Moulton Niguel Water District will own 1.5 MGD of the treatment capacity of the Advanced Wastewater Treatment and will distribute the recycled water to its customers via its Recycled Water Distribution System. The wastewater treated at the Advanced Wastewater Treatment Plant would have otherwise been discharged to the ocean. This project is a part of the Integrated Water Resources Management Plan for south Orange County and part of the Proposition 50 Chapter 8 grant application;

12. San Juan Capistrano Valley Non-domestic Water System Expansion – The proposed system expansion includes two projects: (i) an Advanced Water Treatment Facility; and (ii) improvements on the San Juan Capistrano Recycled Water Distribution System.

    The proposed Advanced Water Treatment Facility will be constructed at the J.B. Latham Plant, which is operated and maintained by the South Orange County Wastewater Authority. The proposed project will be constructed in three phases. The City of San Juan Capistrano will be the lead agency for the development of Phase 1, a 6 MGD Advanced Water Treatment. This facility will provide recycled water exclusively to the city of San Juan Capistrano.

    In addition to the Advanced Water Treatment Plant, the project also proposes to construct transmission mains and a recycled water

reservoir to the existing recycled water distribution system in San Juan Capistrano.

The water supply from this proposed expansion will serve the largest and most demanding areas for recycled water in the city of San Juan Capistrano;

13. Santa Margarita Water District Chiquita Reclamation Expansion I - The Chiquita Water Reclamation Plant has an existing capacity to produce 5.0 of recycled water. The Phase I expansion is proposed to be 3.0 MGD, to bring the plant tertiary capacity to 8.0 MGD. The expansion is proposed to be on-line in Fiscal Year 2009/2010;

14. Santa Margarita Water District Chiquita Reclamation Expansion II - A final expansion of the Santa Margarita Water District Chiquita Reclamation Plant is proposed between 2015 and 2020, with an addition of 5 MGD bringing the recycled water capacity up to 13 MGD with a projected average annual production of 11 MGD;

15. Santa Margarita Canada Gobernadora - The Santa Margarita Water District proposes to construct the Gobernadora Multipurpose Basin (GMB) to respond to erosion and sedimentation along Gobernadora Creek, high storm flows damaging the downstream restoration habitat area, excessive surface and groundwater originating upstream, and degraded water quality. Canada Gobernadora is a sub-basin (Basin Number 1.24) within the San Juan Creek Watershed. The upper portion of Canada Gobernadora has been developed over the past two decades as the community of Coto de Caza.

    The GMB will consist of a storm detention basin that will be established as a wetland and riparian habitat, an infiltration gallery to capture and divert flows to the wetlands, a pump station and pipeline. The GMB will be utilized to capture and naturally treat urban runoff and storm flows to: 1) reduce downstream erosion and sedimentation; 2) address excessive surface and groundwater; and 3) improve the water quality in the Gobernadora Creek and San Juan Creek.

    Successful implementation of the Basin is anticipated to result in the following project benefits:

    - Attenuation of storm flows, reduction of soil erosion and sedimentation, and removal of excess surface and groundwater. These problems, which are currently damaging Gobernadora Creek and the Gobernadora Ecological Resource Area (GERA), and presenting obstacles to the restoration of Gobernadora Creek advocated by the participants in the Special Area Management Plan and

Natural Communities Conservation Plan, including state and federal resource agencies, are a concern to the Army Corps of Engineers.;

- Higher quality of water, specifically a reduction in total coliform, biological oxygen demand, total solids, ammonia, nitrogen, and phosphates, utilizing natural vegetated treatment methods instead of chemicals;

- Protection of beneficial uses of the GMB, including contact and non-contact recreation, cold and warm freshwater habitat, and wildlife habitat; and

- Capture and reuse of a valuable water resource decreasing the need to utilize domestic water for nonpotable purposes.

Thus the construction of the basin will dramatically improve supply reliability by collecting and storing storm water supplies for irrigation. Construction will also include the creation of wetlands to protect the existing wetlands and other watershed ecosystems, and treat non-point source pollution;

16. Santa Margarita Dove Canyon Project – Santa Margarita Water District in conjunction with the Starr Ranch Audubon Society is developing an urban water return flow collection facility to divert the flow to its seasonal storage Portola Reservoir in Coto de Caza. The facility will collect 100 acre-feet per year. The collection facility will not only be a source of irrigation water but benefits the downstream environment;

17. Santa Margarita Horno Basin Surface Water – Santa Margarita Water District is considering the collection of urban runoff flows from the Horno Water Quality Basin for irrigation uses. The low flows are generally return flows from the sale of water within the Ladera Ranch community. Santa Margarita Water District has not waived or abandoned its rights to recover return flows from the groundwater basin and desires that such waters be put to beneficial use in order to reduce or offset requirements for imported water;

18. South Coast Water District Capistrano Beach Desalter – South Coast Water District is currently constructing this groundwater recovery facility that should be operational by the end of 2006. The plant initially will be built for 1,300 acre-feet per year; however, the current State Water Resources Control Board permit allows for 976 acre-feet per year until additional availability in the basin is shown. The plant is being built for future expansion by additional reverse osmosis trains. The cost of the plant is $5.5 million not including offsite facilities. South Coast Water District may be allowed to

expand beyond the current state permit once the performance of the basin is established;

19. Orange County Water District/Orange County Sanitation District Groundwater Replenishment System (GWR System) – The purpose of GWR System is to augment existing groundwater supplies through indirect potable reuse, providing a reliable, high-quality source of recharge water for the Orange County Basin. The GWR SYSTEM consists of three major components: (1) Advanced Water Treatment facilities and pumping stations, (2) a pipeline connection from the treatment facilities to existing recharge basins, and (3) expansion of the Talbert Barrier. The first phase of the GWR System will produce 72,000 acre-feet per year for groundwater recharge. The GWR System will be operational in mid-2007.

Table 2-2-3-A provides estimated timelines, projected supplies, and expected reliability in single-dry and multiple dry years for the projects listed.

Table 2-2-3-A: Planned Water Supply Projects in MWDOC's Service Area

Project Name	Projected Completion Date	2010					2015					2020				
		Normal year AF to agency	Single-dry year yield AF	Multiple-Dry Year 1 AF	Multiple-Dry Year 2 AF	Multiple-Dry Year 3 AF	Normal year AF to agency	Single-dry year yield AF	Multiple-Dry Year 1 AF	Multiple-Dry Year 2 AF	Multiple-Dry Year 3 AF	Normal year AF to agency	Single-dry year yield AF	Multiple-Dry Year 1 AF	Multiple-Dry Year 2 AF	Multiple-Dry Year 3 AF
ETWD Protion of El Toro AWT Joint project with MNWD and IRWD	2009-10	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
IRWD Irvine Desalter (Nonpotable)	2006-07	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898
IRWD Irvine Desalter (potable)	2007-08	4,645	4,645	4,645	4,645	4,645	5,372	5,372	5,372	5,372	5,372	5,372	5,372	5,372	5,372	5,372
IRWD Wells 51,52,53,21&22	2009-10	5,327	5,327	5,327	5,327	5,327	9,494	9,494	9,494	9,494	9,494	10,375	10,375	10,375	10,375	10,375
IRWD Other Groundwater	2024-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRWD IrvineDesalter Wells 106,115	2014-15	0	0	0	0	0	2,903	2,903	2,903	2,903	2,903	2,903	2,903	2,903	2,903	2,903
IRWD Michelson&LAWRP Reclamation 2005 Upgrades	2006-07	7,713	7,713	7,713	7,713	7,713	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500
IRWD Michelson Reclamation Expansion Phase II	2014-15	0	0	0	0	0	1,693	1,693	1,693	1,693	1,693	3,524	3,524	3,524	3,524	3,524
LBCWD Laguna Creek Watershed Project	2007-08	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Laguna Beach Well in the OCWD Basin	2009-10	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025
Moulton Niguel Reclamation Expansion Phase IV (LRP 98)	2006-07	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276
MNWD portion of SOCWA AWT	2007-08	204	204	204	204	204	364	364	364	364	364	364	364	364	364	364
MNWD portion of El Toro AWT Joint project	2009-10	50	50	50	50	50	1,390	1,390	1,390	1,390	1,390	1,390	1,390	1,390	1,390	1,390
San Juan Capistrano Valley Non-Domestic Water System Expansion (LRP-98)	2007-08	1,250	1,250	1,250	1,250	1,250	1,750	1,750	1,750	1,750	1,750	2,250	2,250	2,250	2,250	2,250
SMWD Chiquita Reclamation Expansion I	2009-10	785	828	838	814	838	2,715	2,864	2,897	2,815	2,897	3,360	3,360	3,360	3,360	3,360
SMWD Chiquita Reclamation Expansion II	2019-20	0	0	0	0	0	0	0	0	0	0	1,154	1,402	1,456	1,321	1,456
SMWD Canada Gobernadora	2008-09	725	653	653	653	653	725	653	653	653	653	725	653	653	653	653
SMWD Dove Canyon	2007-08	100	90	90	90	90	100	90	90	90	90	100	90	90	90	90
SMWD Horno Basin Surface Water	2006-07	215	194	194	194	194	215	194	194	194	194	215	194	194	194	194
South Coast WD Capistrano Beach Desalter	2006-07	800	800	800	800	800	1,300	1,300	1,300	1,300	1,300	2,000	2,000	2,000	2,000	2,000
Groundwater Replenishment System	2007	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000

Project Name	Projected Completion Date	2025					2030				
		Normal year AF to agency	Single-dry year yield AF	Multiple-Dry Year 1 AF	Multiple-Dry Year 2 AF	Multiple-Dry Year 3 AF	Normal year AF to agency	Single-dry year yield AF	Multiple-Dry Year 1 AF	Multiple-Dry Year 2 AF	Multiple-Dry Year 3 AF
ETWD Protion of El Toro AWT Joint project with MNWD and IRWD	2009-10	200	200	200	200	200	200	200	200	200	200
IRWD Irvine Desalter (Nonpotable)	2006-07	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898	3,898
IRWD Irvine Desalter (potable)	2007-08	5,372	5,372	5,372	5,372	5,372	5,372	5,372	5,372	5,372	5,372
IRWD Wells 51,52,53,21&22	2009-10	12,155	12,155	12,155	12,155	12,155	12,155	12,155	12,155	12,155	12,155
IRWD Other Groundwater	2024-25	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575
IRWD IrvineDesalter Wells 106,115	2014-15	2,903	2,903	2,903	2,903	2,903	2,903	2,903	2,903	2,903	2,903
IRWD Michelson&LAWRP Reclamation 2005 Upgrades	2006-07	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500
IRWD Michelson Reclamation Expansion Phase II	2014-15	4,931	4,931	4,931	4,931	4,931	4,931	4,931	4,931	4,931	4,931
LBCWD Laguna Creek Watershed Project	2007-08	200	200	200	200	200	200	200	200	200	200
Laguna Beach Well in the OCWD Basin	2009-10	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025	2,025
Moulton Niguel Reclamation Expansion Phase IV (LRP 98)	2006-07	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276	1,276
MNWD portion of SOCWA AWT	2007-08	364	364	364	364	364	364	364	364	364	364
MNWD portion of El Toro AWT Joint project	2009-10	1,390	1,390	1,390	1,390	1,390	1,390	1,390	1,390	1,390	1,390
San Juan Capistrano Valley Non-Domestic Water System Expansion (LRP-98)	2007-08	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600
SMWD Chiquita Reclamation Expansion I	2009-10	3,360	3,360	3,360	3,360	3,360	3,360	3,360	3,360	3,360	3,360
SMWD Chiquita Reclamation Expansion II	2019-20	3,307	3,674	3,754	3,554	3,674	3,307	3,674	3,754	3,554	3,674
SMWD Canada Gobernadora	2006-07	725	653	653	653	653	725	653	653	653	653
SMWD Arroyo Trabuco	2007-08	100	90	90	90	90	100	90	90	90	90
SMWD Horno Basin Surface Water	2006-07	215	194	194	194	194	215	194	194	194	194
South Coast WD Capistrano Beach Desalter	2006-07	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Groundwater Replenishment System	2007	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000

Source: Municipal Water District of Orange County, Annual 25-Year Survey (Spring 2005)
In the event of a discrepnancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data takes precedence

2.3 Water Service Reliability

This section assesses the reliability of MWDOC's water service to its customers during three water year scenarios: normal water year, single dry water year, and multiple dry water years. As shown in Table 2-3-A, the Plan concluded that the region will be able to meet 100 percent of its demand under every water year scenario.

Table 2-3-A: Summary of Water Service Reliability in MWDOC's Service Area

	2010	2015	2020	2025	2030
Normal Water Year	100%	100%	100%	100%	100%
Single-Dry Year	100%	100%	100%	100%	100%
Multiple-Dry Years	100%	100%	100%	100%	100%

Source: Municipal Water District of Orange County, output of "Water Balance" Model

To evaluate the service reliability of its service area, MWDOC used a computer model called "Water Balance Model" developed by its staff. This model is used to forecast local groundwater supplies from Orange County Basin and the imported demand taking the following into consideration: total retail demand, local recycled water, local surface water, local groundwater supply, and weather. Like the model used by Metropolitan, this model uses 83 years of historical hydrology (from 1922 to 2004) to develop estimates of water supply and demand in Orange County over the 25-year planning horizon. The outputs from these model runs enable MWDOC staff to assess the water service reliability in MWDOC's service area. See *Appendix 2-A* for outputs from the model runs. However, it should be noted that outputs from the model runs provide possible scenarios of supply and demand levels within the MWDOC service area, based on the underlying assumptions. Actual supply and demand will vary from these outputs based on conditions at the time and resource management decisions made by Orange County Water District for production from Orange County Basin and by local agencies.

The region's water supply for direct use is broken down into four categories: groundwater, recycled water, surface water, and imported water. As for indirect use, the supply is broken down into four categories: nature and subsurface flows, recycled water, imported water, and deposit/withdraw from storage. The assessment is done by comparing the supplies in these categories to demands based on historical hydrology that are equivalents to the three types of water year

scenarios. The determination of historical basis of the water year types for MWDOC was discussed in Section 2.2.2 Again the base years are:

- Normal water year: average of 83 historical hydrology from 1922 to 2004;
- Single dry normal water year: 1961 hydrology; and
- Multiple dry water years: 1959 to 1961 hydrology.

The following subsection describes and compares the region's water supply and demand during each of the scenarios for the next twenty five years.

2.3.1 Normal Water Year

With emphasis on local water supply development within MWDOC's service area, it is anticipated that the demand on imported water supplies in ratio will be reduced in the future. Projected normal year supplies for direct consumptive use are presented in Table 2-3-1-A and supplies for replenishment and saline barriers are in Table 2-3-1-B.

Table 2-3-1-A: Projected Supply for Direct Consumption in MWDOC's Service Area – Normal Water Year Condition

Acre-feet Per Year						
	2005	2010	2015	2020	2025	2030
Groundwater	234,019	284,117	282,392	286,628	292,297	296,434
Surface Water	10,908	11,476	10,749	10,500	10,462	10,525
Recycled Water	31,619	51,375	54,521	59,208	62,618	62,618
Imported Water	245,232	208,006	230,494	243,030	245,322	246,981
Total	**521,778**	**554,975**	**578,156**	**599,365**	**610,699**	**616,558**
% of year 2005						
Groundwater		121%	121%	122%	125%	127%
Surface Water		105%	99%	96%	96%	96%
Recycled Water		162%	172%	187%	198%	198%
Imported Water		85%	94%	99%	100%	101%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-1-B: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Normal Water Year Condition

Acre-feet Per Year						
	2005	2010	2015	2020	2025	2030
Natural Flows [Note 1]	316,505	249,063	255,084	261,684	268,964	277,739
Recycled Water	4,000	72,000	72,000	72,000	72,000	72,000
Imported from Metropolitan	63,181	61,739	58,734	56,685	57,048	50,700
Imported from Others	4,000	4,000	4,000	4,000	4,000	4,000
+/- Storage	(62,606)	2,132	(3,825)	(2,201)	(789)	4,041
Total	325,080	388,934	385,993	392,169	401,223	408,479
% of year 2005						
Natural Flows		79%	81%	83%	85%	88%
Recycled Water		1800%	1800%	1800%	1800%	1800%
Imported from Metropolitan		98%	93%	90%	90%	80%
Imported from Others		100%	100%	100%	100%	100%
+/- Storage (increase/decrease from 2005)		103%	94%	96%	99%	106%

Source: MWDOC, output of "Water Balance" Model

Note 1: Natural Flows in 2005 reflect an extremely wet year with increased Santa Ana Storm flow and Orange County Basin's incidental recharge

As shown in the two tables above, all local supplies, with the exception of surface water, are projected to be greater than those available in 2005. The following paragraphs describe the projected supplies under a normal water year condition in the MWDOC region over the next 25 years.

Groundwater – During normal water years, groundwater provides the single largest source of supplies (almost 50% of all supplies). The majority of groundwater is produced from the Orange County Basin, with additional water produced from other local groundwater basins. The production from Orange County Basin is directly correlated to the supplies available for replenishment and saline barriers listed in Table 2-3-1-B. However, note that the correlation occurs over multiple year periods, and the Basin should be considered a significant storage reservoir that can be utilized to provide supplies during dry year conditions. Although replenishment water from Metropolitan is projected to decrease by about 20% from 2005 to 2030, both recycled water and natural flows are expected to increase. Anticipating the growth at the upper Santa Ana River watershed, the baseflow, the main components of natural flows, is projected to be increased by expecting greater municipal discharge to the river. When complete in 2007, Groundwater Replenish System will provide 72,000 acre-feet of recycled water for basin replenishment. Together with the addition of desalter projects in San Juan Basin, groundwater production for direct consumption is projected to increase 27% from 2005 to 2030.

Surface Water – A small portion of the water supply for the MWDOC service area is comprised of surface water. The principal sources of surface water came from natural runoff from Santiago Creek collected in Irvine

Lake. However, the initial increase of surface water supply shown in Table 2-3-1-A is attributed to the increasing amount of reclaimed surface water in south Orange County.

Recycled Water – Recycled water is becoming an increasingly important source of local water for the region. Current use of recycled water within the region is approximately 32,000 acre-feet per year and is expected to increase to nearly 63,000 acre-feet per year in 2030, an increase of 96%.

Imported Water – Significant efforts have been made to develop local supplies and, as a result, the demand for imported water in ratio is expected to decrease in the future. While the retail demand is projected to grow, the region is not expected to increase its demand on imported water in normal water years.

Tables 2-3-1-C and 2-3-1-D summarize the region's water demands for direct consumption and for replenishment and saline barriers during a normal year.

Table 2-3-1-C: Projected Demand for Direct Consumption in MWDOC's Service Area – Normal Water Year Condition

Acre-feet Per Year						
	2005	2010	2015	2020	2025	2030
Demand	521,778	554,975	578,156	599,365	610,699	616,558
% of year 2005		106%	111%	115%	117%	118%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-1-D: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Normal Water Year Condition

Acre-feet Per Year						
	2005	2010	2015	2020	2025	2030
Demand	325,080	388,934	385,993	392,169	401,223	408,479
% of year 2005		120%	119%	121%	123%	126%

Source: MWDOC, output of "Water Balance" Model

Both tables indicate that the demands for direct and indirect uses will continue to grow in the next 25 years.

The comparisons between supply and demand for a normal water year are presented in Tables 2-3-1-E and 2-3-1-F (for direct use and indirect use).

Table 2-3-1-E: Comparison of Supply and Demand for Direct Consumption in MWDOC's Service Area – Normal Water Year Condition

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Supply Totals	554,975	578,156	599,365	610,699	616,558
Demand Totals	554,975	578,156	599,365	610,699	616,558
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-1-F: Comparison of Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Normal Water Year Condition

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Supply Totals	388,934	385,993	392,169	401,223	408,479
Demand Totals	388,934	385,993	392,169	401,223	408,479
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

As shown in the tables, the region is expected to meet 100 percent of direct-use demand and indirect-use demand through the year 2030 under a normal water year condition.

2.3.2 Single-Dry Water Year

The water demands and supplies for MWDOC's service area over the next 25 years were analyzed in the event a single dry year occurs, similar to the drought that occurred in Orange County in 1961, which also was the last year of a three-year drought.

Tables 2-3-2-A and 2-3-2-B present the projected supplies for direct and indirect uses during a single dry year event over the next 25 years.

Table 2-3-2-A: Projected Supply for Direct Consumption in MWDOC's Service Area – Single-Dry Water Year

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Groundwater	274,848	261,413	262,952	265,384	272,366
Surface Water	6,278	6,278	6,278	6,278	6,278
Recycled Water	51,649	54,878	59,644	63,139	63,139
Imported Water	254,476	288,677	304,510	310,373	309,572
Total	**587,250**	**611,246**	**633,383**	**645,174**	**651,354**
% of Normal Year					
Groundwater	97%	93%	92%	91%	92%
Surface Water	55%	58%	60%	60%	60%
Recycled Water	101%	101%	101%	101%	101%
Imported Water	122%	125%	125%	127%	125%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-2-B: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Single-Dry Water Year

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Natural Flows	213,799	216,627	222,636	229,281	239,729
Recycled Water	72,000	72,000	72,000	72,000	72,000
Imported Water from Metropolitan	52,750	46,245	16,250	16,250	8,283
Imported Water from Others	4,000	4,000	4,000	4,000	4,000
+/- Storage	33,480	16,518	40,471	37,748	44,952
Total	376,029	355,389	355,357	359,279	368,964
% of Normal Year					
Natural Flows +/- Storage	86%	85%	85%	85%	86%
Recycled Water	100%	100%	100%	100%	100%
Imported Water from Metropolitan	85%	79%	29%	28%	16%
Imported Water from Others	100%	100%	100%	100%	100%
+/- Storage (increase/decrease from Normal Year)	1470%	532%	1939%	4885%	1013%

Source: MWDOC, output of "Water Balance" Model

The following paragraphs describe the reliability of each supply source during a single-dry year event.

Groundwater – The model output shows that production from the Orange County Basin is expected to diminish by 3% to 9% during a single dry year event in next 25 years. This reduction is caused by a decrease of supply from its three replenishment sources – natural flows from the Santa Ana River, local streams, and replenishment supply from Metropolitan. Urban and storm runoff is expected to diminish by 15% during a dry year condition, thereby reducing the supply from natural flows to replenish the Orange County Basin. Furthermore, as the region experiences a dry-year spell, the rest of Southern California is also experiencing shortages. Metropolitan would have less supply and facility capacity for replenishment

uses. As the Southern California region continues to grow, Metropolitan's surplus during dry years would diminish. This is shown on Table 2-3-2-B where the imported supply for replenishment is projected to decrease – 85% of the normal year supplies is available in 2010 whereas only 16% is available by 2030.

Although the replenishment supplies to the Orange County groundwater basin are projected to decrease significantly in a single dry year event, the groundwater production is not expected to decrease by the same amount. As shown in Tables 2-3-2-A and 2-3-2-B, while the total replenishment supplies from natural flows and Metropolitan diminished from about 20% in 2010 to 30% in 2030 in a single dry year event, the groundwater production is projected to diminish less than 10%. This occurs because the groundwater basin in Orange County is expected to draw from basin storage to sustain a production that is higher than the replenishment supplies it receives in a dry year event.

However, it should be noted that these projections are based on modeled groundwater production levels (BPP) based upon hydrologic conditions and assumed Basin operation criteria. The model outputs do not reflect the fact that Orange County Water District may choose to sustain or raise the BPP under single or multiple dry years to optimize the use of Basin storage, or that some groundwater producers may pump in excess of the BPP to sustain local supply levels.

Surface Water – Surface water is expected to decrease during a single dry year by approximately 40% from a normal year.

Recycled Water – During a single dry year, the recycled water is expected to be more than 100% reliable with some treatment plants projecting to produce more supplies in a dry year event.

Imported Water – As local supplies decrease during a single dry year, MWDOC relies on imported water to meet its demand. Metropolitan's draft Regional UWMP, dated September 2005, describes how Metropolitan has created a diverse resource portfolio and aggressive conservation program to protect the reliability of the entire system. Metropolitan demonstrated in its UWMP that sufficient supplies can be reasonably relied upon to meet projected supplemental demands in the region during a dry year event. As a result, MWDOC is expected to fill in the supply gap to meet demand. During a dry year, imported water demands are expected to increase from 22% to 27%.

Tables 2-3-2-C and 2-3-2-D present the projected demand in single dry year conditions. The retail consumptive demand is expect to increase by 6% (an increase occurred in 1961). Since the demand for replenishment and saline barriers is driven by supply availability, it is projected to decrease at a rate from 3% to 10%.

Table 2-3-2-C: Projected Demand for Direct Consumption in MWDOC's Service Area – Single-Dry Water Year

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Demand	587,250	611,246	633,383	645,174	651,354
% of Normal Year	106%	106%	106%	106%	106%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-2-D: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Single-Dry Water Year

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Demand	376,029	355,389	355,357	359,279	368,964
% of Normal Year	97%	92%	91%	90%	90%

Source: MWDOC, output of "Water Balance" Model

Tables 2-3-2-E and 2-3-2-F compare the supply and demand for direct and indirect use in projected single dry years from 2010 to 2030. By expecting reliable supplemental supply from Metropolitan, MWDOC is projected to be 100% reliable during a single dry year condition.

Table 2-3-2-E: Comparison of Supply and Demand for Direct Consumption in MWDOC's Service Area – Single-Dry Water Year

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Supply Totals	587,250	611,246	633,383	645,174	651,354
Demand Totals	587,250	611,246	633,383	645,174	651,354
Difference	0	0	0	(0)	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-2-F: Comparison of Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Single-Dry Water Year

Acre-feet Per Year					
	2010	2015	2020	2025	2030
Supply Totals	376,029	355,389	355,357	359,279	368,964
Demand Totals	376,029	355,389	355,357	359,279	368,964
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

2.3.3 Multiple Dry Water Years

The water demands and supplies for MWDOC's service area over the next 25 years were analyzed in a multiple-dry-years event, similar to the drought happened from 1959 to 1961.

The following paragraphs describe the available water supply to MWDOC during a multiple dry year period.

Groundwater – Similar to the single dry year scenario described previously, the production of groundwater is expected to decrease due to less supply being available for replenishment of the Orange County Basin.

Surface Water – Reliability of surface water is expected to reduce by 35%-45% in multiple dry years.

Recycled Water – During multiple dry years, the use of recycled water will reduce overall water demands. During multiple dry years, production of recycled water is expected to be greater than 100% of that produced during normal years. Again, this is due to some treatment plants projecting to produce more supplies in the dry year events.

Imported Water – During multiple dry years, MWDOC member agencies are expected to increase their imported demand to make up for the decrease in local supplies.

Again, by relying on Metropolitan for supplying imported demand during multiple dry years, MWDOC is able to demonstrate that the region will maintain 100% reliability during multiple dry years.

The following is a list of tables that summarizes the projected multiple dry year water supply and demand calculations for direct and indirect uses in the MWDOC service area:

- For projection ending 2010: Tables 2-3-3-A and 2-3-3-B summarize projected supplies, Tables 2-3-3-C an 2-3-3-D summarize projected demands, and Tables 2-3-3-E and 2-3-3-F compare the projected supplies and demands;

- For projection ending 2015: Tables 2-3-3-G and 2-3-3-H summarize projected supplies, Tables 2-3-3-I an 2-3-3-J summarize projected demands, and Tables 2-3-3-K and 2-3-3-L compare the projected supplies and demands;

- For projection ending 2020: Tables 2-3-3-M and 2-3-3-N summarize projected supplies, Tables 2-3-3-O an 2-3-3-P summarize projected demands, and Tables 2-3-3-Q and 2-3-3-R compare the projected supplies and demands;

- For projection ending 2025: Tables 2-3-3-S and 2-3-3-T summarize projected supplies, Tables 2-3-3-U an 2-3-3-V summarize projected demands, and Tables 2-3-3-W and 2-3-3-X compare the projected supplies and demands;

- For projection ending 2030: Tables 2-3-3-Y and 2-3-3-Z summarize projected supplies, Tables 2-3-3-AA an 2-3-3-BB summarize projected demands, and Tables 2-3-3-CC and 2-3-3-DD compare the projected supplies and demands;

Table 2-3-3-A: Projected Supply for Direct Consumption in MWDOC's Service Area – Multiple-Dry Water Years Ending 2010

Acre-feet Per Year			
Normal Year	2008	2009	2010
Groundwater	284,915	286,171	284,117
Surface Water	11,044	11,291	11,476
Recycled Water	44,439	49,000	51,375
Imported Water	200,269	202,092	208,006
Subtotal	**540,667**	**548,553**	**554,975**
Multiple Dry Year			
Groundwater	283,301	276,094	274,848
Surface Water	5,084	7,604	6,278
Recycled Water	44,740	49,146	51,649
Imported Water	244,821	237,614	254,476
Subtotal	**577,946**	**570,458**	**587,250**
% of Normal Year			
Groundwater	99%	96%	97%
Surface Water	46%	67%	55%
Recycled Water	101%	100%	101%
Imported Water	122%	118%	122%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-B: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2010

Acre-feet Per Year			
Normal Year	2008	2009	2010
Natural Flows	242,318	245,938	249,063
Recycled Water	69,500	72,000	72,000
Imported from Metropolitan	65,746	66,201	61,739
Imported from Others	4,000	4,000	4,000
+/- Storage	18,869	9,182	2,132
Subtotal	**400,433**	**397,320**	**388,934**
Multiple Dry Year			
Natural Flows	201,036	198,288	213,799
Recycled Water	69,500	72,000	72,000
Imported from Metropolitan	56,750	40,500	52,750
Imported from Others	4,000	4,000	4,000
+/- Storage	65,744	65,794	33,480
Subtotal	**397,030**	**380,582**	**376,029**
% of Normal Year			
Natural Flows	83%	81%	86%
Recycled Water	100%	100%	100%
Imported from Metropolitan	86%	61%	85%
Imported from Others	100%	100%	100%
+/- Storage (increase or decrease from normal year)	248%	617%	1470%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-C: Projected Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Year Ending 2010

Acre-feet Per Year			
	2008	2009	2010
Normal Year Demand	540,667	548,553	554,975
Multiple Dry Year Demand	577,946	570,458	587,250
% of Normal Year	107%	104%	106%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-D: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2010

Acre-feet Per Year			
	2008	2009	2010
Normal Year Demand	400,433	397,320	388,934
Multiple Dry Year Demand	397,030	380,582	376,029
% of Normal Year	99%	96%	97%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-E: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2010

Acre-feet Per Year			
	2008	2009	2010
Supply Totals	577,946	570,458	587,250
Demand Totals	577,946	570,458	587,250
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-F: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2010

Acre-feet Per Year			
	2008	2009	2010
Supply Totals	397,030	380,582	376,029
Demand Totals	397,030	380,582	376,029
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-G: Projected Supply for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2015

Acre-feet Per Year			
Normal Year	2013	2014	2015
Groundwater	278,816	281,598	282,392
Surface Water	10,891	10,815	10,749
Recycled Water	53,136	53,724	54,521
Imported Water	226,074	227,336	230,494
Subtotal	**568,917**	**573,472**	**578,157**
Multiple Dry Year			
Groundwater	265,904	257,861	261,413
Surface Water	5,388	7,710	6,278
Recycled Water	53,546	53,919	54,878
Imported Water	282,844	276,226	288,677
Subtotal	**607,682**	**595,716**	**611,246**
% of Normal Year			
Groundwater	95%	92%	93%
Surface Water	49%	71%	58%
Recycled Water	101%	100%	101%
Imported Water	125%	122%	125%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-H: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Year Ending 2015

Acre-feet Per Year			
Normal Year	2013	2014	2015
Natural Flows	253,146	253,893	255,084
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	61,061	60,232	58,734
Imported from Others	4,000	4,000	4,000
+/- Storage	(10,640)	(5,615)	(3,825)
Subtotal	**379,567**	**384,510**	**385,993**
Multiple Dry Year			
Natural Flows	209,661	203,559	216,627
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	49,531	32,420	46,245
Imported from Others	4,000	4,000	4,000
+/- Storage	26,447	37,542	16,518
Subtotal	**361,639**	**349,520**	**355,389**
% of Normal Year			
Natural Flows	83%	80%	85%
Recycled Water	100%	100%	100%
Imported from Metropolitan	81%	54%	79%
Imported from Others	100%	100%	100%
+/- Storage (increase or decrease from normal year)	349%	769%	532%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-I: Projected Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2015

Acre-feet Per Year			
	2013	2014	2015
Normal Year Demand	568,917	573,472	578,157
Multiple Dry Year Demand	607,682	595,716	611,246
% of Normal Year	107%	104%	106%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-J: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2015

Acre-feet Per Year			
	2013	2014	2015
Normal Year Demand	379,567	384,510	385,993
Multiple Dry Year Demand	361,639	349,520	355,389
% of Normal Year	95%	91%	92%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-K: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2015

Acre-feet Per Year			
	2013	2014	2015
Supply Totals	607,682	595,716	611,246
Demand Totals	607,682	595,716	611,246
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-L: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2015

Acre-feet Per Year			
	2013	2014	2015
Supply Totals	361,639	349,520	355,389
Demand Totals	361,639	349,520	355,389
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-M: Projected Supply for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2020

Acre-feet Per Year			
Normal Year	2018	2019	2020
Groundwater	283,777	285,055	286,628
Surface Water	10,601	10,545	10,500
Recycled Water	57,402	58,363	59,208
Imported Water	239,739	241,948	243,030
Subtotal	**591,519**	**595,911**	**599,366**
Multiple Dry Year			
Groundwater	265,727	258,086	262,952
Surface Water	5,388	7,710	6,278
Recycled Water	57,913	58,603	59,644
Imported Water	302,616	294,339	304,510
Subtotal	**631,643**	**618,738**	**633,383**
% of Normal Year			
Groundwater	94%	91%	92%
Surface Water	51%	73%	60%
Recycled Water	101%	100%	101%
Imported Water	126%	122%	125%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-N: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2020

Acre-feet Per Year			
Normal Year	2018	2019	2020
Natural Flows	259,013	260,358	261,684
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	56,279	56,847	56,685
Imported from Others	4,000	4,000	4,000
+/- Storage	(3,537)	(3,615)	(2,201)
Subtotal	**387,754**	**389,590**	**392,169**
Multiple Dry Year			
Natural Flows	215,349	208,783	222,636
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	48,750	16,250	16,250
Imported from Others	4,000	4,000	4,000
+/- Storage	20,422	46,971	40,471
Subtotal	**360,521**	**348,004**	**355,357**
% of Normal Year			
Natural Flows	83%	80%	85%
Recycled Water	100%	100%	100%
Imported from Metropolitan	87%	29%	29%
Imported from Others	100%	100%	100%
+/- Storage (increase or decrease from normal year)	677%	1399%	1939%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-O: Projected Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2020

Acre-feet Per Year			
	2018	2019	2020
Normal Year Demand	591,519	595,911	599,366
Multiple Dry Year Demand	631,643	618,738	633,383
% of Normal Year	107%	104%	106%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-P: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2020

Acre-feet Per Year			
	2018	2019	2020
Normal Year Demand	387,754	389,590	392,169
Multiple Dry Year Demand	360,521	348,004	355,357
% of Normal Year	93%	89%	91%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-Q: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2020

Acre-feet Per Year			
	2018	2019	2020
Supply Totals	631,643	618,738	633,383
Demand Totals	631,643	618,738	633,383
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-R: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2020

Acre-feet Per Year			
	2018	2019	2020
Supply Totals	360,521	348,004	355,357
Demand Totals	360,521	348,004	355,357
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-S: Projected Supply for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2025

Acre-feet Per Year			
Normal Year	2023	2024	2025
Groundwater	289,840	291,176	292,297
Surface Water	10,436	10,416	10,462
Recycled Water	61,494	62,257	62,618
Imported Water	244,654	244,873	245,322
Subtotal	**606,424**	**608,722**	**610,698**
Multiple Dry Year			
Groundwater	276,786	260,146	265,384
Surface Water	5,388	7,710	6,278
Recycled Water	62,117	62,550	63,139
Imported Water	303,132	301,425	310,373
Subtotal	**647,423**	**631,831**	**645,174**
% of Normal Year			
Groundwater	95%	89%	91%
Surface Water	52%	74%	60%
Recycled Water	101%	100%	101%
Imported Water	124%	123%	127%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-T: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2025

Acre-feet Per Year			
Normal Year	2023	2024	2025
Natural Flows	266,014	267,461	268,964
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	56,666	56,703	57,048
Imported from Others	4,000	4,000	4,000
+/- Storage	(1,438)	(792)	(789)
Subtotal	**397,242**	**399,372**	**401,223**
Multiple Dry Year			
Natural Flows	221,269	215,736	229,281
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	48,750	16,250	16,250
Imported from Others	4,000	4,000	4,000
+/- Storage	32,168	43,310	37,748
Subtotal	**378,187**	**351,296**	**359,279**
% of Normal Year			
Natural Flows	83%	81%	85%
Recycled Water	100%	100%	100%
Imported from Metropolitan	86%	29%	28%
Imported from Others	100%	100%	100%
+/- Storage (increase or decrease from normal year)	2337%	5567%	4885%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-U: Projected Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2025

Acre-feet Per Year			
	2023	2024	2025
Normal Year Demand	606,424	608,722	610,698
Multiple Dry Year Demand	647,423	631,831	645,174
% of Normal Year	107%	104%	106%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-V: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2025

Acre-feet Per Year			
	2023	2024	2025
Normal Year Demand	397,242	399,372	401,223
Multiple Dry Year Demand	378,187	351,296	359,279
% of Normal Year	95%	88%	90%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-W: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2025

Acre-feet Per Year			
	2023	2024	2025
Supply Totals	647,423	631,831	645,174
Demand Totals	647,423	631,831	645,174
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-X: Comparison of Projected Supply and Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2025

Acre-feet Per Year			
	2023	2024	2025
Supply Totals	378,187	351,296	359,279
Demand Totals	378,187	351,296	359,279
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-Y: Projected Supply for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2030

Acre-feet Per Year			
Normal Year	2028	2029	2030
Groundwater	294,676	295,728	296,434
Surface Water	10,525	10,525	10,525
Recycled Water	62,618	62,618	62,618
Imported Water	246,886	247,103	246,981
Subtotal	**614,705**	**615,974**	**616,558**
Multiple Dry Year			
Groundwater	286,534	266,671	272,366
Surface Water	5,388	7,710	6,278
Recycled Water	63,276	62,917	63,139
Imported Water	301,024	302,027	309,572
Subtotal	**656,222**	**639,325**	**651,354**
% of Normal Year			
Groundwater	97%	90%	92%
Surface Water	51%	73%	60%
Recycled Water	101%	100%	101%
Imported Water	122%	122%	125%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-Z: Projected Supply for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2030

Acre-feet Per Year			
Normal Year	2028	2029	2030
Natural Flows	273,889	275,770	277,739
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	52,796	51,233	50,700
Imported from Others	4,000	4,000	4,000
+/- Storage	2,687	4,239	4,041
Subtotal	**405,372**	**407,243**	**408,479**
Multiple Dry Year			
Natural Flows	231,015	226,146	239,729
Recycled Water	72,000	72,000	72,000
Imported from Metropolitan	48,750	16,250	8,283
Imported from Others	4,000	4,000	4,000
+/- Storage	37,767	41,852	44,952
Subtotal	**393,531**	**360,248**	**368,964**
% of Normal Year			
Natural Flows	84%	82%	86%
Recycled Water	100%	100%	100%
Imported from Metropolitan	92%	32%	16%
Imported from Others	100%	100%	100%
+/- Storage (increase or decrease from normal year)	1305%	887%	1013%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-AA: Projected Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2030

Acre-feet Per Year			
	2028	2029	2030
Normal Year Demand	614,705	615,974	616,558
Multiple Dry Year Demand	656,222	639,325	651,354
% of Normal Year	107%	104%	106%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-BB: Projected Demand for Groundwater Replenishment and Saline Barriers in MWDOC's Service Area – Multiple-dry Water Years Ending 2030

Acre-feet Per Year			
	2028	2029	2030
Normal Year Demand	405,372	407,243	408,479
Multiple Dry Year Demand	393,531	360,248	368,964
% of Normal Year	97%	88%	90%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-CC: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2030

Acre-feet Per Year			
	2028	2029	2030
Supply Totals	656,222	639,325	651,354
Demand Totals	656,222	639,325	651,354
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

Table 2-3-3-DD: Comparison of Projected Supply and Demand for Direct Consumption in MWDOC's Service Area – Multiple-dry Water Years Ending 2030

Acre-feet Per Year			
	2028	2029	2030
Supply Totals	393,531	360,248	368,964
Demand Totals	393,531	360,248	368,964
Difference	0	0	0
Difference as % of Supply	0%	0%	0%
Difference as % of Demand	0%	0%	0%

Source: MWDOC, output of "Water Balance" Model

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3.0 WATER QUALITY IMPACTS ON RELIABILITY

Information presented in this section is based on the best available data from each Municipal Water District of Orange County (MWDOC) member agency at the time of drafting. The information is presented to provide a regional summary within the MWDOC service area. MWDOC has made every effort to coordinate information during the preparation of this section in a manner that is consistent with local agencies' Urban Water Management Plans. In the event of a discrepancy, the local retail agency plan should be consulted.

3.1 Introduction

Water supplies within MWDOC's service area are derived from a combination of sources: imported water from Metropolitan Water District of Southern California (Metropolitan), groundwater production by individual agencies, and other local supplies. Contamination of any of these sources or more stringent regulatory requirements has the potential to result in adjustments to water resource management strategies and, in a worse-case scenario, impacting supply reliability. Blending available supplies and implementing additional treatment processes are common mitigation options used by water agencies to guard against water quality impacts. Since MWDOC does not operate any facilities, MWDOC does not have any direct responsibilities in water quality sampling or compliance. However, the potential impact of reduced water quality on reliability, either from imported or local sources, is a critical piece in understanding the water system as a whole.

California Title 22 Drinking Water Standards (Title 22) incorporates the federal requirements of the Safe Drinking Water Act, and compliance with Title 22 is required by all water service providers. Therefore, Title 22 monitoring of all regulated chemicals as well as a number of unregulated chemicals is conducted by Metropolitan, Orange County Water District (OCWD), and all of the retail water agencies within the MWDOC service area. In order to be in compliance with Title 22, each agency must ensure that the regulated chemicals in the water supply meet established primary drinking water standards. In addition, secondary drinking water standards have been set for some minerals based on non-health-related aesthetics, such as taste and odor. Both primary and secondary standards are expressed as the maximum contaminated levels (MCL) allowable for a given constituent. Unregulated chemicals do not have established drinking water standards, but are chemicals of concern for which standards may be eventually adopted. These unregulated chemicals often have a "notification level," which is a health-based advisory level established by the U.S. Department of Health Services for chemicals in drinking water that lack MCLs.

As illustrated in Table 3-1, all responsible agencies within MWDOC's service area have accounted for known and foreseeable water quality impacts in their current management strategies. None of the responsible agencies for each water source anticipate water quality impacts that would either reduce the water supply available or that cannot be handled through existing management strategies. Any agencies with water sources having known contamination that cannot be remedied through

treatment, blending, or other options have already removed the impacted water source from their supply portfolio.

Table 3-1-A: Current and Projected Water Supply Change in MWDOC's Service Area Due to Water Quality

Water Source	Percentage					
	2005	2010	2015	2020	2025	2030
MWDSC	0	0	0	0	0	0
Local Supplies						
OCWD Groundwater Basin						
City of Buena Park	0	0	0	0	0	0
City of Fountain Valley	0	0	0	0	0	0
City of Garden Grove	0	0	0	0	0	0
City of Huntington Beach	0	0	0	0	0	0
City of La Palma	0	0	0	0	0	0
City of Newport Beach	0	0	0	0	0	0
City of Orange	0	0	0	0	0	0
City of Seal Beach	0	0	0	0	0	0
City of Tustin	0	0	0	0	0	0
City of Westminister	0	0	0	0	0	0
East Orange County Water District	0	0	0	0	0	0
Irvine Ranch Water District	0	0	0	0	0	0
Mesa Consolidated Water District	0	0	0	0	0	0
Santiago County Water District	0	0	0	0	0	0
Serrano Water District	0	0	0	0	0	0
Golden State Water Company	0	0	0	0	0	0
Yorba Linda Water District	0	0	0	0	0	0
Non - OCWD Groundwater Basin						
City of Brea	0	0	0	0	0	0
City of La Habra	0	0	0	0	0	0
City of San Clemente	0	0	0	0	0	0
City of San Juan Capistrano	0	0	0	0	0	0
El Toro Water District	0	0	0	0	0	0
Irvine Ranch Water District	0	0	0	0	0	0
Moulton Niguel Water District	0	0	0	0	0	0
Santiago County Water District	0	0	0	0	0	0
Santa Margarita Water District	0	0	0	0	0	0
Trabuco Canyon Water District	0	0	0	0	0	0

Sources:
1) Metropolitan Water District of Southern California, Draft 2005 Regional Urban Water Management Plan (Sept, 2005)
2) Agency interviews conduced by Camp Dresser & Mckee's for Municipal Water District of Orange County
3) Orange County Water District, *Groundwater Management Plan, 2005*

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Each of the three main water sources for MWDOC member agencies and any water quality impacts, current or future, are discussed in detail below.

3.2 Groundwater Supply from Orange County Water District

OCWD, manages the groundwater resources in the underlying Orange County Groundwater Basin (Basin). Twenty of these agencies are within the MWDOC service area. The other three, Anaheim, Santa Ana, and Fullerton, are direct member agencies of Metropolitan. As part of its management activities, OCWD operates a network of over 800 groundwater monitoring wells that measure and record groundwater quality and levels. Monitoring occurs at both monitoring wells and at production wells. OCWD's member agencies are required by the Department of Health Services (DHS) to monitor at production wells. OCWD performs that monitoring on behalf of its member agencies. Member agencies conduct separate and additional monitoring of their distribution systems. OCWD also monitors surface water quality from the Santa Ana River and its tributaries to verify the quality of recharge water. On the western fringes of the Basin, OCWD monitors seawater intrusion as part of its seawater intrusion barrier operations. More than 100 regulated and unregulated constituents are currently monitored throughout the Basin.

3.2.1 Groundwater Quality Issues

OCWD has taken a proactive approach to protect and prevent pollution via extensive programs that address short-term and long-term water quality issues throughout the Basin. OCWD has programs to minimize the release of contaminants to groundwater including:

- Sanitary landfill program;
- Leaking underground storage tank program;
- DHS-required Drinking Water Source Assessment and Protection Program;
- Review of environmental documents associated with land use developments;
- Public outreach for pollution prevention; and
- Well-closure program for abandoned wells.

To further protect its groundwater resources, OCWD adopted a Groundwater Quality Protection Policy in 1987 that includes water quality monitoring, cleanup of contaminants, managing toxic and hazardous wastes, and sharing information with producers, regulatory agencies and the public. OCWD uses blending techniques and treatment processes to ensure groundwater quality is not degraded. Though OCWD does not currently conduct any direct treatment of groundwater, it has funded both capital, and operations and maintenance costs for the installation of a N-nitrosodimethylamine (NDMA) treatment facility in the Mesa Consolidated Water District and it is in the planning phase of a volatile organic compound (VOC) cleanup plant in the Anaheim/Fullerton area (outside of MWDOC's service area). OCWD has also assisted in the funding of two nitrate removal

plants, one in Tustin, the other in Garden Grove, as well as the Irvine Desalter project, in conjunction with Irvine Ranch Water District (IRWD).

The sections that follow identify the groundwater quality issues in the Basin for primary drinking water standards, secondary drinking water standards, and as yet unregulated drinking water standards.

3.2.1.1 Contaminant Exceeding a Primary Drinking Water Standard Maximum Contaminant Level (MCL)

3.2.1.1.1 Nitrate Management

The most prevalent form of inorganic nitrogen compounds in the Basin is nitrate. Nitrate loading of groundwater is generally associated with past agricultural land uses. However, the scale of agricultural activities is much smaller today than in years past. DHS has set the primary drinking water standard for nitrate as nitrogen in drinking water delivered to retail customers, and expresses that number as a maximum contaminant level (MCL) allowable for nitrate. The MCL established by DHS for nitrate-nitrogen concentrations is 10 mg/L. Five out of more than 500 production wells were found to have nitrate-nitrogen concentrations exceeding MCL. Water extracted from drinking water wells with nitrates exceeding the MCL is either blended with other sources or treated to reduce nitrate concentrations below the MCL. Approximately 89% of the drinking water wells have nitrate-nitrogen concentrations less than 50% of the MCL. Urban uses have replaced agricultural uses in many locations, reducing nitrate loading. However, residuals from past land uses present in underlying soils will continue to enter the Basin over time until they eventually dissipate. Nitrate remediation is occurring through multiple groundwater treatment projects currently in operation. Other projects are in the planning stage and are discussed below. In addition, as part of its Drinking Water Source Assessment and Protection Programs (DWSAPP), OCWD has identified and continuously monitors those areas susceptible to future nitrate contamination. If concentrations approach the MCL, producers evaluate various alternatives, such as additional treatment.

The Santa Ana Regional Water Quality Control Board (RWQCB) also has a water quality objective for nitrate, an average 3.4 mg/L (as nitrogen) in the Forebay and pressure regions, and 6-8 mg/L in the Irvine area. Nitrate levels have exceeded applicable RWQCB standards in individual areas, typically in shallow depths or in groundwater areas located

near former agricultural zones. However, average nitrate levels throughout the Basin meet the RWQCB standard.

3.2.1.1.2 Volatile Organic Compounds

Plumes of volatile organic compounds (VOCs) have been identified in the Basin within the vicinity of the former El Toro Marine Corps Base and Irvine, the Forebay region of the Basin within the vicinity of Fullerton, and at one IRWD well located in Santa Ana. Contamination at the former El Toro Marine Corps Base is associated with Trichloroethylene (TCE), a type of VOC with an MCL of 0.005 mg/L, which was previously utilized as aircraft cleaning solvent on the base. In Santa Ana, concentrations of TCE, PCE, and perchlorate have been detected at IRWD Well No. 3. As discussed below, projects designed to reduce the VOCs to acceptable levels are scheduled for implementation, and therefore no future water reliability impacts are anticipated.

There is also a VOC plume along the Santa Ana River, starting in the southern part of Orange County. OCWD is currently monitoring the plume. Based on available data, the plume is limited in vertical extent to the shallow aquifers. OCWD will continue to monitor the plume and respond appropriately as needed.

3.2.1.1.3 Methyl Tertiary-Butyl Ether (MTBE)

MTBE, a gasoline additive, is commonly found at leaking underground fuel tanks and in surface water (lakes and reservoirs) allowing recreational motorized boats. Hundreds of documented leaking underground fuel tanks are present within OCWD's management area. Most tank owners do not have groundwater cleanup programs in place to remove MTBE. MTBE is very soluble in water and has a low affinity for soil particles resulting in the rapid migration of contaminant plumes.

In May 2000, Department of Healthy Services established the primary MCL for MTBE at 13 µg/L based on the healthy risks. Two drinking wells that were previously removed from OCWD service due to other contaminants had been found to have MTBE exceeding that level. A secondary drinking water standard of 5 µg/L was also adopted. The use of MTBE as an oxygenate in gasoline was required by the Environmental Protection Agency to reduce air pollution. However, MTBE was completely phased out as a gasoline oxygenate after December 31, 2003.

MTBE is primarily found in the shallow portion of the aquifer. OCWD is taking proactive steps and is cooperating with local water agencies in monitoring for MTBE in groundwater to prevent MTBE from migrating down into the main aquifer where most pumping occurs.

3.2.1.2 Contaminants Exceeding a Secondary Drinking Water Standard MCL

3.2.1.2.1 Total Dissolved Solids Management

As described in Section 3.1 above, secondary drinking water standards are those standards that affect the aesthetic quality of water, such as taste. The secondary drinking water standard established by DHS for TDS in water delivered to retail customers is 500 mg/L. The Santa Ana RWQCB set a TDS objective of 580mg/L for Orange County Groundwater Basin.

In general, water recharged into the Basin has TDS concentrations greater than the water extracted. Over the past decades this has increased TDS concentrations within the Basin, creating a salt imbalance. Increased TDS concentrations can adversely impact industrial, commercial, and agricultural uses. Multiple measures have been developed or are currently being developed to reduce TDS levels in the Basin, a few of which are listed below:

- Groundwater desalter projects have been implemented to reduce TDS levels, and are further discussed in the later section;

- OCWD and MWDOC are working with Metropolitan to provide a blend of State Water Project (SWP) and Colorado River water, which will result in lower (TDS) levels for recharge water at Anaheim Lake and Kraemer Basin; Most imported water is from Metropolitan's Colorado River Aqueduct (CRA) which has higher salinity levels than State Water Project (SWP) water;

- Starting in 2007, the Groundwater Replenishment System (GWR System) will provide a source of low TDS recharge water with a concentration of approximately 100 mg/L, resulting in a reduction in the salt imbalance;

- The Santa Ana River is the primary source of recharge water for the Basin. Strategies to reduce TDS levels in the river include developing non-reclaimable waste lines in the upper watershed that segregate high TDS industrial wastewater, extension of the existing Santa Ana River Interceptor (SARI) Brine Line, and controlling TDS introduced from agricultural practices; and

- OCWD is also working with agencies to alter the composition of recharge water at the Los Alamitos Barrier Project from imported water to a blend of imported water and purified water, which will have a lower TDS concentration than the current injection supply.

3.2.1.2.2 Colored Groundwater Management

A significant quantity of colored groundwater is present in the Lower Main Aquifer of the Basin. More than one million acre-feet of water is colored primarily by contacting with redwood trees deposited in the aquifer. Sampling has indicated that the water is very high quality, but has a color and an odor that do not meet secondary drinking water standards. Colored water treatment projects are currently operated in the Basin by Mesa Consolidated Water District and IRWD. This colored water could be an additional source of supply in the region.

3.2.1.3 Contaminant Exceeding an Unregulated "Notification Level"

3.2.1.3.1 Pharmaceuticals, Personal Care Products, and Endocrine Disruptors

Potential water quality issues of concern include compounds found within pharmaceuticals and personal care products (PPCPs). PPCPs include prescription and over-the-counter medicines, fragrances, food supplements, deodorants, insect repellants, and other items. Endocrine Disrupting Compounds (EDCs) are those compounds that affect the endocrine system and include over-the-counter medicines, pesticides, and other industrial compounds. Impacts of these compounds in low doses on human health are for the most part unknown. OCWD is tracking potential regulations concerning these compounds to determine any impacts upon the level of treatment required for future water reclamation projects. The GWR System treatment process with microfiltration, followed by RO, and finally ultraviolet (UV)

light and hydrogen peroxide treatment removes these contaminants.

3.2.1.3.2 N-nitrosodimethylamine

N-nitrosodimethylamine (NDMA), which is found to be a byproduct of drinking water treatment, does not yet have an MCL. However, it has a "notification level," which is a health based advisory level established by DHS for chemicals in drinking water that lack MCLs. NDMA has an action level of 10 ng/L. The treatment process currently conducted by GWR SYSTEM, as detailed above, removes NDMA.

3.2.2 Groundwater Restoration Projects

Restoration of groundwater quality is a high priority for OCWD. As an incentive to encourage water quality improvement projects, on a case-by-case basis OCWD considers offering pumpers full or partial exemptions to the Basin Equity Assessment fees for pumping and treating water that was previously unsuitable for potable use. Benefits of the program are (1) removal and use of poor quality groundwater from the Basin, and (2) reducing or preventing of the spread of contaminated groundwater into non-degraded areas.

Garden Grove Nitrate Removal Project (Existing)

The Garden Grove Nitrate Removal Project utilizes two wells, one with a high nitrate concentration and one with a low nitrate concentration, that are blended together after the groundwater is withdrawn to achieve a nitrate concentration below the primary drinking water MCL for nitrate. Without this project, the high nitrate well would not be utilized.

Tustin Main Street Treatment Plant (Existing)

Tustin's Main Street Treatment Plant reduces nitrate levels produced by two wells through the use of RO or ion exchange (IX) treatment. During fiscal year 2001-2002, 120,000 pounds of nitrates were removed.

Irvine Desalter (Under Construction)

The Irvine Desalter is a joint project implemented by both IRWD and OCWD with financial contributions from the U.S. Navy and Metropolitan. Currently, a plume of VOCs is migrating toward the Main Basin from the former El Toro Marine Corps base. As proposed, the project will consist of two water purification plants with separate wells and pipeline systems. One plant will be designed to remove TDS and VOCs utilizing air stripping, activated carbon adsorption, and RO. The end-product will be used for irrigation in the recycled water system. The other plant, located outside the

main VOC contamination plume, will remove TDS and nitrates via RO with the end product being a new supply of drinking water.

Tustin Desalter (Existing)

Tustin's Seventeenth Street Desalter reduces nitrate and TDS concentration from groundwater produced by three wells. Two RO membrane trains are utilized to treat the water. In fiscal year 2001-2002, 354,000 pounds of nitrate were removed.

River View Golf Club VOC (Existing)

Located in the City of Santa Ana, the River View Golf Club operates a well that removes VOCs. The well is used for golf course irrigation. Prior to contamination, the well was used as a potable supply source.

Forebay VOC Cleanup Project (Future)

A Forebay VOC Cleanup is planned to remove VOC contaminants in the area north of Highway 91 and west of Highway 57 to prevent further spreading of the plume. This plume has previously resulted in the closure of two Fullerton production wells because of perchloroethylene concentrations. Four extraction wells would pump groundwater that would be conveyed to a central treatment facility. Treated groundwater would be discharged to a flood retention basin for recharge. High nitrate groundwater at one of the well sites would be blended with the three other wells to reduce nitrates below the MCL.

N-nitrosodimethylamine Removal (Existing)

N-nitrosodimethylamine (NDMA), which is found to be a byproduct of drinking water treatment, does not yet have an MCL. However, it has an "notification level", which is a health based advisory level established by DHS for chemicals in drinking water that lack MCLs. NDMA has a notification level of 10 ng/L. Mesa Consolidated Water District operates a NDMA facility to remove NDMA from groundwater in a located area and prevent down-gradient migration. Treatment consists of UV oxidation.

In addition, the treatment process currently conducted by GWR SYSTEM, which provides water to OCWD's seawater intrusion barrier and spreading grounds, does remove NDMA. The GWR SYSTEM treatment process currently includes microfiltration, followed by RO, and finally UV light and hydrogen peroxide treatment.

Mesa Consolidated Water District Colored Water Treatment (Existing)

MCWD's colored water treatment facility uses ozone oxidation to remove color extracted from two wells. Treatment of deep colored water reduces

the potential for upward migration of the colored water into areas with clear water.

IRWD Colored Water "Deep Aquifer Treatment System" or DATS (Existing)

IRWD treats colored groundwater from two wells using nanofiltration, with the end-product used as a potable water supply. The removed concentrate is discharged to the sewer for treatment with wastewater. As with the Mesa Consolidate Water District facility, this facility also reduces the potential for upward migration of colored water.

3.2.3 Groundwater Quality Impacts on Supply Reliability

Currently, there are no known water quality impacts that would reduce the reliability of the Orange County Basin as a water supply source for the next 25 years. OCWD's adopted Groundwater Quality Protection Policy serves as a framework for protecting and improving water quality in the Basin. Current water quality impacts and potential future impacts are taken into account in OCWD's management of the Basin. OCWD, in conjunction with local agencies, is proactively managing the Basin to reduce contamination. OCWD has an extensive monitoring program to identify contamination at an early stage to prevent detrimental impacts to the Basin. OCWD has implemented or will be implementing projects to address current contamination issues and to prevent future degradation of the Basin, such as reducing the TDS imbalance through construction of desalters and the GWR System. Additionally, OCWD has a toxic clean-up reserve fund to immediately begin remediation operations if a portion of the Basin were to become threatened with contamination, further enhancing the reliability of the groundwater supply.

3.3 Imported Supply From Metropolitan

MWDOC is a member agency of the Metropolitan. As a water wholesaler, MWDOC obtains 100 percent of its supply through Metropolitan. That supply accounts for approximately 50 percent of the total water supply within the MWDOC service area. Metropolitan has two primary sources of water, the State Water Project (SWP) and the Colorado River Aqueduct (CRA). For most of Orange County, imported water is served as a blend of both sources with the proportions of the blend dependent upon the year-to-year availability of CRA and SWP water. Colorado River water tends to be higher in total dissolved solids (TDS) and lower in dissolved organics. SWP water usually has a lower TDS but higher organic materials, which can lead to the formation of disinfection byproducts (DBPs). Metropolitan recognizes the regional impacts of water quality, and emphases its commitment to ensuring the highest quality water in its Integrated Resources Plan. Planning efforts have identified management strategies that allow flexibility in operations to improve water quality and source protection while maintaining reliability. Metropolitan's water quality staff conducts both required

monitoring and monitoring for constituents of concern that are currently unregulated. Over 300,000 water quality tests are performed each year.

3.3.1 Metropolitan Water Quality Issues

3.3.1.1 Total Dissolved Solids Management

High TDS levels in imported water delivered by Metropolitan to MWDOC have impacts on MWDOC's and OCWD's management of water resources. High TDS levels in potable water lead to increased recycled water treatment costs, result in increased water losses during the recycled water treatment processes, reduce recycled water use as demand decreases for recycled water with high TDS levels, recycled water does not meet RWQCB standards, brine volumes increase, and ultimately the ability to use the underlying groundwater basins for water storage could be diminished. As previously stated, TDS levels in groundwater managed by OCWD have steadily increased as lower TDS water is extracted and replaced with higher TDS water from imported water and other sources. Metropolitan has established an operational policy objective to deliver water to each of its member agencies at a TDS of 500 mg/l when feasible. This requires careful operational planning and management to achieve.

Colorado River Aqueduct

CRA water has high TDS levels, averaging 650 mg/L during normal water years. Salinity levels are dependent upon precipitation in the Colorado River Basin. During drought years, salinity levels increase. During years with above-normal precipitation, salinity levels decline as naturally occurring salt concentrations decline. In times of extreme drought salinity levels could exceed 900mg/L. A long-term salinity management strategy is in place at the state and federal level for the Colorado River Basin. Funds are appropriated annually to help fund salinity mitigation and reduction projects throughout the watershed.

State Water Project

SWP TDS levels are significantly lower than those in CRA water, averaging 250mg/L for water delivered via the East Branch of the SWP and 325 mg/L for the West Branch deliveries. West Branch deliveries have higher TDS levels as a result of salt loading in local streams, operational issues, and evaporation losses at Pyramid and Castaic Lakes. TDS levels and available supply vary based on hydrologic conditions in the Sacramento-San Joaquin watersheds, introduction of saline non-project waters by upstream parties, as well as saline intrusion in the Sacramento-San Joaquin Bay Delta.

Variations of TDS levels over short periods of time are attributed to seasonal and tidal flow patterns, presenting a unique challenge in trying to achieve Metropolitan's 500 mg/L TDS objective. During periods when TDS levels are high at the SWP intake facilities and in the Colorado River, it may not be possible to meet Metropolitan's salinity objective and maintain water supply reliability. Metropolitan's Board has adopted a policy of needs to meet Metropolitan's 500 mg/L salinity-by-blending objective in a cost-effective manner while minimizing resource losses and ensuring the viability of recycling and groundwater management programs.

Management Actions

Metropolitan has taken numerous actions to reduce TDS concentrations in its water supplies. In 1999, Metropolitan's Board adopted a Salinity Action Plan and a Salinity Management Policy with the goal of delivering water with salinity levels less than 500mg/L. A three-year joint effort between the U.S. Bureau of Reclamation and a task force of stakeholders led to the development of the Action Plan. A Salinity Summit attended by representatives from over 60 agencies was held as the Action Plan neared completion to discuss regional salinity issues and how to work together to attain salinity management goals. Components of the action plan include:

- Imported water source control and salinity reductions;
- Distribution system salinity management actions;
- Collaborative actions with other agencies; and
- Local salinity management actions to protect groundwater and recycled water supplies.

Under the Action Plan, Metropolitan is reliant upon blending of its source water to meet salinity goals. It is anticipated that the TDS goal will be met in 7 out of 10 years. Hydrologic conditions would result in Metropolitan not achieving this goal in the other three years. Member agencies, such as MWDOC, are cognizant of this and have taken this concern into development of their management strategies.

Metropolitan has obtained Proposition 13 funding to improve salinity levels for The Water Quality Exchange Partnership and The Desalination Research and Innovation Partnership (DRIP) programs. Metropolitan received $20 million to develop a water exchange partnership to access high quality water from the Sierras in exchange for SWP water. Funds are being used to develop the program and construct additional infrastructure. A total of $4 million was

received for the DRIP program to develop cost-effective advanced water treatment technologies for removing salts from the CRA, brackish groundwater, wastewater, and agricultural drainage.

Under the CALFED Bay-Delta Program actions are already reducing TDS loading in SWP water, and more actions are planned for the next 30 years. Actions in progress include improved management of salts in the San Joaquin Valley, upstream source control, desalination demonstration projects, and programs to control stormwater runoff into SWP aqueducts. In the long-term, additional projects are planned to reduce short-term variations in TDS levels and the long-term average salinity levels.

Without reductions in TDS levels in both the short-term variations and long-term average, desalination of CRA water may be needed. However, at the present time current technologies are expensive, and 5 to 10 percent of the CRA water would be lost during the treatment process. The DRIP program is designed to assist in obtaining a viable solution to reducing CRA TDS levels.

3.3.1.2 Perchlorate Management

Perchlorate has been detected at low levels in the CRA water supply, but not in the SWP water supply. Therefore, this discussion will focus on the CRA water supply. An exceedance level for perchlorate has not been adopted at this time by DHS. However, DHS has adopted a notification level of 6 µg/L, requiring agencies to inform their governing bodies. Notification of customers and the potential health risks is also recommended. DHS recommends non-utilization of sources with perchlorate levels greater than 60 µg/L. Perchlorate primarily interferes with the production of hormones for normal growth and development in the thyroid gland. Further research on the health effects of perchlorate is pending.

Metropolitan began monitoring for perchlorate in June 1997 after it was detected in the Colorado River and the Lake Mead outlet at Hoover Dam. Sampling was able to isolate the source to the Las Vegas Wash and its potential source in Henderson, Nevada. A quarterly monitoring program for Lake Mead was initiated in August 1997 followed by monthly monitoring of the CRA. The Nevada Division of Environmental Protection manages a remediation project in the Henderson area. Since inception, the amount of perchlorate entering the Colorado River has been reduced from 900 pounds per day in 1997 to less than 150 pounds per day as of December 2004.

Management Actions

In 2002, Metropolitan adopted a Perchlorate Action Plan. Plan objectives include:

- Expand monitoring and reporting programs;
- Assess the impact of perchlorate on local groundwater supplies;
- Track remediation efforts in the Las Vegas Wash;
- Initiate modeling of perchlorate levels in the Colorado River;
- Investigate the need for additional resource management strategies;
- Pursue legislative and regulatory options;
- Include information on perchlorate in outreach activities; and
- Provide periodic updates to the Metropolitan Board and member agencies.

Through its Perchlorate Action Plan, Metropolitan has taken a proactive approach towards addressing a potential water quality issue and ensuring minimal or no water supply losses associated with perchlorate.

3.3.1.3 Total Organic Carbon and Bromide Management

Treatment of SWP water supplies containing high levels of total organic carbon (TOC) and bromide with disinfectants, such as chlorine, creates disinfection byproducts (DBPs) linked to specific cancer types. CRA water does not have high levels of TOCs and bromide. TOC and bromide in the Delta region of the SWP are of a significant concern to Metropolitan as concentration levels increase as Delta water is impacted by agricultural drainage and seawater intrusion. In 1998, the United State Environmental Protection Agency adopted more stringent regulations for DBPs, which took effect in 2002. Even more stringent regulations are expected to be proposed in 2005.

Management Actions

Metropolitan's Board adopted a Statement of Needs for the CALFED Bay-Delta Program in 1999 stating that Metropolitan

requires a safe drinking water supply for compliance with existing and future regulatory requirements. CALFED's Program has developed numerous conceptual actions to improve Bay/Delta water; however, Metropolitan desires CALFED to adopt water quality improvement milestones. These milestones are necessary to assure that Metropolitan and its member agencies will be able to comply with pending water quality regulations.

Metropolitan's Board has committed to install ozone treatment processes at its two treatment plants that solely treat SWP water to avoid the production of DBPs through chlorination. In addition to the concern of DBPs, some studies have linked negative reproductive and developmental effects to chlorinated water. The other three treatment plants that receive a combination of SWP and CRA water utilize blending to reduce levels of DBPs below regulatory requirements. By 2009 Metropolitan plans on installing ozonation facilities at the remainder of its treatment faculties removing the percentage of SWP water that requires blending.

3.3.1.4 Other Contaminants of Concern

Metropolitan has identified various other contaminants of concern to its water supply sources.

Methyl Tertiary Butyl Ether (MTBE)

As previously discussed, the use of MTBE as a gasoline oxygenate has resulted in the contamination of surface waters and groundwater. Metropolitan operates boating facilities at its reservoirs. Therefore, these facilities were previously subjected to the introduction of MTBE. MTBE is discharged into surface water from the exhaust of recreational watercraft. MTBE and other oxygenates are regularly monitored in Metropolitan's water supplies. Past monitoring has detected MTBE concentrations varying from non-detected level to 3.9 µg/L in treatment plant effluent and up to 6.4 µg/L in source water effluent.

Metropolitan has taken numerous actions to reduce the contamination of its supplies with MTBE including supporting state and federal legislation to reduce the impacts of MTBE. At its Diamond Valley Lake and Lake Skinner, MTBE free-fuel and clean burning engines are required to minimize the introduction of MTBE into surface waters. Water monitoring programs for MTBE and other gasoline components were instituted at the lakes. Metropolitan has also investigated various treatment mechanisms for MTBE. Future contamination of water supplies will more than likely decrease as time elapses since the phase-out of MTBE. However,

the extent of future contamination is unknown as MTBE is still within the environment.

Arsenic

Effective 2006, a federal MCL of 10 µg/L (10 parts per billion) will go into effect for domestic water supplies. Metropolitan's water supplies contain low levels of this contaminant within the regulatory requirements. Currently, the California Office of Environmental Health Hazard Assessment has set a public health goal of 0.004 µg/L for arsenic.

Radon

The USEPA has proposed a radon MCL of 300 pCi/L for drinking water supplies in states where there are no approved Multimedia Mitigation programs for reducing indoor radon. For states with approved programs, the standard is 4,000 pCi/L. Metropolitan's supplies have radon levels well below the MCL.

Uranium

Uranium is high priority with Metropolitan as a 10.5 million ton pile of uranium mine tailings is 600 hundred feet from the Colorado River in Moab, Utah. Percolation of rainwater through the pile occurs causing contamination of local groundwater resources and flows of uranium into the river. During a large flood or other natural disaster there is the potential for large volumes of the contaminated material to flow enter the river. Interim action measures instituted by the Department of Energy (DOE) include intercepting portions of the contaminated groundwater before it enters the River. Concentrations ranging from 950 to 1,190 pCi/L have been detected at the point local groundwater enters the river. At Metropolitan's intake at the river, uranium concentrations of 1 to 5 pCi/L have been detected. California has a drinking water standard for uranium of 20 pCi/L. Metropolitan continues to monitor clean-up effort instituted by DOE.

Emerging Contaminants

NDMA is an emerging contaminant of concern believed to be widespread. NDMA is a disinfection-product of water and wastewater treatment processes. Chlorine and monochloramines can react with organic nitrogen precursors to form NDMA. California notification level is 0.010 µg/L. Concentrations found in Metropolitan supply ranging from non-detect (reporting limit of 0.002 µg/L) to 0.012 µg/L. Action measures may be required in the future to control or remove NDMA from water supplies.

Hexavalent chromium or chromium VI is a potential surface water and groundwater contaminant. It is an inorganic chemical used in cooling towers for corrosion control, electroplating, leather tanning, wood treatment, and pigment manufacturing. Contaminant pathways include discharges from industrial users, leaching from hazardous waste sites, and erosion of naturally occurring deposits. California has a current MCL for total chromium (includes chromium VI) of 0.05 mg/L. This level is currently under review by DHS. The California Legislature required DHS to set a MCL specifically for chromium VI by January 1, 2004. However, this has not been set at this time. Metropolitan participates in a Technical Work Group reviewing remediation plans for chromium VI near Topock, Arizona along the Colorado River.

3.3.2 Water Quality Protection Programs

Metropolitan participates in multiple programs to improve water quality supplies. Those programs include:

- Watershed Sanitary Survey;
- Source Water Assessment;
- Support of DWR policies and programs improving the quality of deliveries to Metropolitan;
- Support of the Sacramento River Watershed Program ;
- Water quality exchange partnerships; and
- Implementation of additional security measures.

3.3.3 Imported Water Quality Impacts on Supply Reliability

Through its management strategies and in coordination with member agencies, Metropolitan is able provide member agencies supply options that allow local agencies to meet regulatory standards. Currently known and foreseeable water quality issues are already incorporated into existing management strategies and the reliability of Metropolitan's supplies for the next 25 years. However, unforeseeable water quality issues could potentially alter Metropolitan water and potentially impact its supply reliability.

3.4 Local Projects

Multiple MWDOC member agencies supplement MWDOC's water supply with their own local potable and non-potable supplies. Local supplies are supplies not produced from the Orange County Groundwater Basin nor managed by OCWD, but rather are supplies obtained from other groundwater basins, surface waters, or recycled water. Each MWDOC member agency must manage its resources and monitor water quality to ensure all applicable regulatory requirements are met. Annual water quality reports are provided by member agencies to their customers as required. Member agencies have accounted for any anticipated water quality issues within their current management strategies and do not anticipate any future reductions in supplies related to water quality.

3.4.1 City of Brea

The city of Brea obtains local water supplies from the California Domestic Water Company to supplement imported supplies. The California Domestic Water Company extracts its groundwater from the San Gabriel Basin. Minimal groundwater pumping for non-potable uses also occurs at a local golf course for irrigation purposes only. The city of Brea has indicated it does not have any water quality issues with its local water resources nor does it anticipate any future issues that would reduce local supplies.

3.4.2 City of La Habra

The city of La Habra obtains local water supplies from both the California Domestic Water Company and local wells in the La Habra Basin. The California Domestic Water Company extracts its groundwater from the San Gabriel Basin. There are no water quality issues with water obtained from the California Domestic Water Company. Groundwater extracted from the La Habra Basin is treated to reduce iron and hydrogen sulfide to acceptable drinking water standards. Treatment consists of air stripping and the addition of sodium hexavalent. In the future, La Habra expects to double its production from groundwater wells. The city of La Habra has indicated that it does not have any water quality issues with their local water sources, beyond the two contaminants it is currently removing, nor does it anticipate any future issues that would reduce local supplies.

3.4.3 Santiago County Water District

Santiago Count Water District utilizes a small horizontal pipeline in Harding Canyon to capture groundwater under the influence of surface water as a means to supplement MWDOC supplies. This local water supply is available during the wet season only with yields ranging from 50 to 250 acre-feet per year. Previously, Santiago County Water District operated Read Well, but the well is closed as additional treatment of the water is required to meet DHS standards. Current water management strategies do not incorporate Read Well as a local supply option. Santiago County Water

District has indicated it does not have any water quality issues with its local water resource in Harding Canyon nor does it anticipate any future issues that would reduce local supplies.

3.4.4 Moulton Niguel Water District

Moulton Niguel Water District produces recycled water to offset part of its demand on MWDOC. All recycled water meets DHS water quality standards. Occasionally, end users have complained about odor or sand/debris in the recycled water distribution system. When these concerns arise, MNWD flushes the system, and the concerns are alleviated. Moulton Niguel Water District has indicated that it does not anticipate any future water quality issues that would reduce available local recycled water supplies.

3.4.5 El Toro Water District

El Toro Water District utilizes approximately 300 acre-feet per year of recycled water for golf course irrigation. El Toro Water District has indicated its does not have any water quality issues with its recycled water resource nor does it anticipate any future issues that would reduce local supplies.

3.4.6 City of San Juan Capistrano

The city of San Juan Capistrano supplements its imported Metropolitan supplies with extractions from the San Juan Basin. Extracted water is used for both potable and non-potable purposes. High manganese, iron, and TDS levels are present within the San Juan Basin. Management strategies to reduce these contaminants include installing additional wells with treatment capabilities to prevent reductions in future local supplies. Additionally, the city recently completed a groundwater desalter plant that has increased the reliability of local supplies while reducing dependability upon imported water. The desalter plant is expected to produce approximately 4,920 acre-feet per year. The city also treats non-potable groundwater from the San Juan Basin at its non-domestic treatment plant for distribution in its non-potable water system. In the future, the city plans to blend discharge from its wastewater treatment plant with the non-potable groundwater and further treat the water at its non-domestic treatment plant prior to distribution to its non-potable water system. The city does not foresee any future supply issues associated with the existing system.

3.4.7 City of San Clemente

Local groundwater is extracted by the city of San Clemente to augment imported supplies. Treatment facilities remove high iron and manganese concentrations from the extracted water. Recycled water is used to partially offset demands of potable water. The city has resolved all water quality

issues associated with its recycled water supply. The city has indicated that it does not anticipate any future water quality issues that would reduce available local water supplies.

3.4.8 Trabuco Canyon Water District

Trabuco Canyon Water District produces approximately 400 acre-feet per year from local groundwater resources that are blended with imported supplies. Trabuco Canyon Water District also utilizes recycled water to for non-potable uses. Trabuco Canyon Water District has indicated it does not have any water quality issues with its local water resources nor does it anticipate any future issues that would reduce local supplies.

3.4.9 Santa Margarita Water District

Santa Margarita Water District operates one potable groundwater well on a contract only basis, producing approximately 150 acre-feet per year. Supplies from this well are not included in Santa Margarita Water District's resource mix. Recycled water is also part of Santa Margarita Water District's local water resource mix. A portion of its recycled water is derived from stormwater captured at Oso Creek. No water quality issues are associated with this well or recycled water supplies nor are any anticipated in the future.

3.4.10 Irvine Ranch Water District

IRWD obtains the majority of its groundwater from the Orange County Groundwater Basin managed by OCWD (see discussion under that section); however, a minimal amount of local groundwater outside of OCWD's jurisdiction is extracted from a well in the Lake Forest area. Water from this well is poor quality and is used for non-potable uses only. Approximately, 300-400 acre-feet per year are extracted. In the future, IRWD may stop using this local source of groundwater. Current management strategies have taken this into account, and IRWD does not rely on this source to meet supply reliability objectives.

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4.0 PLANNING FOR THE FUTURE

4.1 Programs to Maximize Resources and Minimize Imported Supplies

As a regional provider and resource planning agency, Municipal Water District of Orange County (MWDOC) is committed to identifying ways of maximizing the area's existing water resources in an effort to minimize its dependency on imported supplies. To that end, the agency has taken a proactive stance, participating in the following efforts:

4.1.1 Integrated Regional Water Management Plan

In 2000, the Legislature passed the *Integrated Regional Water Management Planning (IRWMP) Act*, which allows a regional water management group to prepare and adopt an IRWMP that includes qualified programs or projects or qualified reports or studies. The intent of the Legislature is to encourage local agencies to work cooperatively to manage their available local and imported water supplies to improve the quality, quantity, and reliability of those supplies.

Recognizing the sustainable future of the MWDOC service area depends upon the successful management of local and imported water supplies, MWDOC has been working with the County of Orange (lead) and the 24 cities and special districts serving the water and wastewater needs of south Orange County over the years to develop and integrate regional strategies that address, raise community awareness, and coordinate numerous and varied projects that:

- Protect communities from drought;
- Enhance local water supply and system reliability;
- Ensure continued water security;
- Optimize watershed and coastal resources;
- Improve water quality throughout the watersheds;
- Safeguard habitat.

In addition, these projects, which are based on a watershed approach, include one or more of the following water management elements:

- Programs for water supply reliability, water conservation and water use efficiency;
- Storm water capture, storage, treatment and management;

- Removal of invasive non-native plants;
- Creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands
- Non-point source pollution reduction, management, and monitoring;
- Groundwater recharge and management projects;
- Water banking, water exchange, water reclamation, desalting, and other treatment technologies;
- Planning and implementation of multipurpose flood control programs that protect property; improve water quality, storm water capture and percolation; and protect or improve wildlife habitat;
- Watershed management planning and implementation; and
- Demonstration projects to develop new drinking water treatment and distribution methods.

In August 2004, this diverse group came together as a single unit to create stronger regional partnerships and connectivity, to maximize the efficiency of their efforts, and to identify funding opportunities and apply for competitive grants.

Specifically, the South Orange County Integrated Regional Water Management (IRWM) Group provides a framework for coordinating planning activities and projects related to water management and watershed protection that have been studied and funded, or are in need of funding, and integrating them into a water management plan with multiple regional benefits.

To date, nearly 100 short- and long-term projects have been identified and prioritized based on the overall benefit they provide the south county region and their readiness for implementation.

4.1.2 Water Use Efficiency Program

California's water is a valuable and limited natural resource. There is a continuing need to conserve and efficiently utilize existing water supplies. Interest in water use efficiency (conservation) has been heightened by the continued growing need for water throughout California. The growth in water demand will continue due to the projected increase in population, along with increases in commercial and industrial activity. Water use

efficiency and demand management programs will help to stretch existing water supplies to meet these growing needs.

MWDOC recognizes water use efficiency as an integral component of the current and future water resource strategy for Orange County. Along with groundwater, recycled water, and imported water, water use efficiency is recognized as a low-cost source of new supply for the region. An ethic of efficient use of water has been developing over the last 14 years of water use efficiency programs implementation.

MWDOC demonstrated its commitment to water use efficiency in 1991 by voluntarily signing the Memorandum of Understanding(MOU) Regarding Urban Water Conservation in California (CUWCC). The California Urban Water Conservation Council was formed through adoption of this MOU and is considered the "keeper" of the 14 Best Management Practices (BMPs), with the authority to add, change, or remove BMPs. The CUWCC also monitors BMP implementation of the MOU. As a signatory to the MOU, MWDOC has committed to a good-faith-effort to implement all cost-effective BMPs.

Relative to urban water supply and management in general, the term "Best Management Practices" refers to policies, programs, rules, regulations and ordinances, and the use of devices, equipment, and facilities that, over the long term, have been generally justified and accepted by the industry as providing a "reliable" reduction in water demand. These methodologies and technologies are both technically and economically reasonable, are not environmentally or socially unacceptable, and their practice is not otherwise unreasonable for most water suppliers to carry out.

These 14 BMPs include technologies and methodologies that have been sufficiently documented in multiple demonstration projects that result in more efficient water use and conservation.

As a regional wholesaler of imported water, MWDOC's current Water Use Efficiency Program includes regional programs implemented on behalf of its member agencies revolving around the 14 BMPs identified in Table 4-1-2-A and the following four basic goals:

- Provide ongoing water use efficiency program technical support for member agencies that are implementing programs locally;

- Assume the position of lead agency to develop and implement water use efficiency programs that are more cost-effectively implemented on a regional basis rather than a local basis;

- Secure outside funding from Metropolitan's Conservation Credits Program, the U.S. Bureau of Reclamation, and other sources; and

- Identify the need for and conduct studies to evaluate the effectiveness of existing and potential water use efficiency programs for the region.

Table 4-1-2-A: Memorandum of Understanding Best Management Practices Implementation Responsibility and Regional Programs in Orange County

BMP #	EFFICIENCY MEASURE	Applies to:		
		Retailer	MWDOC as a Wholesaler	MWDOC Regional Program
1	Home Water Surveys	√		√
2	Residential Plumbing Fixture Retrofits	75% Saturation goal achieved in 2001		
3	System Water Audits, Leak Detection and Repair	√	(1)	√
4	Metering With Commodity Rates	√		
5	Large Landscape Conservation Programs	√		√
6	High-Efficiency Washing Machine Rebate Programs	√		√
7	Public Information Programs	√	√	√
8	School Education Programs	√	√	√
9	Commercial, Industrial, and Institutional Programs	√		√
10	Wholesale Agency Assistance Programs		√	√
11	Conservation Pricing	√	√	√
12	Conservation Coordinator	√	√	√
13	Water Waste Prohibition	√		√
14	Residential ULFT Replacement Programs	√		√

(1) MWDOC does not own or operate a distribution system; water wholesaled by MWDOC is delivered through the Metropolitan distribution system and meters.

Source: Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data takes precedence.

Section 5 of this Plan provides a detailed description of MWDOC's overall water use efficiency efforts including regional program descriptions, implementation achievements to date, water savings realized, and research activities.

4.1.3 Orange County Water Reliability Plan

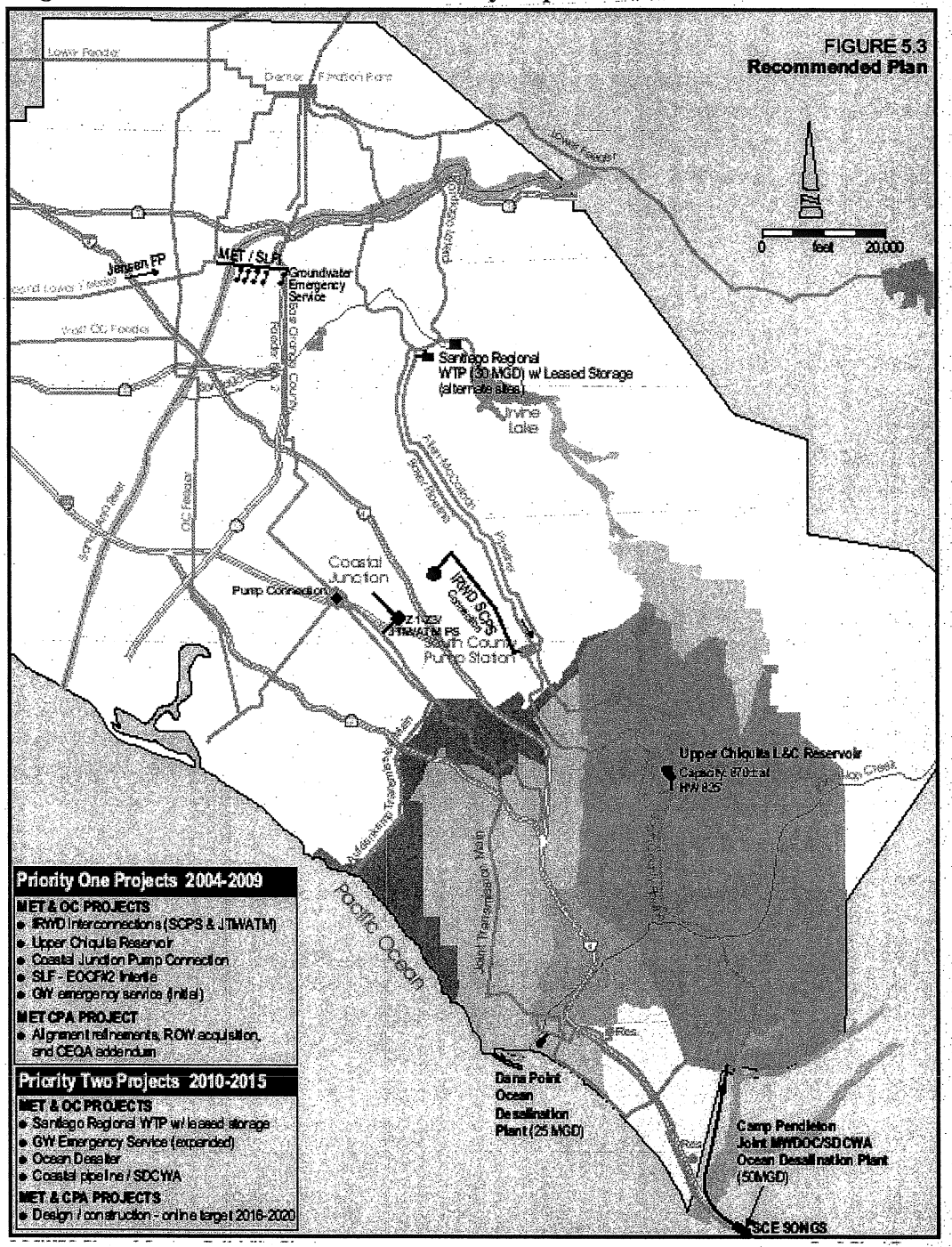
Under this program, MWDOC completed its *Orange County Water System Reliability Study*, which currently consists of separate planning documents for both the south and north county areas. The primary focus of these efforts is developing system reliability improvement plans that will more fully protect Orange County from major facility outages due to earthquakes, facility component or structural failures, or from other causes.

Especially vulnerable areas, such as south Orange County, which receives 95% of its potable water supply from a single regional Metropolitan treatment plant (Diemer Filtration Plan) located more than 35 miles from the

area, will significantly benefit from this program. The Diemer Filtration plant is situated close to the Whittier Fault, which poses a major risk to this facility and the reliability of water supply to South Orange County. Under a collaborative reliability improvement program, MWDOC and Metropolitan have been working cooperatively on various regional reliability improvements. Metropolitan has recently completed its Infrastructure Reliability and Protection Program (IRPP) for the Diemer Filtration Plant and its Orange County distribution system. MWDOC, with the cooperation of eight south Orange County agencies and with funding support from the U.S. Bureau of Reclamation, has developed the South Orange County Water Reliability Study. The Phase 2 System Reliability Plan was released in September 2004. This study recommended several reliability improvements to be implemented under two phases spanning 10 years.

Figure 4-1-3-A shows the recommended reliability improvements. Work is underway on implementing the Phase 1 program. These projects are: (1) two lined and covered reservoirs with emergency interconnections to the South County Pipeline in Santa Margarita Water District (lead agency with MWDOC coordination); (2) emergency interconnections from the IRWD to the South County Pipeline and to the Joint Transmission Pipeline and Aufdemkamp Transmission Pipeline (IRWD lead agency with MWDOC coordination); (3) East Orange County Feeder No. 2 emergency interconnections by construction of the Orange County Cross Feeder and pump risers at the Coastal Junction facility (Metropolitan lead agency with MWDOC coordination); (4) groundwater emergency pump-in service to the East Orange County Feeder No. 2 (MWDOC lead planning agency); and (5) the Dana Point Ocean Desalination Project (MWDOC lead planning agency).

Figure 4-1-3-A: Recommended Reliability Improvements



Source: Municipal Water District of Orange County, *South Orange County Water Reliability Study*, Figure 5.3

The Dana Point Ocean Desalination Project will provide both system reliability benefits as well as a new potable-water supply source in south Orange County. Feasibility investigations are now underway. MWDOC's goal is to determine the feasibility of the project by mid-2006. Primary areas of investigation are feedwater supply using a subsurface intake system, concentrated ocean water disposal utilizing the regional wastewater system outfall, and a project power study. Upon completion of these investigations, the overall project feasibility report would be prepared and costs estimated. At that time, the project will be reviewed and a go/no-go decision considered. Should the project proceed, the next steps will include developing arrangements to preserve the identified sites, conducting a pilot plant and demonstration project to develop the treatment process and cost parameters, and preparation of the full project California Environmental Quality Act documentation.

4.1.4 South Orange County Water Reliability Study

Approximately 95% of south Orange County's potable water supply is imported from Northern California and the Colorado River. This water is treated locally at the Diemer Filtration Plant in Yorba Linda and delivered via two aging pipelines, the East Orange County Feeder No. 2 and Allen McColloch Pipeline. To ensure continued water reliability for south Orange County, 11 Orange County agencies, Metropolitan, and the U.S. Bureau of Reclamation joined together to fund the *South Orange County Water Reliability Study* (SOCWRS) - Phase 2 System Reliability Plan. MWDOC headed these efforts.

The purpose of this planning effort, conducted from 2003-04, was to:

- Identify risks, including earthquakes, that pose the greatest threat to the regional water treatment and distribution infrastructure;
- Identify ways to bolster source-of-supply and regional distribution systems;
- Building on earlier engineering investigations and studies Develop a list of projects that accomplish the above objectives, and identify appropriate investments;
- Allow for flexibility in phasing. Most notably project operational dates and sizing should be flexible to account for changes in local resource development (LRPs);

The plan builds on a number of prior studies, including: SOCWRS Phase 1, which served as the foundation for this effort; Metropolitan's Central Pool Augmentation Project, currently in project and right-of-way refinement; Santa Margarita Water District's Lined and Covered Reservoir investigations to increase local storage for emergency needs;

IRWD's Water Resources Master Plan Update and Planning Area-6 Sub-Area Master Plan; and various Orange County Water District (OCWD) plans and groundwater basin operations studies.

To determine the economic impacts of water shortages, MWDOC retained the services of the Orange County Business Council. According to the Orange County Business Council, the economic impacts could reach $1.7 billion, depending on the shortage scenario. Even a relatively short 10-day outage of 20% carries a projected impact of over $60 million. These numbers illustrate the tremendous potential cost to south Orange County from water system outages.

Key planning principles used to guide the formulation of alternatives and the plan included:

- Developing priorities for accommodating Metropolitan planned shutdowns of seven days of average demand and for emergency outages of up to 31 days of summer demand;
- Evaluating compatibility of project components with existing and future supply needs, with preference for projects providing multiple purposes, and seeking economies of scale through regional joint use facilities;
- Making better use of existing, underutilized infrastructure assets;
- Identifying Metropolitan system investments that can provide for flexibility in system operation, which would maintain and improve system capability and reliability for Orange County; and
- Selecting appropriate projects that can be phased and modified to changing conditions.

Projects were identified and an action plan developed. The recommended projects fell into three categories and are the building blocks of the Base Plan and the Contingency Plan. They included: (1) regional distribution system; (2) storage/treatment; and (3) ocean desalination. Implementation of the recommended plan will commence upon reaching agreement with the south Orange County agencies on the priority projects, gaining plan acceptance, and developing a business plan and organizational structure for implementation of the plan.

4.1.5 Assist Member Agencies to Participate in Metropolitan's Incentive Program for Local Supply Development

MWDOC plays a key role in assisting its member agencies in getting the financial assistance from Metropolitan's incentive programs through the competitive selection process.

Capital risk is a significant constraint to increased local supply project development. Most of the local supply projects require significant capital investments in treatment and distribution system. Uncertainty of market demands creates a risk to the cost recovery required for the repayment of capital debt. This large capital risk often deters agencies from undertaking the development of new supplies.

Metropolitan developed several incentive programs to assist local agencies in overcoming this obstacle. In its role as the regional provider, MWDOC works hard to assist its member agencies to obtain this financial assistance by showing evidence that those local projects do offer regional benefits to offset regional supply shortages.

Followings are summary of the incentive programs:

- Local Projects Program (LPP) – Metropolitan implemented the LPP in 1982 to assist local agencies with the development of recycled water supply projects. Between 1986 to 1990, the LPP contribution for a project was a minimum of $75 per acre-foot of production, which roughly equaled Metropolitan's avoided energy cost for pumping an equivalent amount of water through the State Water Project. In April 1990, Metropolitan modified the LPP contribution to $154 per acre-foot. In August 1995, Metropolitan converted the program again. The contribution for a project for the converted program ranged from $0 to a maximum of $250 per acre-foot, based on the difference between the project's unit cost and Metropolitan's treated water rate;

- Groundwater Recovery Program (GRP) – Metropolitan initiated the GRP in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes. Metropolitan provided financial assistance based on the difference between the project unit cost and its treated water rate, up to a maximum of $250 per acre-foot;

- Competitive Local Resources Program (LRP) – In June 1998, Metropolitan retired the aforementioned incentive programs and established the Competitive LRP in their places. The Competitive LRP uses a competitive Request for Proposals process to encourage the development of cost-effective recycled and groundwater

recovery projects. This program offers financial incentives of up to $250 per acre-foot; and

- Seawater Desalination Program (SDP) – Metropolitan and its member agencies view seawater desalination as a future component of a diversified water supply portfolio. In Metropolitan's Integrated Resource Plan Update, Metropolitan identified a target of 750,000 acre-feet per year of local water production by 2025 that could include up to 150,000 acre-feet per year of seawater desalination. Metropolitan initiated the SDP in 2001 and provides financial assistance of up to $250 per acre-foot for 25 years for desalinated seawater that is developed and used within Metropolitan's service area. MWDOC has submitted a proposal on behalf of its member agencies for an amount of 28,000 acre-feet per year of seawater desalination. Currently, MWDOC is working on executing the contract with Metropolitan under this proposal.

Table 4.1.5 summarizes the projects within MWDOC's service area that have been awarded with the incentive program contract.

Table 4-1-5-A: Local Supply Projects within MWDOC's Service Area that Have Been Awarded with Metropolitan's Financial Incentive Program Contracts

Lead Agency Name	Project Name	Met Sponsorship		Types	Usage	Status
		Contract Type	Contract Yield [1]			
Irvine Ranch Water District	IRWD **Irvine Desalter**	GRP 91	6,700	GW Recovery	Potable and Non-Potable	Construction
Irvine Ranch Water District	IRWD **Michelson and LAWRP Reclamation 2005 Upgrades**	LRP 04	8,500	Reclamation	Non-potable	Construction; on-line 12/2006
Irvine Ranch Water District	IRWD **Michelson Reclamation** Project	LPP	10,000	Reclamation	Non-Potable	In Operation
Mesa Consolidated WD	Mesa CWD **Colored Water Treatment Facility Phase I**	LRP 98	5,650	GW Recovery	Potable	In operation
Mesa Consolidated WD	Mesa CWD **Colored Water Treatment Facility Phase II**	LRP 98	5,650	GW Recovery	Potable	In planning
Moulton Niguel WD	Moulton Niguel **Reclamation Expansion Phase II-III** Plus DWR Loan	LPP	8,000	Reclamation	Non-Potable	In operation
Moulton Niguel WD	Moulton Niguel **Reclamation Expansion Phase IV**	LRP 98	1,276	Reclamation	Non-Potable	In operation
MWDOC	MWDOC **South OC Ocean Desalination** Project	ODP 05	28,000	Ocean Desal	Potable	Planning
Orange County Water District	OCWD **Green Acres Reclamation** Project	LRP	7,000	Reclamation	Non-Potable	In Operation
Orange County Water District & Orange County Sanitation District	OCWD & OCSD **Ground Water Replenishment System**	LRP 04	31,000	Reclamation	Potable (indirectly)	Construction; On line Summer 2007
San Clemente, City of	San Clemente Water Reclamation	LPP	1,500	Reclamation	Non-Potable	In Operation
San Juan Capistrano, City of	San Juan Capistrano **Desalter**	GRP 98	4,800	GW Recovery	Potable	Construction
San Juan Capistrano, City of	San Juan Capistrano **Non-Domestic Water System Expansion**	LRP 98	2,895	Reclamation	Non-Potable	Planning
Santa Margarita WD	SMWD **Oso Reclamation** Plant (Existing)	LPP	3,360	Reclamation	Non-potable	In Operation
Santa Margarita WD	SMWD **Chiquita Reclamation** Project	LRP 98	2,772	Reclamation	Non-potable	Construction; on-line 2005-06
South Coast WD	South Coast WD **Capistrano Beach Desalter**	GRP 98	1,300	GW Recovery	Potable	Design
Trabuco Canyon WD	**TCWD Reclamation Expansion** Project	LPP	800	Reclamation	Non-potable	In Operation
Tustin, City of	**Tustin Desalter (17th Street)**	GRP 91	2,800	GW Recovery	Potable	Operation

[1] A typical contract provision has MET pay on yield up to 20% over the Contract Yield amount.
[2] South Coast WD South Laguna Reclamation Project not included because MET contract expired in 3/04 after its full 20 years.
Source: Muncipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data takes precedence.

4.1.6 Cooperative Agreement with Orange County Water District

For the water supply sustainability in this region, it is critical that MWDOC and Orange County Water District (OCWD), work cooperatively for the benefit of the public. MWDOC manages the imported water supplies into the county in conjunction with Anaheim, Fullerton, and Santa Ana. OCWD manages the local supplies and groundwater storage levels of the Lower

Santa Ana River Groundwater Basin. On August 15, 2001 and again on April 23, 2003, MWDOC and OCWD adopted a *memorandum of understanding* (MOU) to coordinate mutual water resources planning, supply availability, and water use efficiency programs for the benefit of the Orange County region.

Such a program requires MWDOC and OCWD to look outside of their strict borders and traditional missions because of the interconnectedness of water issues affecting Orange County. Due to their regional natures, MWDOC as a water wholesaler and OCWD as a groundwater basin manager, both are appropriate agencies in Orange County to lead such a program.

With this program, the Boards of Directors of both MWDOC and OCWD jointly declare the following to be desirable and mutually acceptable objectives:

- Staffs from both agencies should continue working together to prepare and pursue actions toward developing an overall water supply and system reliability program for Orange County;

- Staffs are directed to coordinate with the Metropolitan and its Orange County member agencies to discuss new ideas to further this program;

- Key planning activities within the Orange County are identified as such:

    - Evaluate Orange County Demand;

    - Identify availability/reliability of Metropolitan supplies;

    - Develop groundwater management plans, including coastal pumping transfers and other programs addressing Santa Ana River Watershed issues;

    - Develop a recharge master plan;

    - Develop a long-term facilities plan;

    - Develop an Emergency Service Plan (Orange County Basin to serve areas outside of the Basin during emergency situation;

    - Facilitate responses to Metropolitan Local Resources Program (RFP) for funding assistance;

    - Complete South Orange County Reliability Study;

- Develop water transfers, dry year options, storage;
- Develop water use efficiency master plan and enhanced conservation;
- Implement Metropolitan conjunctive use project;
- Evaluate rate structure refinements; and
- Coordinate and support each others on issues related to legislative, regulatory, and water supply.

- The program creates a joint planning committee, which will continue to meet to monitor progress and make recommendations for the two Boards, which shall also periodically meet on a joint basis.

Not yet adopted, a resolution has been drafted by this joint program to work together to manage supplies during drought and non-drought situation. Goals identified are:

- Avoid water-rationing situations caused by prolonged droughts through proactive management of supplies during both drought and non-drought situations and through efficiency of use of existing supplies;
- Minimize the impacts of prolonged droughts to Orange County; and
- Accelerate the refill of the groundwater basin following any drafting of storage during a drought situation.

4.1.7 Role in Ocean Water Desalination Feasibility Investigation

South Orange County, home to about 500,000 residents and growing, obtains most of it water from imported sources (86% of total, 98% of potable). This imported water is delivered through two pipelines and treated at the Diemer Filtration Plant, as much as 35 miles away from portions of south Orange County. The two pipelines are the Allen McColloch Pipeline and the East Orange County Feeder No. 2. The Diemer Filtration Plant, located in Yorba Linda, was built in 1964 and supplies almost 100% of the treated imported supplies to Orange County. The Diemer FiltrationPlant, the Allen McColloch Pipeline, and the East Orange County Feeder No. 2 pipeline are essential for supplying water, particularly to south Orange County. An outage of any one of the three facilities has the potential to create supply problems until service is restored. In particular, an outage of the Diemer FiltrationPlant would be an extremely difficult event with which to deal. Development of additional local supplies in south Orange County,

such as ocean desalination facilities, can help improve the reliability of the area.

MWDOC recently completed the South Orange County Water Reliability Study, which examined and evaluated options for providing greater water supply and system reliability. A recommendation from the study is the development of an ocean water desalination facility that would provide south Orange County with a new local source of water. Such a project would also provide relief to the area that is almost entirely dependent on imported water, has only two imported water delivery pipelines to serve more than 500,000 people, and is subject to interruptions should it experience another imported water pipeline outage like it did in 1999.

While still in the feasibility stage, MWDOC is considering constructing a 10-20 Million Gallon per Day (MGD) reverse osmosis (RO) ocean desalination facility to supply water to south Orange County. The facility would produce a new water supply of 12,000-to-24,000 acre-feet per year, diversify the sources of supply, provide drought protection, improve system reliability, and improve water quality by providing a lower level of Total Dissolved Solids (TDS) in the supply. This will be especially helpful in expanding water recycling opportunities for south Orange County.

Potential sites for a south Orange County ocean water desalination facility include Dana Point and a somewhat larger facility at Camp Pendleton that could provide water service to Orange County, San Diego County, and could improve the water security to the U.S. Marine Corps at Camp Pendleton. The project at Camp Pendleton would be a joint effort between MWDOC and the San Diego County Water Authority and would potentially use the existing intake and outfall facility from the San Onofre Unit 1, which is currently in the process of being decommissioned.

In February/March 2005, MWDOC conducted the first phase of its hydrogeology and water quality testing at a possible ocean water desalination site in Dana Point at Doheny State Beach. Results of the initial testing are promising, and MWDOC is now continuing to the next phase of feasibility testing. Throughout this effort, MWDOC has worked closely with the city of Dana Point, the South Coast Water District, which serves this part of the county, and the California State Department of Parks and Recreation. MWDOC has also done target community outreach to such important stakeholders as the Surfrider Foundation, Orange County Coastkeeper, and other environmental groups.

4.1.8 Southern California Comprehensive Water Reclamation and Re-use Study

MWDOC participated, as a member of its Project Advisory Committee (PAC), in the Phase II of this comprehensive regional study on the use of recycled supply.

This is a six-year comprehensive effort that fully examined recycled water opportunities from a regional perspective to develop a long-term planning strategy to develop recycled water supplies for *Southern California. Southern California Comprehensive Water Reclamation and Re-use Study* (SCCWRRS) was developed by three phases: Phase IA, Phase IB, and Phase II. The following paragraphs describe each of the phrases:

- Phase IA – The primary purpose of this phase was to compile available information on supply and demand for both fresh and recycled water throughout southern California. At the end of this phase, the study concluded that without increased water recycling, the water supply would remain relatively constant through the year 2040, while demand would increase. It also concluded that the water demand shortfall in the near term could be met with recycled water if the projected recycled water supplies are put to beneficial uses;

- Phase IB – The study gathered inputs and used analysis tools to optimize recycled water use from the regional perspective and, in the process, to identify constraints to maximizing reuse. The major conclusion reached during this phase was that a regional water recycling project that spans the entire study area does not appear practical at this time; however, sub-regional systems warranted further evaluation. The sub-regional areas evaluated in this phase were grouped into geographical regions that facilitated the development of reclamation systems to meet the regional recycling goals. These regions include the Los Angeles Basin region, Orange County region, San Diego region, and Inland Empire region;

- Phase II – This phase of the study focused on developing a long-term regional recycling strategy and identifying short-term opportunities for implementing the strategy. In Phase I, participation was limited to the United States Bureau of Reclamation and eight agencies representing a variety of water recycling interests in Southern California. In Phase II, participation was expanded to include local agencies potentially affected by the implementation of projects arising from the SCCWRRS. In response to the invitation to participate, MWDOC, joined with other 70 local agencies from across Southern California, and became an active participant in the development and analysis of regional water recycling projects. Local agencies were integral participants in the decision-making process of Phase II.

  The objective of this phase was to examine opportunities for short-term and long-term implementation. Unlike typical master planning activities, the SCCWRRS analyses examined two distinct time horizons, which were defined as 2010 (short-term) and 2040 (long-term). Through the short-term analysis, 34 projects distributed

across Southern California were identified for short-term implementation. Of these, 15 projects were identified as regional projects. All projects identified within Orange County were grouped in the regional projects category. The regional projects include a number of agencies, both water and wastewater, cooperating regionally to produce and deliver recycled water. This phase also develop a long-term regional recycling strategy for projects through 2040.

The short term projects have a total potential yield of approximately 451,500 acre-feet per year of additional recycled water, of which 114,600 acre-feet per year were with Orange County. The long-term strategy is expected to satisfy additional demand of 296,300 acre-feet per year by 2040, of which 52,500 acre-feet per year should be within Orange County.

References:

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5.0 WATER DEMAND MANAGEMENT PROGRAMS

The Urban Water Management Planning Act describes two distinct methods for providing information related to Demand Management Measures (DMMs) and meeting the requirements of Water Code Section 10631 (f) and (g): (1) Members of the California Urban Water Conservation Council (CUWCC) may submit annual Best Management Practice (BMP) Activity Reports; or (2) water suppliers who are not members or choose not to submit annual BMP Activity Reports must submit information about their programs, including current activities, scheduled activities, methods of evaluation, savings, and costs.

As an active reporting member of the CUWCC, the Municipal Water District of Orange County (MWDOC) has included its BMP Activity Reports as Section 5.1 and BMP Coverage Reports as Section 5.2 of this Urban Water Management Plan.

Although no future programs are needed to meet the scheduled demand management measures, MWDOC believes in the value of demand management and continuously invests in programs beyond those required by BMP. Supplemental information describing those demand management activities that go beyond voluntary wholesaler BMP implementation is included as Section 5.3.

The five most recent annual BMP Activity Reports are included in this Plan (2000 through 2004), along with BMP Coverage Reports as a measure of implementation over time. MWDOC has not submitted any exemption requests as it has found all BMPs applicable to wholesalers to be cost effective.

5.1 Best Management Practice (BMP) Activity Reports (2000 through 2004)

The California Urban Water Conservation Council Annual Best Management Practice Implementation Reports for 2000 through 2004 are provided as *Appendix 5-A* in this report.

5.2 Best Management Practice (BMP) Coverage Report

The California Urban Water Conservation Council Best Management Practice Coverage Reports for 2000 through 2004 are provided as *Appendix 5-B* in this report

5.3 Council Coverage Calculator and Best Management Practice Cost-effectiveness Forms

MWDOC considers all BMPs applicable to MWDOC as a signatory wholesale water agency to be cost effective and is actively pursuing implementation. As a result, MWDOC has not submitted any cost effectiveness exemptions to the CUWCC.

5.4 MWDOC's Accomplishment in Conservation Programs Since 2000

California's water is a valuable and limited natural resource. There is a continuing

need to conserve and efficiently utilize existing water supplies. Interest in water use efficiency (conservation or demand management measures) has been heightened by the growing need for water throughout California. The growth in water demand will continue due to increases in population and changes in commercial and industrial activity. Water use efficiency will help stretch existing water supplies to meet these growing needs.

MWDOC recognizes water use efficiency as an integral component of the current and future water resource strategy for Orange County. Along with groundwater, recycled water, and imported water, water use efficiency is a low-cost source of new supply for the Orange County region. An ethic of efficient use of water has been developing over the last 14 years of implementing water use efficiency programs. Retail water agencies throughout Orange County also recognize the need to use existing water supplies efficiently – implementation of Best Management Practices-based efficiency programs makes good economic sense and reflects responsible stewardship of the county's water resources.

As a regional wholesaler of imported water, MWDOC purchases Colorado River and State Water Project water from the Metropolitan and sells it to 29 of 32 retail water agencies in Orange County. The cities of Anaheim, Fullerton, and Santa Ana purchase imported water directly from Metropolitan.

5.4.1 Role of BMPs in MWDOC Service Area

The standards for water use efficiency in California are the 14 BMPs contained in the *Urban Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU) established in 1991. The California Urban Water Conservation Council was established through the MOU and acts as the "keeper" of the BMPs with the authority to add, remove, or change BMPs over time. These 14 BMPs include technologies and methodologies that have been sufficiently documented in multiple demonstration projects which result in more efficient water use and conservation. All retail water agencies in Orange County are actively implementing BMP-based programs; however, not all retail water agencies are signatories to the MOU. Table 5-4-1-A identifies those regional and local water agencies and organizations that have signed the MOU, voluntarily committing to a good faith effort to implement cost effective BMPs.

Table 5-4-1-A: Memorandum of Understanding Signatory Agencies and Organizations in Orange County

Water Agencies	Year MOU Signed
Anaheim, City of	1991
Brea, City of	
Buena Park, City of	
East Orange County WD	2000
El Toro WD	1994

Fountain Valley, City of	2000
Fullerton, City of	
Garden Grove, City of	1996
Huntington Beach, City of	2000
Irvine Ranch WD	1991
La Habra, City of	
La Palma, City of	
Laguna Beach County WD	
Mesa Consolidated WD	1994
Moulton Niguel WD	1991
Municipal Water District of Orange County	1991
Newport Beach, City of	
Orange, City of	
Orange County WD	1991
Orange Park Acres Mutual WCo.	
San Clemente, City of	
San Juan Capistrano, City of	1994
Santa Ana, City of	1999
Santa Margarita WD	
Santiago County WD	
Seal Beach, City of	2002
Serrano WD	
South Coast WD	1991
Golden State Water Co.	1991
Trabuco Canyon WD	1991
Tustin, City of	
Westminster, City of	
Yorba Linda WD	
Other Signatory Agencies and Organizations	
County of Orange	1991
Orange County Sanitation District	1991

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

While implementation of water use efficiency BMPs is focused primarily on retail water agencies, wholesale water agencies, including MWDOC, develop and implement regional programs on behalf of the retail water agencies and their customers. This regional implementation approach enables economies of scale, provides a more consistent message of efficiency to the public, and assists in acquisition of grant funding for program implementation. Table 5-4-1-B sets forth the BMPs and how they apply to retail and wholesale water agencies, and identifies BMP programs being implemented by MWDOC.

Table 5-4-1-B: Memorandum of Understanding BMP Implementation Responsibility and Regional Programs in Orange County

BMP #	EFFICIENCY MEASURE	Applies to:		
		Retailer	**MWDOC as a Wholesaler**	**MWDOC Regional Program**
1	Home Water Surveys	√		√
2	Residential Plumbing Fixture Retrofits	75% Saturation goal achieved in 2001		
3	System Water Audits, Leak Detection and Repair	√	(1)	√
4	Metering With Commodity Rates	√		
5	Large Landscape Conservation Programs	√		√
6	High-Efficiency Washing Machine Rebate Programs	√		√
7	Public Information Programs	√	√	√
8	School Education Programs	√	√	√
9	Commercial, Industrial, and Institutional Programs	√		√
10	Wholesale Agency Assistance Programs		√	√
11	Conservation Pricing	√	√	√
12	Conservation Coordinator	√	√	√
13	Water Waste Prohibition	√		√
14	Residential ULFT Replacement Programs	√		√

(1) MWDOC does not own or operate a distribution system; water wholesaled by MWDOC is delivered through the Metropolitan distribution system and meters.

Source: Municipal Water District of Orange County

5.4.2 Review of MWDOC Conservation Programs as Described in 2000 Urban Water Management Plan

As a wholesaler, MWDOC did not contain a specific implementation plan in its 2000 Regional Urban Water Management Plan. However, as a signatory to the Memorandum of Understanding regarding urban water use efficiency, MWDOC's commitment to implement BMP-based water use efficiency program continues today. To help facilitate implementation of BMPs throughout Orange County, MWDOC's efforts focus on the following three areas. These areas both comply with BMP No. 10 - Wholesaler Assistance, and go beyond the basic BMP 10 requirements:

- Regional Program Implementation: MWDOC develops, obtains funding for, and implements regional BMP programs on behalf of all retail water agencies in Orange County. This approach minimizes confusion to consumers by providing, countywide, the same programs with the same participation guidelines, and also maintains a consistent message to the public to use water efficiently. Programs implemented by MWDOC on behalf of the region are identified in Table 5-4-1-B above;

- Local Program Assistance: When requested, MWDOC assists retail agencies to develop and implement local programs within their

individual service areas. This assistance includes collaboration with each retail agency to design a program to fit that agency's local needs, which may include providing staffing, targeting customer classes, acquiring grant funding from a variety of sources, and implementing, marketing, reporting, and evaluating the program. MWDOC provides assistance with a variety of local programs including, but not limited, to Home Water Surveys, Large Landscape, Conservation Public Information, School Education, Conservation Pricing, and Water Waste Prohibitions; and

- Research and Evaluation: An integral component of any water use efficiency program is the research and evaluation of potential and existing programs. Research allows an agency to measure the water savings benefits of a specific program and then compare those benefits to the costs of implementing the program in order to evaluate the economic feasibility of the program when compared to other efficiency projects or existing or potential sources of supply. Over the past five years, MWDOC has completed three research and evaluation projects. The efforts are summarized below:

  Orange County Saturation Study, 2001

  The principal objective of the *Orange County Saturation Study* was to test the hypothesis that, at least within Southern California, the results from countywide surveys will "produce good estimates of the saturation of low-flow showerheads (LFSHs) among households" served by the individual retail agencies comprising the county. The study results strongly support this hypothesis, but suggest that the required 75% saturation threshold had not quite been achieved as of the winter of 2000. The estimated saturation rates were, however, close enough to the requisite 75% level to support that the combined effect of utility distribution programs and natural replacement may have substantially bridged the gap between then and now. This is an example of an evaluation project that measured the level of project implementation relative to the 75% implementation goal. The full report can be accessed on MWDOC's website.

  Evaluation of the Landscape Performance Certification Program, 2004

  The Landscape Performance Certification Program was a pilot program implemented by MWDOC to comply with the goals of BMP No. 5 - Large Landscape Conservation Programs. BMP No. 5 targets the development of landscape irrigation budgets for dedicated landscape meters and monthly irrigation performance reporting. This program was implemented as a pilot program from 1997 to 2003. As significant participation and program design improvements were made during this time, an evaluation was necessary to determine program effectiveness for continued implementation. This evaluation comprised three parts: (i)

a Process Evaluation designed to determine how effectively the program was being delivered to participants; (ii) an Impact Evaluation to measure water savings; and (iii) the development of Recommendations to be implemented to improve the program. The evaluation revealed a water savings of 367 gallons per day per meter for early participants and 765 gallons per day per meter for later program participants. The evaluation documented several recommendations to improve the project as it transitioned into a standard implementation program. The full report can be accessed on MWDOC's website.

Residential Runoff Reduction Study, 2004

This research project, which began in fall of 2001 and concluded in 2003, was designed to verify the water savings measured in the earlier Westpark Study and to evaluate changes in runoff pollutant content and runoff volume from a neighborhood before and after installation of "smart" weather-based irrigation controllers. The evaluation identified an average annual water savings of 10% for those study participants using "smart" weather-based controllers to schedule and regulate their landscape irrigation systems, and a 49% reduction in runoff leaving the neighborhood. Statistically significant changes in pollutant concentrations were not found, resulting in a pollutant reduction of 49%. The full report can be accessed on MWDOC's website.

5.4.3 BMP Implementation in MWDOC Service Area

BMP No. 1 - Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers

MWDOC assists its retail water agencies to implement this BMP by making available the following programs:

NEW as of 2004 - SmarTimer Rebate Program

This regional program is available to all participating retail agencies and their customers. Residential customers are eligible to receive a rebate when they purchase and install a new, state-of-the-art, weather-based sprinkler timer. This advanced sprinkler timer technology has been shown to save 41 gallons per day per residential installation and to reduce runoff and pollution by 49%. A total of 5,000 residential and commercial SmarTimer installations are targeted over the next few years.

Protector Del Agua Irrigation Management Training (Residential)

The Protector Del Agua Irrigation Management Training Program provides education to residential homeowners on a variety of landscape water efficiency practices they can employ in their home landscapes. These classes are hosted by MWDOC and/or the retail agencies to encourage

participation across the county. Table 5-4-3-A summarizes residential participation in this program.

The program consists of a series of four 4-hour classes taught either on four consecutive Saturdays or a designated Saturday each month. Alternatively, a mini class incorporates the curriculum from all four classes into one condensed class. The presentations cover the following topics:

Basic Landscape Design
Getting Started
The Design Process
The Planting Design
Plant Selection

Landscape Plants
Why Go Native
Plant Selection Tips
Planting Guidelines
Maintenance

Landscape Sprinkler Systems
The Irrigation System
Layout of the Irrigation System
Components of the System
Installation & Maintenance Practices

Landscape Watering, Fertilizing
Scheduling your Irrigation
MWD's Watering Calculator
Controller Programming Basics
Fertilizers

Table 5-4-3-A: Protector Del Agua Irrigation Management Training Residential Participation Summary

	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	Total:
Number of Participants	405	945	847	537	2,734

Source: Municipal Water District of Orange County

BMP No. 2 -Residential Plumbing Retrofit

Using the 2001 *Orange County Saturation Study* as a benchmark, saturation of low-flow showerheads was measured at 67% and 60% in single- and multi-family housing stock respectively. Today, low-flow showerhead saturation is estimated at nearly 100% and 94% saturation in single- and multi-family homes. As a result, water agencies throughout Orange County have achieved the 75% saturation requirement for this BMP. No further low-flow showerhead distribution or installation activity has occurred.

BMP No. 3 - System Water Audits, Leak Detection, and Repair

With the sale of the Allen-McColloch Pipeline to the Metropolitan Water District of Southern California in 1995, MWDOC no longer owns or operates a distribution system. Water purchased and sold by MWDOC is distributed through Metropolitan's system to the MWDOC retail agencies. As a result, implementation of BMP No. 3 is not applicable to MWDOC.

However in an effort to assist our retail agencies, MWDOC publishes annually the *Orange County Water Agencies Water Rates, Water System Operations, and Financial Information* survey. This survey facilitates a pre-screening survey that estimates the volume and percent of unaccounted-for-water for each retail water agency in the county. In 2004, the percent of unaccounted-for-water for retail water agencies ranged from a low of 1.2% to a high of 10.7%, with an average of 5.1%.

BMP No. 4 - Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

Metering with commodity rates by wholesale and retail agencies has been an industry standard throughout Orange County for many years. All customers are metered and billed based on commodity rates either monthly or bi-monthly.

BMP No. 5 - Large Landscape Conservation Programs and Incentives

Three programs are offered in Orange County to assist retail agencies and their large landscape customers to use water efficiently. These programs include:

Protector Del Agua Irrigation Management Training (Professional)

This course consists of four consecutive classes in landscape water management geared at the landscape professional, each building upon principles presented in the preceding class. Each participant receives a bound handbook containing educational materials for each class. These classes are offered throughout the year and taught in both English and Spanish languages. The following is a synopsis of each class in the course:

- Irrigation Principles: A comprehensive class that covers the principle factors in landscape irrigation and provides a solid foundation for sound landscape water management. At the conclusion of the class, participants will have attained, through lecture and classroom demonstrations, a practical knowledge of landscape irrigation design, installation, maintenance, and repair. Topics include irrigation system types, sprinkler layouts, sprinkler components, sprinkler selection and spacing, and common sprinkler problems;

- Irrigation System Troubleshooting: This session focuses on an analytical approach to solving irrigation system failures. Three potential problem areas are examined: (1) mechanical problems, 2) hydraulic problems, and 3) electrical problems. Workshop participants receive practical training in the use of electrical troubleshooting equipment;

- Controller Programming: A hands-on workshop where participants learn basic controller features by programming sample cases. Participants then move into advanced controller features as they input more complex schedules, taking into consideration temperature/seasonal changes, rain, landscape activities, and demands that limit irrigation times. Irrigation controllers are provided for in-class use;

- Irrigation Scheduling: This session focuses on two critical questions: 1) When to irrigate? 2) How much water to apply? A variety of field techniques and methods are presented, along with the technical aspects to be considered when scheduling irrigation run times. Each class participant is furnished with the tools needed to perform an irrigation scheduling assignment.

Upon completion of the course, participants receive a certificate listing all classes completed. Participants are eligible for 21 Continuing Education Units as certified by the Irrigation Association. Table 5.4.3-B summarizes commercial participation in this program.

Table 5-4-3-B: Portector Del Agua Irrigation Management Training Professional Participation Summary

	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	Total:
Number of English Participants	324	454	66	118	962
Number of Spanish Participants	359	215	198	122	894

Source: Municipal Water District of Orange County

Landscape Performance Certification Program

MWDOC has created a unique and innovative partnership linking landscape water management, green material management, and the non-point source pollution prevention goals of separate agencies into one program -- the Landscape Performance Certification Program. This partnership includes MWDOC as lead agency, Metropolitan, Orange County Integrated Waste Management Department, United States Bureau of Reclamation, and all retail water agencies in Orange County. The Landscape Performance Certification Program is designed to:

- Assist water agencies in meeting the landscape irrigation management requirements of the California Urban Water Conservation Council's Best Management Practice #5;

- Assist cities and the county in meeting Integrated Waste Management Act goals (AB 979) to reduce the volume of waste and to recycle organic materials for the benefit of the landscape; and

- Assist cities and the county in identifying landscape run-off sites and providing site-by-site remedies.

Homeowner associations managing dedicated landscape irrigation meters are the primary target audience for participation in this program; however, city and school district landscapes also participate. There are more than 17,000 dedicated irrigation meters served by retail water agencies in Orange County, of which nearly 14,000 use potable water, while the remaining 3,000 use reclaimed water to irrigate urban landscapes. Table 5-4-3-C identifies the agencies currently activated in the program along with the number of meters and associated acre-feet per year water savings. Water savings is based on the results of the "Evaluation of the Landscape Performance Certification Program" which include a 765 gallon per day savings rate.

Table 5-4-3-C: Landscape Performance Certification Program

Activated Agency	Number of Meters Activated and Acre-Feet Per Year of Water Savings				
	12/31/01	8/31/02	8/31/03	7/31/04	5/30/05
Capistrano Valley Water District	42 Meters 36 acre-feet per year	43 Meters 37 acre-feet per year	47 Meters 40 acre-feet per year	Not reported	Not reported
El Toro Water District	0	0	63 Meters 54 acre-feet per year	79 Meters 68 acre-feet per year	91 Meters 64 acre-feet per year
Irvine Ranch Water District	80 Meters 69 acre-feet per year	122 Meters 105 acre-feet per year	187 Meters 160 acre-feet per year	157 Meters 135 acre-feet per year	242 Meters 207 acre-feet per year
Mesa Consolidated Water District	4 Meters 3 acre-feet per year	115 Meters 99 acre-feet per year	184 Meters 158 acre-feet per year	156 Meters 134 acre-feet per year	249 Meters 213 acre-feet per year
Moulton Niguel Water District	161 Meters 138 acre-feet per year	181 Meters 155 acre-feet per year	189 Meters 162 acre-feet per year	60 Meters 51 acre-feet per year	229 Meters 192 acre-feet per year
Newport Beach	9 Meters 8 acre-feet per year	47 Meters 40 acre-feet per year	48 Meters 41 acre-feet per year	22 Meters 18 acre-feet per year	92 Meters 79 acre-feet per year
Santa Margarita Water District	333 Meters 285 ACRE-FEET PER	354 Meters 303 acre-feet per year	558 Meters 478 acre-feet per year	640 Meters 548 acre-feet per year	753 Meters 645 acre-feet per year

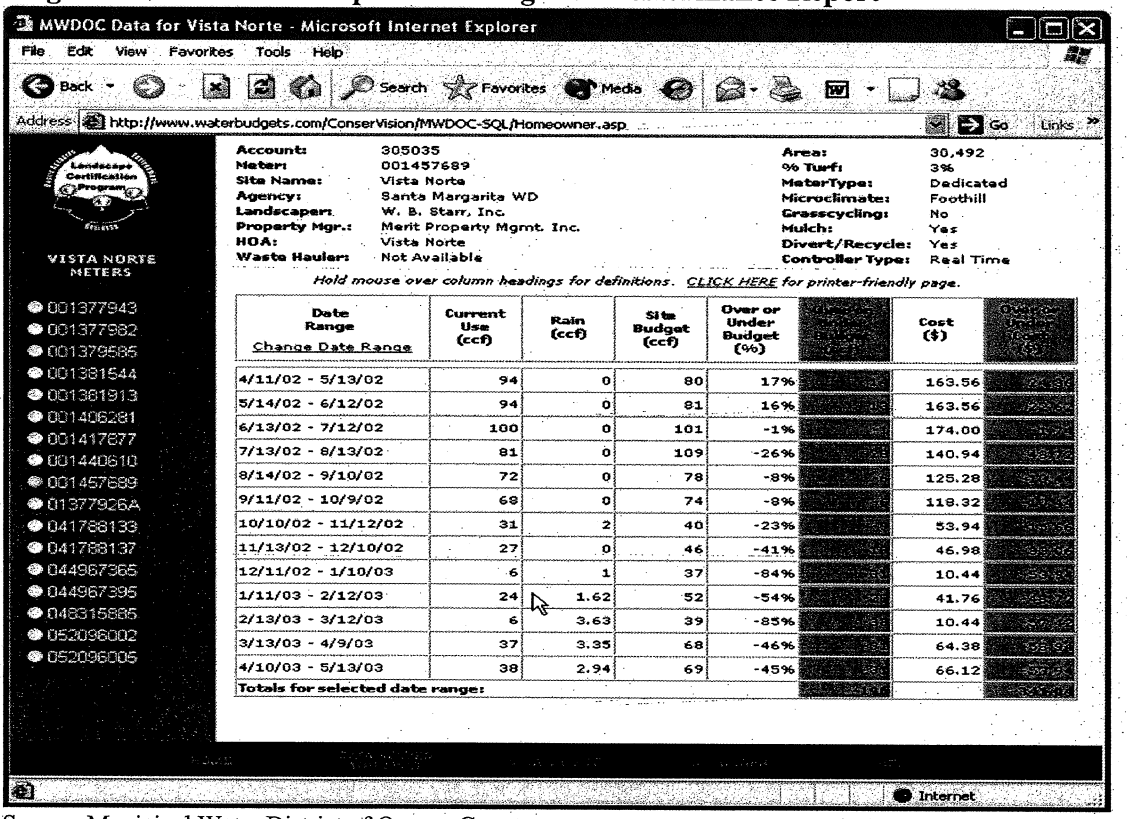
	YEAR				
San Clemente	0	38 Meters 33 acre-feet per year	151 Meters 129 acre-feet per year	134 Meters 115 acre-feet per year	168 Meters 144 acre-feet per year
South Coast Water District	0	0	62 Meters 53 acre-feet per year	21 Meters 18 acre-feet per year	83 Meters 71 acre-feet per year
Westminster, City of	0	0	0	9 Meters 8 acre-feet per year	18 Meters 16 acre-feet per year
Total	**629 Meters 539 acre-feet per year**	**900 Meters 771 acre-feet per year**	**1,489 Meters 1,277 acre-feet per year**	**1,278 Meters 1,095 acre-feet per year**	**1,925 Meters 1,650 acre-feet per year**

Source: Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Usually, three different parties are involved in managing landscapes associated with these meters: (i) the property owner (home owner association board of directors), (ii) the property manager, and (iii) the landscape contractor. This program creates a "Loop of Accountability" by providing regular (monthly or bi-monthly) irrigation performance reports to all three parties via the program website, www.waterbudgets.com. Participants are sent an e-mail informing them that their Irrigation Performance Report has been updated and requesting that they to log-on to the program website to view their latest reports. A monthly newsletter sent via e-mail encourages implementation of seasonally appropriate landscape maintenance practices, describes case studies, and provides a schedule of upcoming Protector del Agua classes. An example of an Irrigation Performance Report is provided as Figure 5-4-3-A.

Figure 5-4-3-A: An Example of an Irrigation Performance Report



MWDOC Data for Vista Norte - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.waterbudgets.com/ConserVision/MWDOC-SQL/Homeowner.asp

Go Links

VISTA NORTE METERS

- 001377943
- 001377982
- 001379586
- 001381544
- 001381913
- 001406281
- 001417677
- 001440610
- 001457689
- 01377926A
- 041788133
- 041788137
- 044967365
- 044967395
- 048315886
- 052096002
- 052096005

Account:	305035	**Area:**	30,492
Meter:	001457689	**% Turf:**	3%
Site Name:	Vista Norte	**MeterType:**	Dedicated
Agency:	Santa Margarita WD	**Microclimate:**	Foothill
Landscaper:	W. B. Starr, Inc.	**Grasscycling:**	No
Property Mgr.:	Merit Property Mgmt. Inc.	**Mulch:**	Yes
HOA:	Vista Norte	**Divert/Recycle:**	Yes
Waste Hauler:	Not Available	**Controller Type:**	Real Time

Hold mouse over column headings for definitions. CLICK HERE *for printer-friendly page.*

Date Range (Change Date Range)	Current Use (ccf)	Rain (ccf)	Site Budget (ccf)	Over or Under Budget (%)		Cost ($)	
4/11/02 - 5/13/02	94	0	80	17%		163.56	
5/14/02 - 6/12/02	94	0	81	16%		163.56	
6/13/02 - 7/12/02	100	0	101	-1%		174.00	
7/13/02 - 8/13/02	81	0	109	-26%		140.94	
8/14/02 - 9/10/02	72	0	78	-8%		125.28	
9/11/02 - 10/9/02	69	0	74	-8%		118.32	
10/10/02 - 11/12/02	31	2	40	-23%		53.94	
11/13/02 - 12/10/02	27	0	46	-41%		46.98	
12/11/02 - 1/10/03	6	1	37	-84%		10.44	
1/11/03 - 2/12/03	24	1.62	52	-54%		41.76	
2/13/03 - 3/12/03	6	3.63	39	-85%		10.44	
3/13/03 - 4/9/03	37	3.35	68	-46%		64.38	
4/10/03 - 5/13/03	38	2.94	69	-45%		66.12	
Totals for selected date range:							

Internet

Source: Municipal Water District of Orange County

Each participating landscaper, property manager, or homeowners' association has the ability to become certified as a good water manager through the program. Certification is based on irrigation management performance over time. It is the full intent of the program that every landscaper contractor and property management company receives program certification. The educational materials, training, site case studies, and monthly irrigation performance reports are designed to help accomplish across-the-board certification. The list of certified companies is posted on the web site and updated three times per year. The level of water budget performance per site determines higher levels of certification. With seasonal updating, companies may move up or down the certification scale.

The intent of the certification component of the program is to provide property managers and landscape-contracting companies with increased marketing opportunities for their services, increased business retention, and access to new business opportunities. The ability to recognize and promote certified companies can and should expand over the life of the program. Promotion will include:

- Advertisement of certified companies to local public agencies and their customers;

- Advertisement of certified companies to professional associations;

- Advertisement of certified companies through trade publications; and

- Potential advertisement of certified companies through local media outlets and the Internet.

NEW as of 2004 - SmarTimer Rebate Program

This regional program is available to all participating retail agencies and their customers. Residential and commercial customers are eligible to receive a rebate when they purchase and install a new, state-of-the-art, weather-based sprinkler timer. This advanced sprinkler timer technology has been shown to save 41 gallons per day per residential installation and to reduce runoff and pollution by 49%. A total of 5,000 residential and commercial SmarTimer installations are targeted over the next few years.

BMP No. 6 - High-Efficiency Washing Machine Rebate Programs

Orange County residents are eligible to receive a $100 rebate when they purchase a new High-Efficiency Clothes Washer (HECW). This program is sponsored by MWDOC, Metropolitan, and local retail water agencies. Rebates are available on a first-come, first-served basis, while funds last. Machines must be purchased after January 1, 2002 and installed in Orange County. Participants must be willing to allow an inspection of the installed machine for verification of program compliance. These machines use 15 to 25 gallons less water per load and, depending on use, can save 7,000 gallons of water per year. Effective as of May 1, 2005, machines must have a water factor of 6.0 or less. Participants are encouraged to contact their local gas and/or electric utility as additional rebates may be available.

As detailed in Table 5-4-3-D, more than 13,900 HECWs have been installed in single-family homes through this program. These retrofits are saving more than 160 acre-feet of potable water per year.

Table 5-4-3-D: Clothes Washers Replaced by Agency

Agency	Previous Years	FY 99/00	FY 00/01	FY 01/02	FY 02/03	FY03/04	Total for all Fiscal Years	Cumulative Water Savings across all Fiscal Years
Brea	0	0	0	17	107	178	302	9.60
Buena Park	0	0	0	9	45	88	142	4.47
Cap Valley	0	0	0	16	95	120	231	7.59
East Orange	0	0	0	3	8	20	31	0.98
El Toro	0	0	0	21	88	108	217	7.26
Fountain Valley	0	0	0	36	127	209	372	12.15
Garden Grove	0	0	0	39	173	278	490	15.85
Huntington Beach	0	0	0	114	486	857	1,457	46.73
Irvine Ranch	0	0	0	158	619	1,084	1,861	59.98
La Habra	0	0	0	8	40	86	134	4.17
La Palma	0	0	0	3	5	13	21	0.68
Laguna Beach	0	0	0	17	88	119	224	7.34
Mesa Consolidated	0	0	0	24	117	228	369	11.63
Moulton Niguel	0	0	0	158	630	841	1,629	54.15
Newport Beach	0	0	0	17	144	343	504	15.28
Orange	0	0	0	58	247	304	609	20.36
San Clemente	0	0	0	32	182	235	449	14.73
Santa Margarita	0	0	0	140	510	743	1,393	46.06
Santiago	0	0	0	1	7	4	12	0.43
Seal Beach	0	0	0	13	28	57	98	3.22
Serrano	0	0	0	9	16	54	79	2.47
So Cal Water	0	0	0	37	195	339	571	18.17
South Coast	0	0	0	35	138	165	338	11.39
Trabuco Canyon	0	0	0	10	63	76	149	4.91
Tustin	0	0	0	21	89	152	262	8.44
Westminster	0	0	0	37	159	235	431	14.10
Yorba Linda	0	0	0	36	214	342	592	18.93
MWDOC Totals	0	0	0	1,069	4,620	7,278	12,967	421.06
Acre-Feet Water Savings	0.0	0.0	0.0	13.8	59.5	93.7		
Anaheim	0	0	0	97	32	-	129	6.23
Fullerton	0	0	0	40	196	369	605	19.14
Santa Ana	0	0	0	15	69	188	272	8.28
Non-MWDOC Totals	0	0	0	152	297	557	1,006	33.65
Acre-Feet Water Savings	0.0	0.0	0.0	0.2	0.8	1.2		
Orange County Totals	0	0	0	1,221	4,917	7,835	13,973	455
Acre-Feet Water Savings	0.0	0.0	0.0	13.9	60.3	94.9		

Source: Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

BMP No. 7 - Public Information Programs

MWDOC's water use efficiency public information programs are built around communication, coordination and partnerships with its member agencies and cities, Metropolitan, and other local, state, and federal legislative and regulatory bodies. MWDOC's information programs are carried out on behalf of and in coordination with its member agencies. The goal is to help the member agencies and public understand current issues and the challenges, opportunities and costs involved in securing a reliable supply of high quality water.

Through a variety of public information programs, MWDOC assists its member agencies in reaching the public with accurate information regarding present and future water supplies, the demands for a suitable quantity and quality of water, and the importance of implementing water efficient techniques and behaviors. MWDOC also assists its member agencies in publicizing the availability of water use efficiency programs and technologies throughout Orange County.

Public Affairs Workgroup

MWDOC's Public Affairs Department conducts monthly meetings with its members' public affairs and customer service representatives to coordinate public outreach efforts and to share information and ideas. Through the Public Affairs Workgroup, MWDOC facilitates and ensures message consistency, especially when promoting water use efficiency programs and workshops. The workgroup also serves as a vehicle through which MWDOC can disseminate to its member agencies important materials and information sent by Metropolitan on regional marketing and advertising programs, including outdoor irrigation.

Poster/Slogan Contest

Each year, MWDOC and its member agencies honor elementary school students as winners in the "Water is Life" Poster and Slogan Contest. As part of MWDOC's school education program, MWDOC solicits entries to the contest throughout the fall and winter. More than 1,000 entries are typically received. Winners are recognized in May and June at either a member agency board of directors meeting or at a city council meeting, depending upon the area in which the student residents. A member of the MWDOC Board of Directors also attends, which allows both organizations (MWDOC and the water retailer) to honor the student. The winning artwork and slogans are incorporated into a school-year calendar that is distributed to every classroom in Orange County the following academic year. In 2005 another venue in which to promote the water-conservation message was identified: the Orange County Youth Expo, an annual event held at the Orange County Fair Grounds. Winning artwork and slogans were displayed during the weeklong event, which drew hundreds of thousands of school-aged children and their families.

Local and Regional Events

Through its participation in the Association of California Water Agencies and the California Water Awareness Campaign, MWDOC also supports and participates in statewide events and activities throughout Water Awareness Month. This includes procuring a proclamation from the State Governor, distributing media kits and distributing water education kits to classrooms, all of which reinforce the need to use water wisely, especially in the semi-arid Southern California region.

Speakers Bureau

MWDOC receives approximately 50 requests annually from civic, business, community, and homeowner groups for presentations on key issues affecting Orange County's water supply. MWDOC's water use efficiency programs and conservation tips for residents and businesses are integrated into our presentation. Printed pieces explaining rebate programs (i.e. SmarTimer Rebate Program, High Efficiency Clothes Washer Rebate Program) and other programs (residential and commercial landscaping workshops, landscaper certification) are distributed, and the programs are promoted. MWDOC staff also works with member agency representatives to assist them in being informed and effective spokespersons on these topics.

Facility Inspection Trips

Each of MWDOC's appointed Metropolitan directors is entitled each year by Metropolitan to sponsor inspection trips of the Colorado River Aqueduct, the State Water Project, and the Diamond Valley Lake. MWDOC takes full advantage of this opportunity by inviting public administrators, elected officials, community leaders, and members of the media to attend these highly educational inspection trips. MWDOC's aim is to familiarize trip guests about the facilities that bring imported water into Southern California, and the need to augment supplies from these facilities to keep up with growing demand. MWDOC optimizes these opportunities to educate guests by distributing information on water use efficiency programs and services available in Orange County.

Information Materials

MWDOC Public Affairs staff regularly produces informational materials, including newsletters, fact sheets, brochures, issue bulletins, manager's reports, annual reports, briefing books, press kits, exhibit booths and displays. These materials are made available to the public and to our member agencies and cities. MWDOC also provides information via the Internet on its website, www.mwdoc.com. A consistent and high-profile message in each of these information pieces is the critical need to follow water use efficiency practices and their cumulative impact on Orange County.

Water Quality Reports

Each year, MWDOC coordinates the production of Water Quality Reports for each of its member agencies and cities. These reports, required by the California Department of Health Services, are distributed to all residents of Orange County via the retail water agencies. The reports include information about the sources of water for each customer and quality of that source water, as well as the quality of the water that consumers get from

their taps. The reports also provide MWDOC with the opportunity to include messages about water use efficiency and conservation to all county residents.

Media Relations

MWDOC is a credible source of information to the media for regional and statewide water issues, as well as water issues within Orange County. In addition, staff keeps environment reporters apprised of key conservation issues and messages, which are often integrated into general-interest articles. Staff also prepares press releases on local and regional issues, and provides template press releases that can be tailored for local use by our member agencies and cities. This message consistency has worked well in Orange County, especially as we disseminate information on water use efficiency.

BMP No. 8 - School Education Programs

BMP No. 8 focuses on the implementation of a school education program to promote water conservation and water conservation-related benefits.

One of the most successful and well-recognized water-education curriculums in Southern California is MWDOC's School Education Program. For more than 30 years, MWDOC teachers, assisted by mascot "Ricki the Rambunctious Raindrop," have been educating students in grades K-12 about the water cycle, the importance and value of water, and the personal responsibility we all have as environmental stewards

Since its inception in January 1973, the MWDOC School Education Program has evolved into what has become the standard for all water-education curriculum. To date, nearly 2.5 million Orange County students have benefited from the program.

In 2004, MWDOC formed an exciting partnership with the Discovery Science Center that has allowed both organizations to reach more Orange County students each year and provide them with even greater educational experiences in the areas of water and science. Table 5-4-3-E provides an implementation summary of the school education Program.

Table 5-4-3-E: Implementation Summary for MWDOC School Education Program

	FY 00-01	FY 01-02	FY 02-03	FY 03-04	FY 04-05
Student Participants	118,522	109,919	101,826	66,550	49,433

Source: Municipal Water District of Orange County

BMP No. 9 - Conservation Programs for Commercial, Industrial and Institutional Accounts

The goal of BMP No. 9 is to identify and rank commercial, industrial, and institutional customers according to use and to establish long-term implementation targets for the replacement of high-water-using toilets with Ultra Low Flush Toilets in the Commercial Industrial and Insitutional sector.

Save Water - Save a Buck!

This program began in 2002 and offers rebates to assist commercial, industrial, and institutional customers in replacing high-flow plumbing fixtures with low-flow fixtures. Facilities where low-flow devices are installed must be located in Orange County. Rebates are available only on those devices listed in Table 5-4-3-F below and must replace higher water use devices. Installation of devices is the responsibility of each participant. Participants may purchase and install as many of the water saving devices as is applicable to their site.

Table 5-4-3-F: Retrofit Devices and Rebate Amounts Available Under the "Save Water – Save a Buck!" Program

Retrofit Device	Rebate Amount
Ultra-Low-Flush Toilet	$60 to $120
Ultra-Low-Flush Urinal or Waterless Urinal	$60
Flush Valve Retrofit Kit	$15
Coin/Card-Operated High Efficiency Commercial Clothes Washer	$250
Cooling Tower Conductivity Controller	$500
Hospital X-ray Film Processor Re-circulating System	$2,000
Water Pressurized Broom	$100

Source: Municipal Water District of Orange County

As detailed in Table 5-4-3-G below, more than 5,800 water wasting plumbing fixtures have been replaced with low flow fixtures through this program. These retrofits are saving more than 560 acre-feet of potable water per year.

Table 5-4-3-G: Commercial, Industrial, Institutional (CII) Retrofit Devices Replaced by Agency

Agency	Previous Years	FY 99/00	FY 00/01	FY 01/02	FY 02/03	FY 03/04	Total for all Fiscal Years	Cumulative Water Savings across all Fiscal Years
Brea	0	0	0	0	2	0	2	13
Buena Park	0	0	0	10	17	28	55	23
Cap Valley	0	0	0	0	0	21	21	5
East Orange	0	0	0	0	0	0	0	0
El Toro	0	0	0	23	20	73	116	35
Fountain Valley	0	0	0	1	28	2	31	9
Garden Grove	0	0	0	21	53	51	125	33
Huntington Beach	0	0	0	5	63	73	141	63
Irvine Ranch	0	0	0	155	919	87	1,161	455
La Habra	0	0	0	10	13	52	75	16
La Palma	0	0	0	0	0	0	0	0
Laguna Beach	0	0	0	2	1	2	5	1
Mesa Consolidated	0	0	0	424	37	22	483	85
Moulton Niguel	0	0	0	31	8	65	104	28
Newport Beach	0	0	0	4	144	9	157	61
Orange	0	0	0	84	21	22	127	69
San Clemente	0	0	0	0	2	5	7	2
Santa Margarita	0	0	0	0	1	3	4	1
Santiago	0	0	0	0	0	0	0	0
Seal Beach	0	0	0	3	0	44	47	12
Serrano	0	0	0	0	0	0	0	0
So Cal Water	0	0	0	11	66	34	111	68
South Coast	0	0	0	0	3	8	11	2
Trabuco Canyon	0	0	0	0	0	0	0	0
Tustin	0	0	0	9	64	16	89	34
Westminster	0	0	0	16	5	32	53	15
Yorba Linda	0	0	0	0	4	12	16	28
MWDOC Totals	**0**	**0**	**0**	809	1,471	661	2,941	1,059
Acre-Feet Water Savings	0.0	0.0	0.0	56.9	223.8	80.1		
Anaheim	0	0	0	1,042	400	647	2,089	299
Fullerton	0	0	0	28	41	28	97	49
Santa Ana	0	0	0	115	142	419	676	215
Non-MWDOC Totals	**0**	**0**	**0**	1,185	583	1,094	2,862	564
Acre-Feet Water Savings	0.0	0.0	0.0	50.5	50.8	104.6		
Orange County Totals	**0**	**0**	**0**	**1,994**	**2,054**	**1,755**	**5,803**	**1,623**
Acre-Feet Water Savings	0.0	0.0	0.0	107.4	274.6	184.7		

[1] Retrofit devices include ULF Toilets and Urinals, High Efficiency Clothes Washers, Cooling Tower Conductivity Controllers, Flush Valve Retrofit Kits, Pre-rinse Spray heads, Hospital X-Ray Processor Recirculating Systems, and Water Pressurized Brooms.

Source: Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data takes precedence.

BMP No. 10 - Wholesale Agency Assistance Programs

MWDOC provides financial incentives, conservation-related technical support, and regional implementation of a variety of BMP-based programs. In addition, MWDOC conducts research projects to evaluate implementation of both existing programs and new pilot programs. Examples of this research include the *Orange County Saturation Study* (2001), the *Residential Runoff Reduction Study* (2004), and the *Evaluation of the Landscape Performance Certification Program* (2004). Greater detail describing MWDOC's role in supporting and implementing water use efficiency programs in Orange County is contained in Section 5.4.2.

BMP No. 11 - Conservation Pricing

MWDOC publishes annually the *Orange County Water Agencies Water Rates, Water System Operations, and Financial Information* survey. This survey documents the rates charged by each retail water agency, as well as the type of rate structure, i.e., a flat rate, inclined block, or seasonal rate structure. Table 5-4-3-H provides a brief summary of the types of rates used by retail water agencies in Orange County and shows a slow progression away from uniform rates.

Table 5-4-3-H: Summary of Rate Structure Types Used in Orange County

Types of Rate Structure	Number of Agencies Utilizing Different Rate Structure Types					
	1991	2000	2001	2002	2003	2004
Declining Block	0	0	0	0	0	0
Uniform or Flat	22	19	16	19	16	15
Inclined Block	13	10	12	13	12	13
Seasonal Inclined Block	1	3	3	1	3	3

Source: Municipal Water District of Orange County

BMP No. 12 - Conservation Coordinator

All retail water agencies in Orange County have designated water conservation coordinators, regardless of signatory status to the Memorandum of Understanding. All retail water agencies in Orange County are actively implementing BMPs in their service areas.

BMP No. 13 – Water Waste Prohibitions

In 2004, MWDOC conducted a survey documenting water waste prohibitions enacted at each retail water agency in Orange County and compared enacted prohibitions to the BMP requirement. This survey revealed that out of the 16 agencies that responded, only one agency was in full compliance with the BMP. The remaining agencies were in partial compliance. In addition, the enacted prohibitions were not centrally located

in one section, but generally dispersed throughout each agency's regulations, thus making the survey a difficult process.

As a result of the survey findings, staff began working with retail and regional water agencies and surface water quality agencies to develop a menu of suggested items local agencies could adopt to augment their existing regulations in order to both comply with the BMP and better manage pollutant-laden nuisance runoff. This menu of suggestions will be promoted to local agencies for their consideration in 2005.

BMP No. 14 - Residential Ultra Low Flush Toilet Replacement Programs

Over the past 13 years, MWDOC has continuously implemented regional Ultra Low Flush Toilet Rebate and/or Distribution Programs targeting single- and multi-family homes in Orange County. All retail agencies encourage participation by their customers. MWDOC develops, prints, and provides marketing materials such as water bill inserts, direct mailers, or brochures for retail agencies to distribute to their customers.

As detailed in Table 5-4-3-I below, more than 351,000 high volume flush toilets have been replaced with ultra-low-flush toilets through these programs, with more than 230,000 being replaced over the past five years. The total of these retrofits is saving more than 11,700 acre-feet of potable water per year.

Table 5-4-3-I: Toilets Replaced by Agency

Agency	Previous Years	FY 99/00	FY 00/01	FY 01/02	FY 02/03	FY 03/04	Total for all Fiscal Years	Cummulative Water Savings across all Fiscal Years
Brea	1,287	144	867	585	341	401	**3,625**	**591**
Buena Park	2,161	469	524	1,229	2,325	1,522	**8,230**	**1,021**
Capistrano Valley	2,202	1,319	347	152	201	151	**4,372**	**952**
East Orange CWD RZ	113	17	15	50	41	44	**280**	**41**
El Toro WD	3,958	171	310	564	472	324	**5,799**	**1,242**
Fountain Valley	3,874	2,355	1,697	1,406	1,400	802	**11,534**	**1,856**
Garden Grove	10,811	3,556	2,423	3,855	3,148	2,117	**25,910**	**4,358**
Huntington Beach	13,183	3,492	3,281	2,698	3,752	1,901	**28,307**	**5,204**
Irvine Ranch WD	9,252	3,251	1,531	1,874	2,242	6,726	**24,876**	**3,938**
Laguna Beach CWD	717	306	220	85	271	118	**1,717**	**312**
La Habra	2,472	105	582	645	1,697	1,225	**6,726**	**945**
La Palma	636	132	518	173	343	193	**1,995**	**311**
Mesa Consol. WD (100%)	7,673	1,956	1,393	1,505	2,387	988	**15,902**	**2,828**
Moulton Niguel WD	3,035	475	716	891	728	684	**6,529**	**1,146**
Newport Beach	2,535	1,223	438	463	396	1,883	**6,938**	**1,028**
Orange	4,978	2,263	1,778	2,444	2,682	1,899	**16,044**	**2,435**
San Clemente	752	198	667	483	201	547	**2,848**	**409**
Santa Margarita	2,642	456	1,258	790	664	260	**6,070**	**1,079**
Santiago	94	5	3	28	21	15	**166**	**34**
Seal Beach	1,108	155	132	81	134	729	**2,339**	**364**
Serrano WD	265	52	95	73	123	98	**706**	**115**
So. Cal. Water Co.	12,209	2,957	1,379	2,143	3,222	1,870	**23,780**	**4,468**
South Coast	759	181	133	358	191	469	**2,091**	**312**
Trabuco Canyon WD	197	21	40	181	102	30	**571**	**87**
Tustin	3,446	1,292	1,508	1,206	1,096	827	**9,375**	**1,588**
Westminster	5,611	2,291	2,304	1,523	2,492	1,118	**15,339**	**2,417**
Yorba Linda WD	1,844	1,400	759	1,690	1,155	627	**7,475**	**1,079**
MWDOC Totals	97,814	30,242	24,918	27,175	31,827	27,568	**239,544**	**40,160**
Acre-Feet Water Savings	3,261.3	1,008.3	830.8	906.1	1,061.2	919.2		
Anaheim	8,705	7,551	4,593	6,346	9,707	5,075	**41,977**	**5,470**
Fullerton	5,847	2,138	1,926	2,130	2,213	1,749	**16,003**	**2,596**
Santa Ana	9,097	8,788	5,614	10,822	10,716	9,164	**54,201**	**6,652**
Non-MWDOC Totals	23,649	18,477	12,133	19,298	22,636	15,988	**112,181**	**14,719**
Acre-Feet Water Savings	788.5	616.1	404.5	643.4	754.7	533.1		
Orange County Totals	121,463	48,719	37,051	46,473	54,463	43,556	**351,725**	**54,879**
Acre-Feet Water Savings	4,049.8	1,624.4	1,235.3	1,549.5	1,815.9	1,452.2	11,727.1	

Source: Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

References:

California Urban Water Conservation Council. *Memorandum of Understanding Regarding Urban Water Conservation in California.* 1991.

Chesnutt, Ph.D., Thomas W., David M. Pekelney, Ph.D, and Maureen Erbeznik. *Evaluation of the Landscape Performance Certification Program.* 2004.

Metropolitan Water District of Southern California. *Protector del Agua Training Program: Condensed Residential Class Description.* 2004.

Metropolitan Water District of Southern California. *Protector del Agua: Professional Course Description.* 2004

Metropolitan Water District of Southern California and **Municipal Water District of Orange County.** *Orange County Saturation Study.* 2001.

Municipal Water District of Orange County. *2000 Regional Urban Water Management Plan.* 2000.

Municipal Water District of Orange County and **Irvine Ranch Water District.** *The Residential Runoff Reduction Study.* 2004

Municipal Water District of Orange County, *Orange County Water Agencies Water Rates, Water System Operations, and Financial Information.* 2004

State of California. *Urban Water Management Planning Act.*

6.0 WASTEWATER MANAGEMENT AND WATER RECYCLING

Information presented in this section is collected based on the best available information from each of Municipal Water District of Orange County (MWDOC)'s member agencies at the time of drafting. The information is presented to provide a regional summary within the MWDOC service area. MWDOC has made every effort to coordinate information during the preparation of this section in a manner that is consistent with local agencies' Urban Water Management Plans. In the event of a discrepancy, the local retail agency plan should be consulted.

6.1 Agency Participation in Recycled Water Planning

Recycled water planning within MWDOC's service area requires close coordination with multiple agencies that, in many instances, have overlapping jurisdictional boundaries, leading to institutional hurdles. A six-year study, *the Southern California Comprehensive Water Reclamation and Reuse Study* (SCCWRRS), led by the United States Bureau of Reclamation was completed in 2002 identifying short- and long-term recycled water implementation plans for areas throughout California, including four sub-regional plans within MWDOC's service area. Applicable partners in development of the plan, as it relates to Orange County, included the Metropolitan Water District of Southern California (Metropolitan) and the South Orange County Water Reclamation Authority, the predecessor to the current South Orange County Wastewater Authority (SOCWA). A Project Advisory Committee (PAC) was formed for the Orange County region that included multiple representatives as identified in Table 6-1-A.

Roles of PAC members included setting priorities and establishing objectives and criteria to satisfy regional recycling water needs. Other local water and wastewater agencies within MWDOC's service area contributed data towards planning efforts. Results of the study are discussed in Section 6.5.1.

Other recycled water planning efforts in MWDOC's service area are occurring in smaller geographical areas. Currently, the South Orange County Integrated Regional Water Management Plan is being developed by multiple cities and agencies in southern Orange County. When complete this plan will incorporate recycled water projects into its overall integrated approach to water resources planning for the region. SOCWA, a joint powers authority with ten member agencies, plays a large role in development of the plan as it coordinates recycled water and wastewater planning efforts for its members in southern Orange County. Plan participants are listed in Table 6-1-A.

In the northern part of the County, recycled water planning efforts are led by the Orange County Sanitation District (OCSD), Orange County Water District (OCWD), and Irvine Ranch Water District (IRWD). OCSD provides wastewater treatment in northern and central Orange County. OCWD further processes this wastewater to meet applicable standards in Title 22, Division 4, of the California Code of Regulation for recycled water for sea water barrier use, groundwater recharge, and irrigation. OCWD also manages the Orange County Groundwater

Basin. IRWD treats its own wastewater and coordinates its recycled water production with SOCWA, OCSD, and OCWD as its boundaries overlap with these agencies.

Table 6-1-A: Recycling Plan Agency Coordination

	Participants	Study	
		Southern California Comprehensive Water Reclamation and Reuse Study	South Orange County Integrated Regional Water Management Plan
Water Agencies	Municipal Water District of Orange County	X	X
	City of Anaheim	X	
	City of San Clemente		X
	City of San Juan Capistrano	X	X
	Laguna Beach County Water District		X
	Metropolitan Water District of Southern California	X	
Water/Wastewater Agencies	Irvine Ranch Water District	X	X
	Aliso Water Management Agency	X	
	El Toro Water District	X	X
	Moulton Niguel Water District	X	X
	Los Alisos Water District[1]	X	
	South Coast Water District	X	X
	Trabuco Canyon Water District	X	X
	Santa Margarita Water District	X	X
Wastewater Agencies	Orange County Sanitation District	X	
	South Orange County Reclamation Authority[2]	X	
	County Sanitation Districts of Los Angeles	X	
	South Orange County Wastewater Authority		X
Groundwater Agencies	Orange County Water District	X	
	San Juan Basin Authority		X
Planning/Other Agencies	Santa Ana Watershed Project Authority	X	
	Orange County Public Facilities and Resources	X	
	US Bureau of Reclamation	X	
	California Department of Water Resources	X	X
	Natural Resources Conservation District		X
	Orange County Health Care Agency		X
	Regional Water Quality Control Board - 9		X
	County of Orange		X
	Orange County Flood Control District		X

Sources:

1) *Southern California Comprehensive Water Reclamation and Reuse Study*

2) *2005 Draft South Orange County Integrated Regional Water Management Plan*

Notes:

[1] Annexed into Irvine Ranch Water District

[2] Merged into SOCWA

Individual wastewater collection and treatment providers and water agencies within MWDOC's service area were contacted as a part of recycled water planning efforts for this Urban Water Management Plan (Plan), combined with a review of the aforementioned studies. Operating information was reviewed and individual agencies were interviewed. For wastewater collection treatment providers, the following information was researched to gain an understanding of disposal methods, treatment levels, discharge volumes, and recycle use. For water agencies the following information was researched: projected recycled water uses, potential recycled water demands, and barriers to expanding recycled water systems. Wastewater and collection treatment providers and water agencies involved in

coordination of recycled water planning for this Plan are listed in Table 6-1-B below.

Table 6-1-B: Agencies Contacted for Recycled Water Planning

Orange County Sanitation District	South Orange County Wastewater Authority
Orange County Water District	Irvine Ranch Water District
Trabuco Canyon Water District	Moulton Niguel Water District
South Coast Water District	Mesa Consolidated Water District
City of San Juan Capistrano	City of Newport Beach
City of Fountain Valley	City of San Clemente
El Toro Water District	Santa Margarita Water District

6.2 Wastewater Collection and Treatment Systems

Wastewater collection and treatment within MWDOC's service area is managed by multiple agencies ranging from local agencies handling both potable water and wastewater to large regional agencies. Table 6-2-A summarizes the past, current, and projected (under normal weather) wastewater volumes collected and treated, and the quantity of wastewater treated to recycled water standards for treatment plants within MWDOC's service area. Table 6-2-B summarizes the disposal method, treatment levels, and past, current, and projected discharge volumes.

Table 6-2-A: Wastewater Collection and Treatment in MWDOC's Service Area

	Avarage Wastewater Collected							Quantity Meeting Recycled Water Standards						
Wastewater Plant	2000	2005	2010	2015	2020	2025	2030	2000	2005	2010	2015	2020	2025	2030
OCSD														
Reclamation Plant No. 1	97,408	97,408	156,748	176,902	198,175	198,175	198,175	0	0	0	0	0	0	0
Treatment Plant No. 2	171,304	169,064	161,227	161,227	161,227	161,227	161,227	0	0	0	0	0	0	0
OCWD[1]														
Green Acres Project	0	0	0	0	0	0	0	6,606	11,196	11,196	11,196	13,436	13,436	13,436
Water Factory 21	0	0	0	0	0	0	0	16,794	0	0	0	0	0	0
Initial 5 MGD GWR System	0	0	0	0	0	0	0	0	5,598	0	0	0	0	0
Full GWR System	0	0	0	0	0	0	0	0	0	109,724	109,724	145,552	145,552	145,552
SOCWA														
Bo Sereno Treatment Plant	3,695	4,255	4,814	5,934	5,934	5,934	5,934	1,008	952	1,120	1,120	1,120	1,120	1,120
JB Latham WWTP	11,196	10,077	10,637	10,637	10,637	10,637	10,637	0	0	4,479	4,479	4,479	4,479	4,479
Plant 3A	2,575	3,919	3,359	3,639	3,639	3,639	3,639	1,791	1,344	1,120	1,344	1,344	1,344	1,344
Regional Treatment Plant	11,532	10,972	11,196	11,476	11,476	11,476	11,476	4,590	6,382	6,718	6,998	7,278	7,837	7,837
El Toro Water District														
El Toro WWTP	4,702	5,625	5,723	5,849	5,974	6,100	6,225	430	430	575	575	575	575	575
Santa Margarita Water District														
Chiquita WRP	5,264	6,720	10,080	12,096	14,224	15,680	15,680	0	2,377	4,329	6,516	8,016	8,016	8,016
Oso Creek WRP	1,495	1,495	2,561	2,000	2,000	2,000	2,000	1,495	1,495	2,561	2,000	2,000	2,000	2,000
Trabuco Canyon Water District	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Robinson Ranch WRP	784	850	956	1,000	1,000	1,000	1,000	784	850	956	1,000	1,000	1,000	1,000
City of San Clemente														
San Clemente WRP	5,150	5,150	5,150	6,718	6,718	6,718	6,718	2,463	2,463	2,463	4,479	4,479	4,479	4,479
Irvine Ranch Water District														
Michelson WRP	14,224	17,320	20,272	21,504	22,624	24,192	24,434	14,555	17,914	30,230	33,589	35,828	36,948	36,948
Los Alisos WRP	4,816	5,936	7,652	8,064	8,176	8,176	8,176	4,816	5,936	7,952	8,064	8,176	8,176	8,176
Total	334,179	338,825	400,409	427,080	451,838	454,988	455,355	55,366	56,971	183,457	191,118	233,317	234,996	234,996

Sources: Agency interviews, Orange County Sanitation District Interim Strategic Plan Update, www.tcwd.ca.gov, Jim Herberg OCSD, and Bruce Chalmers, CDM
1) Agency interviews conducted by Camp Dresser & McKee's for Municipal Water District of Orange County
2) Orange County Sanitation District, Orange County Sanitation District Interim Strategic Plan Update
3) www.tcwd.ca.gov (Tabuco Canyon Water District website)
4) Jim Herberg, Orange County Sanitation District
5) Bruce Chalmers, Camp Dresser & McKee's
Notes:
[1] Projections end in 2020, assumes 2020 projections are the same for 2025
[2] Receives secondary treated effluent from OCSD Reclamation Plant No. 1 for treatment to recycled water standards.
[3] Interpolated 2015-2025 using build-out of 1,949 acre-feet/year in 2030.
[4] 2025 flow assumes expansion complete. Values assume HATS flow go to Michelson
[5] Assumes no El Toro panhandle flows.

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Table 6-2-B: Disposal of Non-Recycled Wastewater in MWDOC's Service Area

			Wastewater Discharged						
Wastewater Plant	Disposal Method	Treatment Level	2000	2005	2010	2015	2020	2025	2030
OCSD									
Reclamation Plant No. 1	Ocean Outfall	Primary and Secondary	74,008	80,614	35,828	55,982	39,187	39,187	39,187
Treatment Plant No. 2	Ocean Outfall	Primary and Secondary	171,304	169,064	161,227	161,227	161,227	161,227	161,227
OCWD[2]									
Green Acres Project	No Discharge		0	0	0	0	0	0	0
Water Factory 21	No Discharge		0	0	0	0	0	0	0
GWR System	No Discharge		0	0	0	0	0	0	0
SOCWA									
Coastal Treatment Plant	Ocean Outfall	Secondary/Tertiary	2,687	3,303	3,694	4,814	4,814	4,814	4,814
JB Latham WWTP	Ocean Outfall	Secondary/Tertiary	11,196	10,077	6,158	6,158	6,158	6,158	6,158
Plant 3A	Ocean Outfall	Secondary/Tertiary	784	2,575	2,239	2,295	2,295	2,295	2,295
Regional Treatment Plant	Ocean Outfall	Secondary/Tertiary	6,942	4,590	4,478	4,478	4,198	3,639	3,639
El Toro Water District									
El Toro WWTP	Ocean Outfall	Secondary	4,272	5,195	5,148	5,274	5,399	5,525	5,650
Santa Margarita Water District									
Chiquita WRP	Ocean Outfall	Tertiary	5,264	4,343	5,751	5,580	6,208	7,664	7,664
Oso Creek WRP	No Discharge		0	0	0	0	0	0	0
Nichols Institute WRP	No Discharge		0	0	0	0	0	0	0
Trabuco Canyon Water District									
Robinson Ranch WRP	No Discharge		0	0	0	0	0	0	0
City of San Clemente									
San Clemente WRP	Ocean Outfall	Secondary/Tertiary	2,687	2,687	2,687	2,239	2,239	2,239	2,239
Irvine Ranch Water District									
Michelson WRP	No Discharge		0	0	0	0	0	0	0
Los Alisos	Ocean Outfall	Secondary/Tertiary	594	3,472	4,110	4,110	4,110	4,110	4,110
Sub-Total			279,738	285,920	231,320	252,157	235,835	236,858	236,983
Unused Recycled Water Disposed	Ocean Outfall	Title 22	19,263	16,470	49,768	46,416	82,749	81,667	81,909
Total			**299,001**	**302,390**	**281,088**	**298,573**	**318,584**	**318,525**	**318,892**

Sources: Agency interviews, Orange County Sanitation District Interim Strategic Plan Update, RWQCB
1) Agency interviews conducted by Camp Dresser & Mckee's for Municipal Water District of Orange County
2) Regional Water Quality Control Board
3) Orange County Sanitation District, *Orange County Sanitation District Interim Strategic Plan Update*
Note:
[1] Does not account for wastewater sent to OCWD for treatment to recycled water standards.

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Wastewater is treated to various treatment levels. Within the MWDOC service area all wastewater is treated to a minimum of a advanced primary treatment. Wastewater treatment is a series of processes that are designed to progressively remove solids to a level established in regulatory water quality standards. Primary treatment separates settleable and floatable solids from the wastewater for additional wastewater treatment. Secondary treatment removes more solids through biological treatment and further sedimentation and converts organic matter into harmless by-products. Finally, during the tertiary treatment process any remaining impurities are removed through filtration. All wastewater within the MWDOC service area is treated to a minimum of a secondary treatment level for non-OCSD treatment facilities. Currently, treated effluent from OCSD is a blend of advanced primary and secondary treated wastewater. Full secondary treatment of all OCSD effluent flows is not anticipated to occur before 2013.

Additional treatment maybe required to meet recycled water standards. All recycled water must meet Title 22 standards. Title 22, Division 4, of the California Code of Regulations establishes recycled water quality standards and treatment reliability criteria dependent upon the end use of recycled water to protect public health. Both secondary and tertiary treated wastewater can meet Title 22 standards

dependent upon the end use of the water. All water not meeting recycled water standards is discharged through ocean outfalls in MWDOC's service area. Recycled water produced in excess of demands is also disposed through the outfalls.

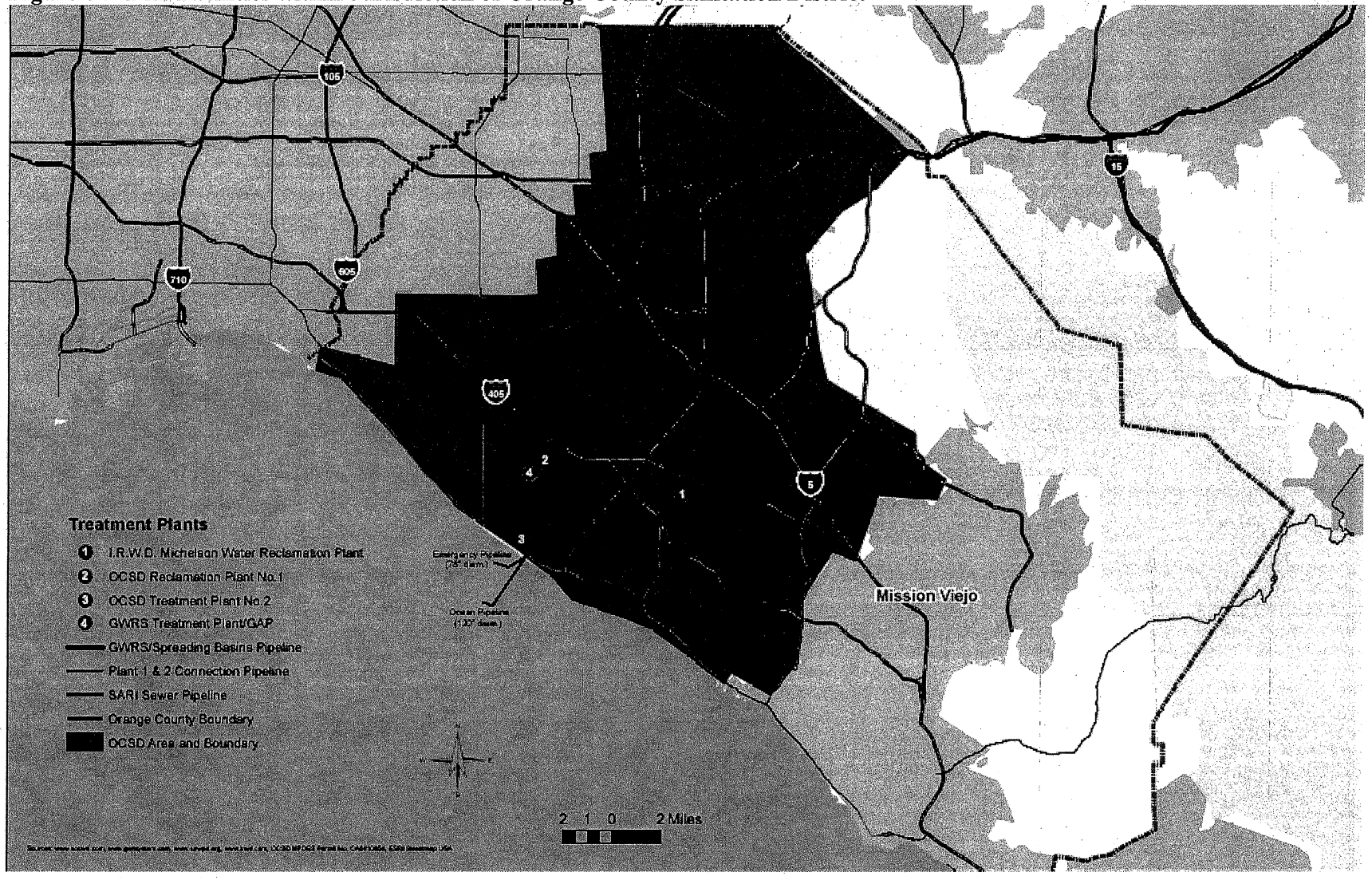
6.2.1 Orange County Sanitation District

OCSD collects wastewater from residential, commercial, and industrial customers in 21 cities, three special districts, and portions of unincorporated Orange County, totaling 471 square miles serving approximately 2.4 million residents. Its wastewater system is the third largest west of the Mississippi River. OCSD treats an average daily flow of 264 MGD or approximately 266,472 acre-feet per year. These flows include dry weather urban runoff collected from 15 diversion points and discharged into the sewer system for treatment and Santa Ana River Interceptor flows from the upper Santa Ana watershed. During the dry weather period, May through September, diverted flows range between 0.7 to 2.6 MGD. During wet months, diverted flows range from 0.4 to 1.4 MGD.

OCSD operates and maintains two treatment plants: Reclamation Plant No. 1, located in Fountain Valley with a capacity of 218 MGD, and Treatment Plant No. 2 located in Huntington Beach with a capacity of 168 MGD. OCSD also operates 650 miles of collection system, with pipelines ranging in size from 6 to 96 inches in diameter along with 20 pump stations. The treated wastewater is discharged to the Pacific Ocean via an ocean outfall in strict and consistent compliance with state and federal requirements as set forth in OCSD's National Pollutant Discharge Elimination System permit, while approximately 10 MGD is reclaimed at facilities operated by the OCWD. OCSD's outfall is 120 inches in diameter and extends four miles into the ocean with an additional one mile long diffuser. Its high tide hydraulic capacity is 480 MGD. A 78-inch-diameter outfall extending one mile offshore is available for emergency situations. Two additional outfalls are located at the Santa Ana River for use in extreme emergency overflow conditions only. Figure 6-2-1-A graphically depicts the location of the outfall and emergency ocean outfall.

Biosolids are 100% land applied as an agricultural soil amendment, while grit and screenings are transported under contract for landfill disposal.

Figure 6-2-1-A: Facilities within Jurisdiction of Orange County Sanitation District



Source: Prepared by Camp, Dresser, and McKee for Municipal Water District of Orange County

Reclamation Plant No. 1

Reclamation Plant No. 1 treats raw wastewater conveyed from six major sewer lines. On average the plant treats approximately 120 MGD of wastewater. The maximum treatment capacity is 218 MGD. The plant provides advanced primary and secondary treatment and supplies secondary treated water to OCWD for further treatment to recycled water standards and distribution. This is the only OCSD treatment plant that provides water to OCWD for reclamation. An interplant pipeline allows flows to be conveyed to Treatment Plant No. 2. Management of interplant flows allows for minimum flow requirements for reclamation facilities to be met during off-peak hours.

Treatment Plant No. 2

Treatment Plant No. 2 provides a mix of advanced primary and secondary treatment. Influent is received via five major sewers and Reclamation Plant No. 1. The average dry weather treatment flow rate is 144 MGD. The maximum treatment capacity is 168 MGD. All treated wastewater is discharged to the ocean through the ocean outfall.

OCSD's 2002 Interim Strategic Plan identifies numerous projects that will improve management of water resources within its service area. Future projects related to wastewater and recycled water include:

- Dry weather diversion, dairy washwater diversions, and water conservation activities; and

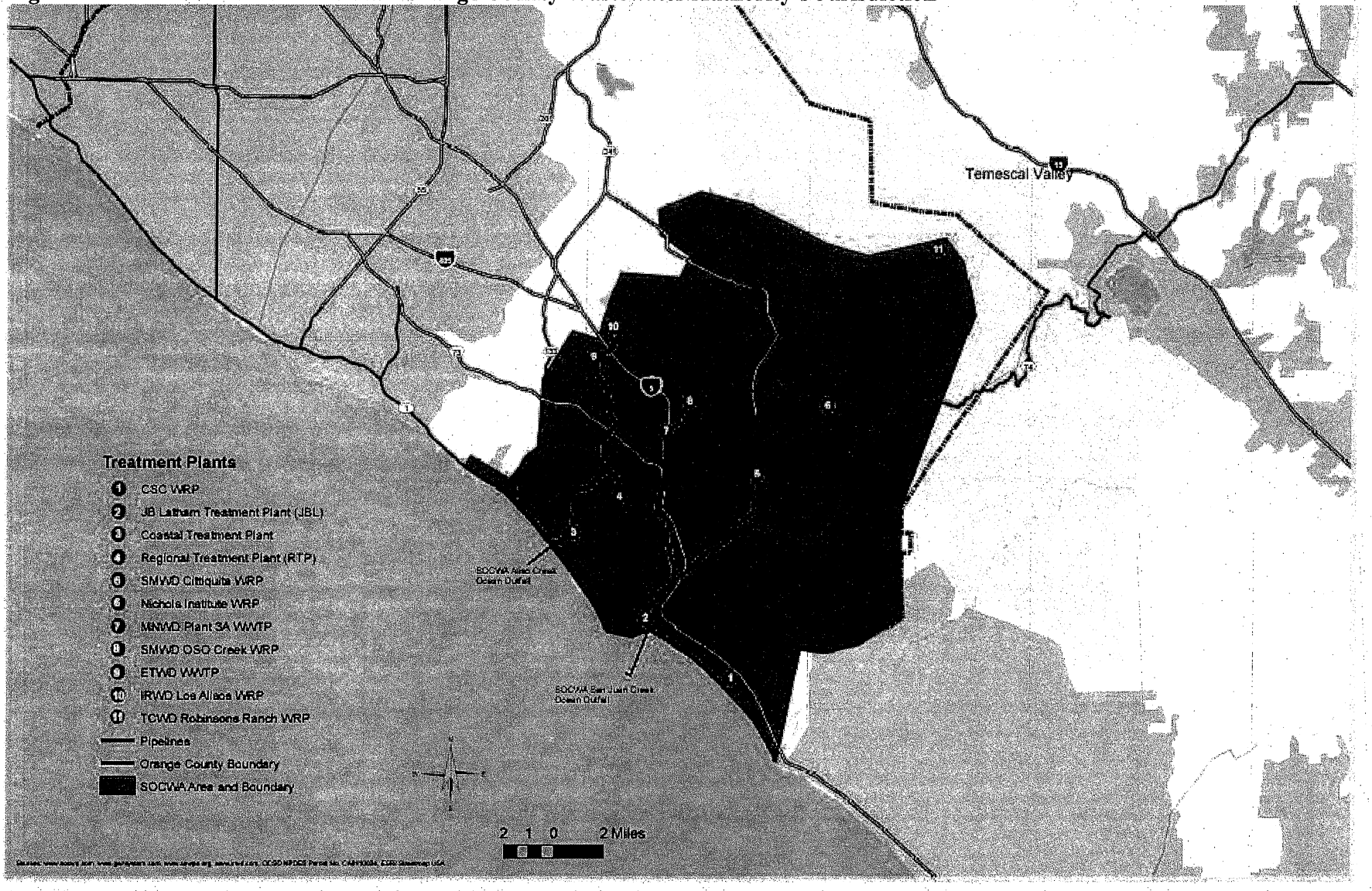
- Secondary effluent from Reclamation Plant No. 1 will provide source water to the Groundwater Replenishment System (GWR System)jointly operated by OCWD and OCSD. Diversion of all Santa Ana River Interceptor flows from Reclamation Plant No. 1 to Treatment Plant No. 2 would occur in order to satisfy Department of Health Services' requirements that the largely industrial sources in the Santa Ana River Interceptor flow should not go to the GWR system.

Projected volumes presented in Tables 6-2-A and 6-2-B incorporate the above stated projects.

6.2.2 South Orange County Wastewater Authority

The South Orange County Wastewater Authority (SOCWA) was formed after the completion of the 2000 UWMP. SOCWA is a Joint Powers Authority created on July 1, 2001. It was formed as the legal successor to three agencies: Aliso Water Management Agency, South East Regional Reclamation Authority, and South Orange County Reclamation Authority. SOCRA Member agencies include: City of Laguna Beach, City of San Clemente, City of San Juan Capistrano, El Toro Water District, Emerald Bay Service District, Irvine Ranch Water District, Moulton Niguel Water District, Santa Margarita Water District, South Coast Water District, and Trabuco Canyon Water District. All of these service areas receive wholesale water through MWDOC. As illustrated in Figure 6-2-2, the service area encompasses approximately 220 square miles including the Aliso Creek, Laguna Canyon, and San Juan Creek Watersheds.

Figure 6-2-2-A: Facilities within South Orange County Wastewater Authority's Jurisdiction



Source: Prepared by Camp, Dresser, and McKee for Municipal Water District of Orange County

The purpose of SOCWA is to:

> Plan for, acquire, construct, maintain, repair, manage, operate and control facilities for the collection, transmission, treatment and disposal of wastewater, the reclamation and use of wastewater for beneficial purposes, and the production, transmission, storage and distribution of non-domestic water.

SOCWA utilizes a Project Committee Basis where member agencies financially contribute and participate in committee that they have an equity ownership interest in. Within its service area, SOCWA operates four wastewater treatment plants, the remaining eight wastewater treatment plants are operated by SOCWA member agencies. Wastewater in the service area is collected at the local and regional level through a series of interceptors that convey influent to the wastewater treatment plants. Treated effluent throughout the service area is conveyed to two gravity flow ocean outfalls, Aliso Creek Outfall and San Juan Creek Outfall, operated by SOCWA. These outfalls have a gravity flow capacity of 50 MGD and 24 MGD (80 MGD pumped), respectively. Aliso Creek outfall extends approximately 7,900 feet offshore near Aliso Creek. San Juan Creek outfall extends 10,550 feet offshore near Doheny Beach and the mouth of San Juan Creek. Ultimately, the hydraulic capacity of the San Juan Creek Outfall will be expanded to 31.5 MGD. At a minimum, full secondary treatment is provided at wastewater treatment plants within the service area, with most plants exceeding this level of treatment.

Coastal Treatment Plant

SOCWA's Coastal Treatment Plant located in Laguna Niguel has a maximum influent capacity of 6.7 MGD. Effluent has been treated to secondary or tertiary levels dependent upon disposal or reuse of the wastewater for recycling. Recycled water is treated to applicable Title 22 standards. Treated effluent that is not recycled is disposed through the Aliso Creek Outfall Ocean Outfall. In 2005, 3.8 MGD or 4,255 acre-feet of dry weather flows were collected and treated on average of which 0.9 MGD or 952 acre-feet was used as recycled water.

Regional Treatment Plant

The Regional Treatment Plant with a maximum influent capacity of 12 MGD lies within Laguna Niguel and is operated by SOCWA. Effluent has been treated to secondary or tertiary levels dependent upon disposal or reuse of the wastewater for recycling. Recycled water is treated to applicable Title 22 standards. Non-recycled effluent is conveyed to the Aliso Creek Ocean Outfall via the SOCWA Effluent Transmission Main. In 2005, the Regional Treatment Plant is receiving and treating an average dry weather flow of 9.8 MGD or 10,972 acre-feet with 5.7 MGD or 6,382 acre-feet treated to recycled water standards.

Plant 3A

Plant 3A is located within Laguna Niguel and is operated by SOCWA. The maximum influent capacity is 6 MGD. Effluent has been treated to secondary or tertiary levels dependent upon disposal or reuse of the wastewater for recycling. Recycled water is treated to applicable Title 22 standards. Unused effluent is conveyed to the San Juan Creek Outfall via the 3A Effluent Transmission Main. On average, in 2005 Plant 3A is receiving and treating 3.5 MGD of dry weather flows or 3,919 acre-feet of which 1.2 MGD or 1,344 acre-feet are treated to recycled water standards.

J. B. Latham Treatment Plant

SOCWA's J. B. Latham Treatment Plant is the largest plant in the service area with a design capacity of 13 MGD. This plant is located in Dana Point. Effluent is currently treated to secondary levels. Effluent is conveyed directly to the San Juan Creek Outfall. In 2005, the average dry weather flows collected and treated are 9 MGD or 10,077 acre-feet. None of the treated effluent currently meets recycled water standards. As proposed, between 2005 and 2010 up to 4 MGD or 4,479 acre-feet of wastewater will be treated to recycled water standards.

El Toro Water District Water Recycling Plant

El Toro Water District Water Recycling Plant is operated by El Toro Water District and is located in Laguna Wood. The plant has a maximum influent capacity of 6 MGD. Wastewater is treated to a secondary to Title 22 standards depending upon the ultimate use of the effluent. On average, in 2005 4.5 MGD or 10,972 acre-feet of secondary treated effluent is disposed via the Southern Orange County Wastewater Authority Effluent Transmission Main to the Aliso Creek Ocean Outfall and 0.5 MGD or 560 acre-feet of effluent is treated to a tertiary level meeting Title 22 standards and is sent to the recycled water distribution system. If grant money is received, El Toro Water District will construct a proposed 5 MGD advanced wastewater treatment facility for recycled water at the plant.

Chiquita Water Reclamation Plant

Chiquita Water Reclamation Plant is operated by Santa Margarita Water District and is located in Chiquita Canyon. Wastewater is treated to a tertiary level with recycled water treated to Title 22 standards. Chiquita Water Reclamation Plant has a maximum design capacity of 9 MGD with plans to increase its size to 14 MGD by 2025. In 2005 approximately 2.1 MGD or 2,377 acre-feet is recycled, with the majority of the effluent, 3.9 MGD or 4,343 acre-feet, disposed via the Chiquita Land Outfall with a connection to the San Juan Creek Ocean Outfall.

Oso Creek Water Reclamation Plant

Oso Creek Water Reclamation Plant (OCWRP) is located along Oso Creek and is operated by Santa Margarita Water District. At this facility, wastewater is treated to a secondary level with recycled water treated to Title 22 standards. A bypass facility allows for excess wastewater to be sent to the previously discussed J.B. Latham Treatment Plant as OSWRP has no outfalls. Without the ability to discharge treated effluent, excess flows beyond recycled water demands are required to be sent to J.B. Latham Treatment Plant. OSWRP has a maximum design capacity of 3 MGD. On average in 2005 approximately 1.4 MGD or 1,495 acre-feet, is treated and recycled. Average wastewater collected in 2010 and after is based on conservative flows. OSWRP is a clipping plant that removes wastewater from the main sewer trunk line.

Nichols Institute Water Reclamation Plant

The Nichols Institute Water Reclamation Plant is operated by Santa Margarita Water District. This small facility treats approximately 34 acre-feet per year. No outfall is available for this facility. Therefore, all wastewater is treated to Title 22 standards for recycling purposes.

San Clemente Water Reclamation Plant

The city of San Clemente owns and operates the San Clemente Water Reclamation Plant located within the city. The San Clemente Water Reclamation Plant has a design capacity of 7 MGD and treats wastewater to secondary or tertiary levels dependent upon if the water will be recycled or disposed. Any water in excess of the plant's recycling limit is conveyed to the San Juan Creek Ocean Outfall via the San Clemente Land Outfall. Recycling capacity is limited to 2.2 MGD or 2,463 acre-feet per year. The average dry weather influent for 2005 is 4.6 MGD or 5,150 acre-feet.

Los Alisos Water Reclamation Plant

Los Alisos Water Reclamation Plant is operated by IRWD and is located in Lake Forest. LAWRP will have a maximum capacity of 7.3 MGD after the 2005 upgrades to the plant are completed. Wastewater is treated to a secondary or tertiary level dependent upon the ultimate use of the effluent. In 2005, average dry weather flows collected and treated are 5 MGD or 5,598 acre-feet. All of the effluent is recycled. When excess water beyond its tertiary treatment capacity is received, it is conveyed to the SOCWA Effluent Transmission Main for disposal via the Aliso Creek Ocean Outfall.

Robinson Ranch Water Reclamation Plant

Robinson Ranch Water Reclamation Plant is operated by Trabuco Canyon Water District and is located in Trabuco Canyon. Robinson Ranch Water

Reclamation Plant has a maximum capacity of 0.85 MGD. In 2005, average dry weather flows collected and treated are 0.76 MGD or 850 acre-feet. Future expansions are planned to increase the capacity to 0.9 MGD. Wastewater is treated to a secondary level and Title 22 standards. All of the wastewater is recycled as the plant is not permitted to have stream discharges, and it is unfeasible to connect to the existing outfalls in the SOCWA service area.

6.2.3 Irvine Ranch Water District

A portion of IRWD falls within both the OCSD and SOCWA jurisdictional boundaries. IRWD operated operates both the Michelson Water Reclamation Plant within the OCSD service area and the previously discussed Los Alisos Water Reclamation Plant within the SOCWA service area.

Michelson Water Reclamation Plant

Michelson Water Reclamation Plant (MWRP) is located in the city of Irvine and is operated by IRWD. MWRP currently has a maximum influent capacity of 18 MGD with plans to expand to 33 MGD by 2025 to meet non-potable demands. Wastewater is treated to a tertiary level with advanced treatment in the form nitrification/ denitrification. All effluent meets Title 22 standards for unrestricted use, except for potable water consumption. All effluent produced by the plant is conveyed to the recycled water distribution system. In 2005, average wastewater influent flows are 13.69 MGD or 15,333 acre-feet.

6.3 Current and Projected Uses of Recycled Water

Recycled water is widely accepted as a source for direct use and indirect use of water supply throughout MWDOC's service area. For definition of direct use verses indirect use, please refer to Section 2.1.3.1 in the Plan. In the past, recycled water was mainly used for landscape irrigation. Large recycled water projects include the Green Acres Project, IRWD's recycled water projects, the recently demolished Water Factory 21, and the forthcoming GWR System. In 2007, GWR System will come online resulting in a dramatic increase in the use of recycled water in Orange County. Uses include injection for sea water barriers and groundwater recharge. Groundwater recharge will surpass landscape irrigation as the greatest consumer of recycled water in Orange County. IRWD is at the forefront of using recycled water not only for irrigation, but also for other uses such as toilet flushing and commercial uses. Other agencies in south Orange County, such as Moulton Niguel Water District and Santa Margarita Water District use a significant amount of recycled water. Recycled water in Orange County is treated to various levels dependent upon the ultimate end use and in accordance with Title 22 regulations.

Tables 6-3-A and 6-3-B summarize current recycled water use and projected recycled water use, respectively, by user type.

Table 6-3-A: 2005 Recycled Water Uses (Actual) in MWDOC's Service Area

Acre-feet Per Year		
User type	Treatment Level	2005
Landscape		
City of Fountain Valley	Title 22[1]	1,260
City of Newport Beach	Title 22[1]	317
City of San Clemente	Title 22[1]	552
El Toro Water District	Title 22[1]	430
Irvine Ranch Water District	Title 22[1]	15,296
Mesa Consolidated Water District	Title 22[1]	1,000
Moulton Niguel Water District	Title 22[1]	7,868
Santa Margarita Water District	Title 22[1]	4,270
South Coast Water District	Title 22[1]	890
Trabuco Canyon Water District	Title 22[1]	850
	Subtotal	32,733
Groundwater Recharge		
GWR System[2]	Micro-filtration/ Reverse Osmosis	0
Sea Water Barrier		
Initial 5-MGD of GWR System	Micro-filtration/ Reverse Osmosis	4,000
	Total	36,733

Source : MWDOC and OCWD

1) Municipal Water District of Orange County

2) Orange County Water District

Notes:

[1]All recycled water is treated to meet Title 22 standards. Treatment levels vary depending upon the source.

[2] GWR System will be online in 2007.

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Table 6-3-B: Projected Future Use of Recycled Water in MWDOC's Service Area

Acre-feet per Year					
User type	2010	2015	2020	2025	2030
Landscape					
City of Fountain Valley	1,500	1,500	1,500	1,500	1,500
City of Newport Beach	444	478	500	500	500
City of San Clemente	1,256	1,767	2,300	2,300	2,300
City of San Juan Capistrano	2,056	2,556	3,039	3,350	3,350
El Toro Water District	575	575	575	575	575
Irvine Ranch Water District	26,203	26,091	27,948	29,231	29,231
Mesa Consolidated Water District	1,231	1,240	1,240	1,240	1,240
Moulton Niguel Water District	9,800	9,800	9,800	9,800	9,800
Santa Margarita Water District	6,367	8,306	10,162	12,122	12,122
South Coast Water District	1,000	1,000	1,000	1,000	1,000
Trabuco Canyon Water District	956	1,000	1,000	1,000	1,000
Subtotal	51,388	54,313	59,064	62,618	62,618
Groundwater Recharge					
GWR System	38,000	38,000	38,000	38,000	38,000
Sea Water Barrier					
GWR System	34,000	34,000	34,000	34,000	34,000
Total	123,388	126,313	131,064	134,618	134,618

Source : Municipal Water District of Orange County

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Projections are based on implementation of currently planned projects where there is a high level of confidence that the projects will be implemented. In 2005, Landscape use for recycled water is 32,733 acre-feet, groundwater recharge use is zero, and seawater barrier use is 4,000. By 2030 recycled water use in this category is projected to almost double to 62,618 acre-feet per year, groundwater recharge use is projected to be 38,000 acre-feet per year, and seawater barrier is projected to be 34,000 acre-feet per year. Sea water barrier use of recycled water is expected to remain constant once GWR SYSTEM is online in 2007. Use of GWR SYSTEM water for groundwater recharge will continue to increase from 2007 to 2030 as additional phases of the project are constructed. Projects that are planned, but have a lower level confidence are discussed in Section 6.5.

Figures 6-3-A and 6-3-B illustrate the percentage of recycling in the current (2005) and future (2030) supply resource mix for direct consumptive and for replenishment and barriers. As shown on the figures, the aggressive investment made in the region will increase the amount of recycling supplies. This, together with improvements in groundwater supplies, would decrease the region's dependence on imported supply.

Figure 6-3-A: Current and Projected Resource Mix in MWDOC's Service Area for Direct Consumption

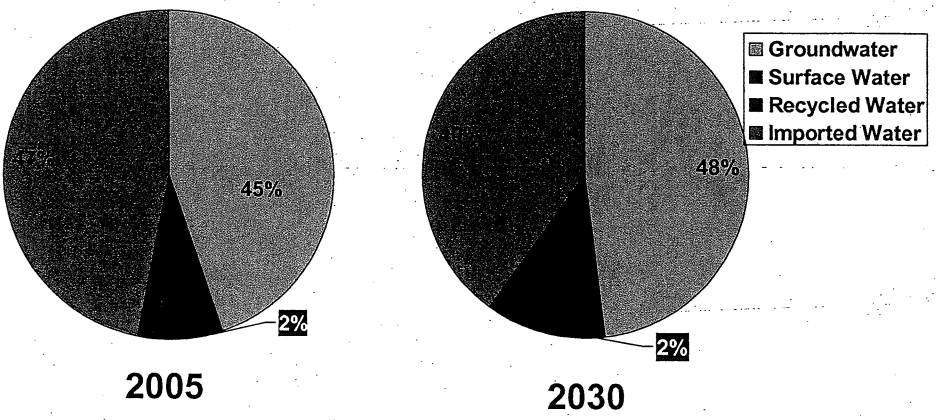
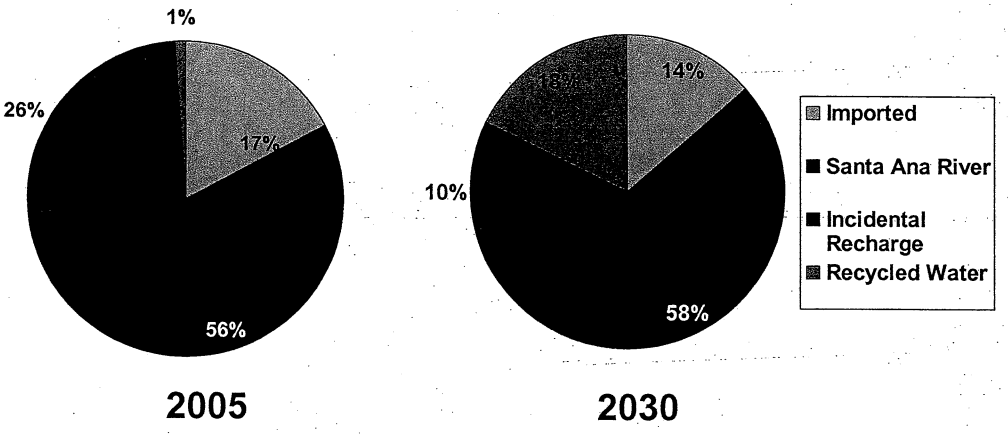


Figure 6-3-B: Current and Projected Resource Mix in MWDOC's Service Area for Groundwater Replenishment and Saline Barriers



As the region continues to grow, more wastewater is expected to be collected. The urban water suppliers in the region also take on the opportunities to recover the treated effluent for recycled water use. Figure 6-3-C shows the percentage of water recycled from wastewater is projected to increase from 11% in 2005 to 30% in 2030. Figure 6-3-D shows that the recycled water use is projected to increase from 36,733 acre-feet in 2005 to 134,618 acre-feet in 2030.

Figure 6-3-C: Current and Projected Percentage of Recycled and Disposed Wastewater in MWDOC's Service Area

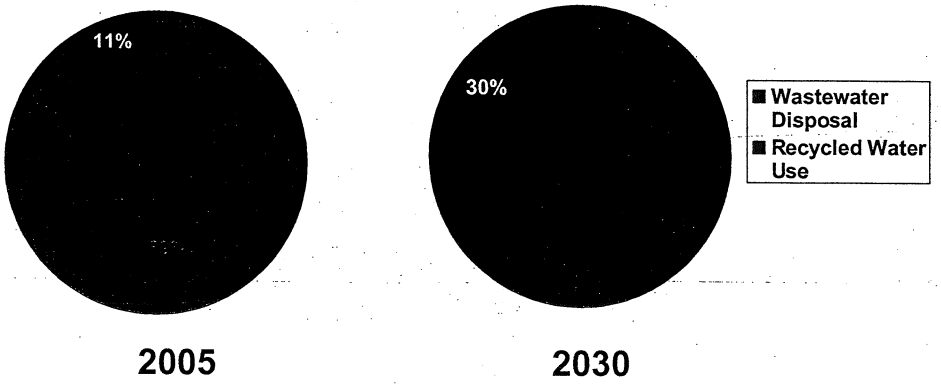
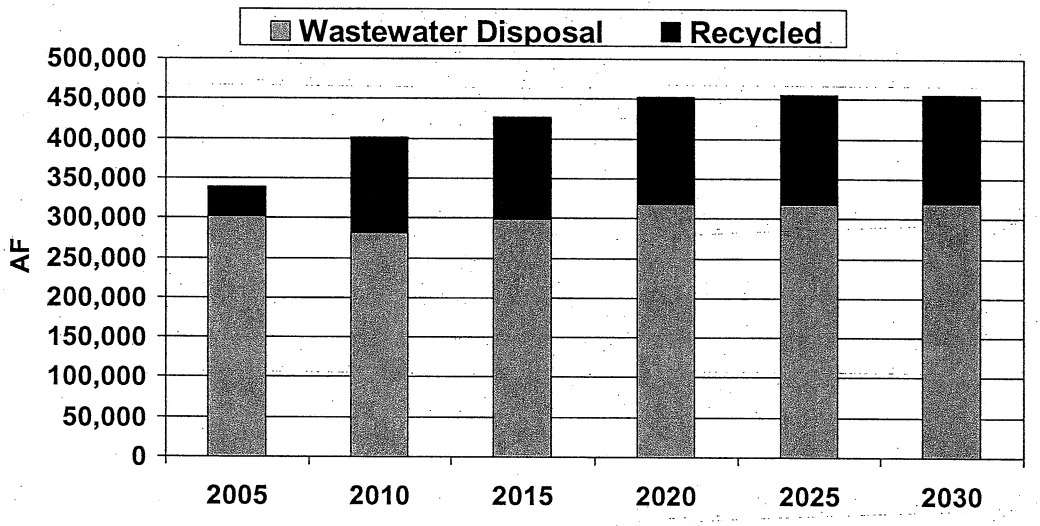


Figure 6-3-D: Current and Projected Recycled and Disposed Wastewater in MWDOC's Service Area



6.3.1 Green Acres Project

During the dry season, typically May through November, tertiary treated recycled water is produced by OCWD's Green Acre Project for wholesale distribution to the cities of Fountain Valley, Huntington Beach, Newport Beach, and Santa Ana, as well as Mesa Consolidated Water District. Additionally, OCWD delivers recycled water to OCSD for use at its two wastewater treatment plants. The capacity of the plant is 7.5 MGD. When demands exceed supply, GAP water can be supplemented with up to 6 MGD of deep colored well water. During winter months, IRWD's Michelson Water Reclamation Plant provides users with advanced treated tertiary recycled water per agreement with OCWD.

Recycled water from GAP is mainly used for landscape and agricultural uses. Landscape uses include, but are not limited to parkways, parks, golf

courses, and schools. Other uses of GAP water include dual plumbing in OCWD's office building, industrial processes, wastewater treatment processes, and carpet dyeing.

6.3.2 Initial 5 MGD Groundwater Replenishment System

Initial operation of the GWR System at 5 MGD commenced in 2004 replace a portion of the water previously produced by Water Factory 21. Until its demolition in 2004 to make room for the GWR System project, the Water Factory 21 project treated approximately 5 MGD of secondary effluent from OCSD with reverse osmosis for blending with approximately 8 MGD of deep well water. The blended water was directly injected into underlying aquifers to prevent seawater intrusion into the Orange County Groundwater Basin. The 5-MGD GWR System uses the same treatment processes that will be used for the full-scale GWR System project, micro-filtration and reverse osmosis. Approximately 4,000 acre-feet per year are produced by the initial 5 MGD GWR System to offset a portion of the injection water that was lost when Water Factory 21 was taken offline. The balance of the lost production water is being replaced with water from Metropolitan until GWR SYSTEM comes online in 2007.

6.3.3 Groundwater Replenishment System

Upon completion in 2007, GWR SYSTEM will produce ultra-pure water using micro-filtration coupled with reverse osmosis, ultraviolet light, and hydrogen peroxide with water obtained from OCSD Reclamation Plant No. 1. When completed GWR System will be one of the most advanced water purification systems in the world. Produced water will exceed all federal and state drinking water standards. At this time, GWR is approved for Phase 1, which will recycle approximately 72,000 acre-feet per year of effluent. Investments beyond Phase 1 have not been approved by OCWD and would require further review before proceeding primarily due to the current lack of OCSD source water. If the future envisioned phases of the project are approved and developed, then it is projected that up to 146,000 acre-feet per year of water will be produced.

GWR SYSTEM was designed to satisfy multiple goals to improve management of groundwater supplies and wastewater supplies. The partnership between OCWD and OCSDS will eliminate the need for construction of another ocean outfall for disposal of treated wastewater. Produced water supplies will be used for percolation into the Orange County Groundwater Basin and injection into seawater barriers. Percolation of this high quality water supply will ultimately assist in boosting the water quality of the Basin by reducing mineral content. Expansion of the seawater barrier may result in the ability to sustain additional groundwater production in coastal areas. GWR SYSTEM water will potentially augment existing recycled water supplies available for irrigation and other uses. With this project, water supply reliability will increase as another local supply option

for groundwater recharge becomes available, reducing dependence on imported water for Basin recharge. Water produced by the project is a drought-proof water supply source

Construction of the project is expected to need a capital investment of $487 million. Funding sources include the United States Bureau of Reclamation, United States Environmental Protection Agency, California State Department of Water Resources, California Energy Commission, Metropolitan's Local Resources Program, and Proposition 13. OCSD and OCWD are equally sharing the cost of construction. OCWD will maintain and operate the system.

6.3.4 Irvine Ranch Water District Water Reclamation

IRWD operates an ambitious recycled water program with up to 20% of its total water supply derived from recycled water. Approximately 80% of all business and community landscaping is irrigated with recycled water. Additional users include agriculture, homeowners' associations, carpet dyeing facilities, large residential lots, commercial buildings for toilet flushing and cooling towers, open space areas, and fountains. IRWD's Michelson Water Reclamation Plant produces water for unrestricted non-potable use, as classified by Department of Health Services, using an advanced treatment process. IRWD has multiple agreements with OCSD, OCWD and SOCWA for operating its program, such as providing water to the GAP project during winter months. IRWD wholesales excess recycled water to OCWD for GAP project and Santa Margarita Water District.

In 2005, the fifteenth building with dual plumbing in the city of Irvine was connected to the recycled water system. These buildings utilize recycled water for toilet flushing. Two of IRWD's fifteen dual plumbed buildings also use recycled water for cooling tower in addition to toilet flushing. Potable water demands in these buildings have decreased by up to 75%. IRWD was the first water district in the country to utilize recycled water for interior uses.

6.3.5 Other Water Reclamation Projects

As listed in Table 6-2-A, seven other wastewater treatment plants provide recycled water on a smaller scale than the previously described projects. Treatment levels by plant vary, but all the plants produce recycled water to Title 22 standards. These plants are owned and operated by SOCWA member agencies or SOCWA itself. Additionally, Santa Ana River water, with a base flow composed mainly of tertiary-treated water from treatment plants in the Upper Santa Ana River Watershed such as the cities of San Bernardino, Corona, and Riverside, is captured and used as recharge water in the Orange County Groundwater Basin. These amounts were not included in Table 6-3-A as they are not produced in MWDOC's service area.

6.4 Comparison of 2000 Projected Recycled Water Use with 2005 Actual Use

Current recycled water projections for 2005 for MWDOC's service area are 25% less than previously forecasted in MWDOC's 2000 UWMP as illustrated in Table 6-4-A. Current 2005 forecasts indicate that approximately 29,287 acre-feet of recycled water will be consumed by these user types, while the 2000 UWMP forecasted 39,600 acre-feet of recycled water use in 2005.

Table 6-4-A: Recycled Water Uses in MWDOC's Service Area – 2000 Projection Compared with 2005 Actual

Acre-feet Per Year		
User type	2000 Projection for 2005	2005 Actual Use
Landscape		
City of Fountain Valley	1,300	1,260
City of Huntington Beach	400	No Use
City of Newport Beach	500	317
City of San Clemente	1,000	552
El Toro Water District	600	430
Irvine Ranch Water District	16,853	15,296
Mesa Consolidated Water District	1,000	1,000
Moulton Niguel Water District	9,000	7,868
Santa Margarita Water District	5,700	3,972
South Coast Water District	1,000	890
Trabuco Canyon Water District	900	850
Subtotal	38,253	32,435
Sea Water Barrier		
Initial 5 MGD of GWR System		4,000
Total	38,253	36,435

Sources :

1) Municipal Water District of Orange County, *2000 MWDOC Urban Water Management Plan*

2) Municipal Water District of Orange County

Notes:

[1]WaterFactory 21 is not included as it was demolished in 2004. GWR System's Initial-5-MGD Plant was not included in 2000 for 2005.

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

For comparison purposes, indirect use of water demand such as seawater barrier use and groundwater recharge are not included in Table 6-4-A. Water Factory 21 provided recycled water for seawater barrier use until it was demolished in 2004. For the 2000 UWMP, recycled water projections were not made for the initial 5 MGD GWR SYSTEM currently in operation. GWR SYSTEM will provide this water beginning in 2007 as previously discussed.

Expected recycled water use by individual retail agencies for 2005 was lower than forecasted in the 2000 UWMP for 2005. However, projected recycled water use is

on target for 2020 as currently and previously projected. Consumption of recycled water, not including groundwater recharge and seawater barrier use, for the MWDOC service area is forecast to be approximately 61,254 acre-feet per year in 2020, close to the 2000 UWMP forecast for 2020 of 62,850 acre-feet per year. On a percentage basis, the city of San Clemente satisfied the least amount of their 2000 projection for 2005 and will only meet 55% of its 2000 UWMP forecast for 2005. Additionally, the city of Huntington Beach has not started using recycled water as previously forecasted. The GAP project was not extended into the city as was anticipated. Discrepancies between the current 2005 expected use of recycled water and the 2000 forecast are attributed to multiple reasons, including a lack of funding and complex interagency agreements. Discussions of individual agency discrepancies in recycled water use are available in their respective UWMPs.

6.5 Potential Uses of Recycled Water and the Feasibility of Serving those Users

Potential recycled water use within MWDOC's service area hinges upon many variables including, but not limited to, economics of treatment and distribution system extension (as well as site retrofits), water quality, public acceptance, infrastructure requirements, and reliability. Recycled water quality, in combination with the tolerance of landscaping to high total dissolved solid levels, plays a large role in whether irrigation with recycled water is feasible. Recycled water that has TDS levels that constantly or occasionally exceed the tolerance level of specific landscape requirements will result in adverse impacts to the landscape. Therefore, some users are not able to utilize recycled water unless TDS levels are held below specific plant-based thresholds.

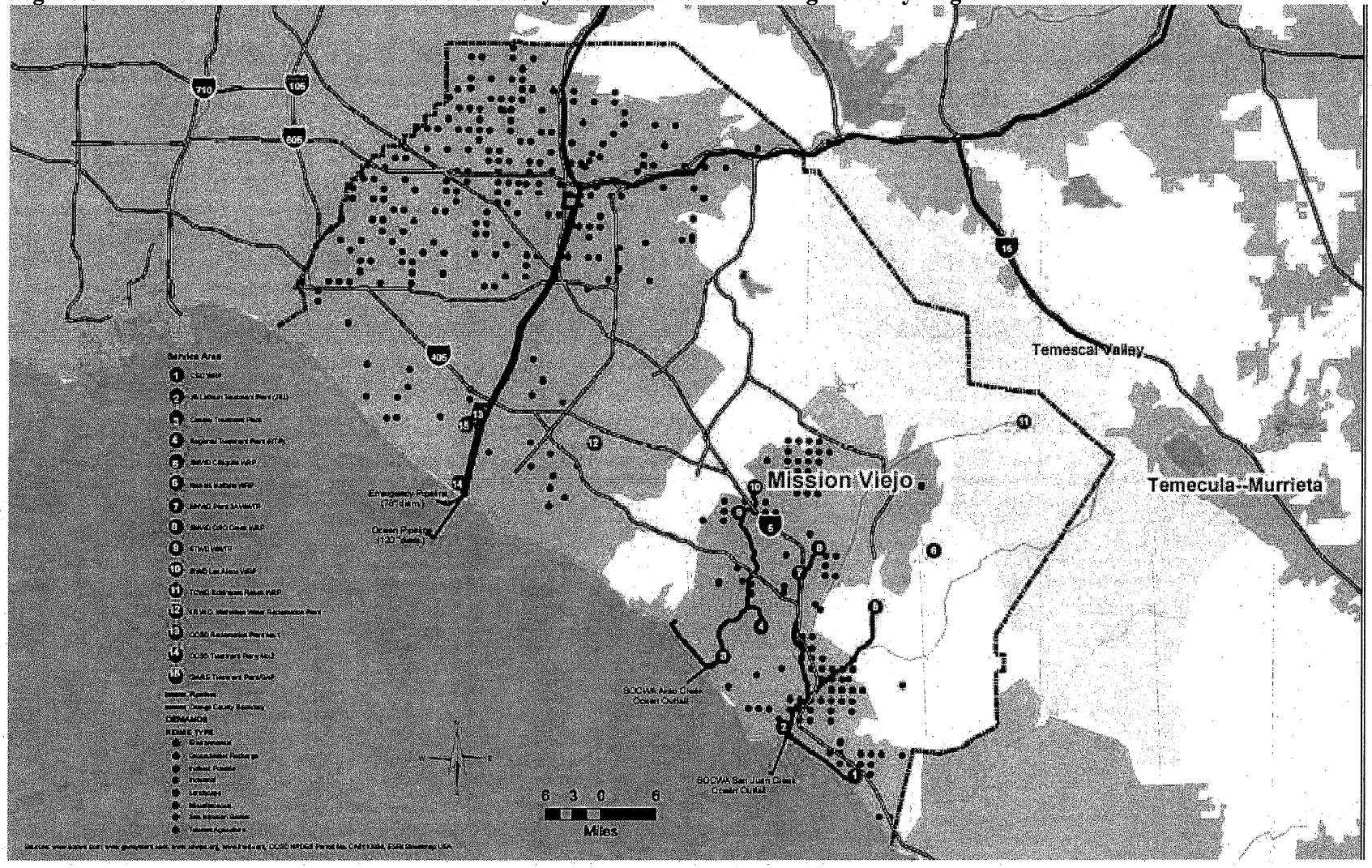
Even with high identified demands, it is not necessarily economically feasible to provide recycled water to all potential users. Expansion of recycled water systems eventually reaches a point where returns diminish, or more money is required to extend the system further, but the benefits of the expansions are less per dollar spent for previous expansions of the system. Water recycling projects involve collecting and treating wastewater to applicable standards dependent upon the ultimate end use, storing recycled water for seasonal use, pipeline construction, pump station installation, and plumbing retrofits for existing end users or dual plumbing systems for new users. Creative solutions to secure funding, overcome regulatory requirements, institutional arrangements, and public acceptance are required to offset existing potable demands with potential recycled water demands.

6.5.1 Southern California Comprehensive Water Reclamation and Reuse Study

In 2002, short-term and long-term regional implementation plans for increasing recycled water use were developed as part of the *Southern California Comprehensive Water Reclamation and Reuse Study* (SCCWRRS). As previously identified, SCCWRRS participating agencies were composed of a consortium of local, state, and federal agencies to address regional recycled water planning in Southern California. The six-year comprehensive study utilized 2040 as a long-term planning horizon,

with more detailed short-term implementation plans (STIP) developed for implementation between 2002 and 2012. Within the Orange County portion of the study five short-term regional implementation plans were developed for the following geographical areas: North Orange County, Central Orange County, Upper Oso, and San Juan. One long-range plan building upon the STIPs was developed for the region. It should be noted that the study incorporates Orange County as a whole and thus extends beyond MWDOC's jurisdictional boundaries and was based on pre-2000 data. Figure 6-5-1-A illustrates areas of potential demand based on eight main classifications of recycled water users within Orange County.

Figure 6-5-1-A: Area of Potential Demand for Recycled Water within Orange County Region



Source: Prepared by Camp, Dresser, and McKee for Municipal Water District of Orange County

Criteria utilized to develop regional projects in the SCCWRRS study included water quality issues, projected available supply of effluent, and interactions with other water management projects. Water quality played a significant role in development of regional projects. For the SCCWRRS study, it was assumed that all proposed regional projects would meet full compliance with Title 22 of the California Administrative Code. Full compliance allows irrigation of food crops, parks, playgrounds, and allows the most stringent degree of human contact. Salinity played a role in development of regional projects as salinity has wide ranging impacts from groundwater management to plant damage. Where necessary regional projects incorporated desalters and brine lines to remove and dispose of excess salinity. Projected supplies of recycled water considered existing treatment capacities and planned reclamation projects. Regional projects also considered other water management projects that could potentially impact recycled water production such as water conservation, salinity of imported waters, and brine produced by desalination plants.

Projects were evaluated from an economic standpoint based on three perspectives as defined in the SCCWRRS study:

- The total Society perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. This perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms;

- The Southern California perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms; and

- The All Agencies perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as part of this short implementation plan. This perspective looks at agency costs and benefits and does not include the broader benefits in the Total Society and Southern California perspectives.

North Orange County

As proposed, the north Orange County STIP links recycled water supplies in Los Angeles County with demand in northern Orange County with a linkage to central Orange County. Treated effluent from the Los Coyotes Water Reclamation Plant operated by Los Angeles County Sanitation District would be conveyed via the existing distribution network in the city of Cerritos and new pipelines to the cities of La Palma and Buena Park. Los

Coyotes Water Reclamation Plant is slated for expansion independent of the STIP from 37.5 MGD to 50 MGD by 2010. The STIP allocates, 1.9 MGD of recycled water in 2010. After losses associated with treatment and allocation, the remaining supply available is 42.5 MGD. Approximately 1,100 acre-feet of demand in 2010 has been identified, including1,000 acre-feet per year to landscape users and 100 acre-feet per year to industrial users.

MWDOC and the city of Long Beach have agreed to do a joint study of this conceptual project. A preliminary economic study is scheduled to occur in 2005/2006 in cooperation with local agencies.

Economic sensitivity analysis conducted as part of the SCCWRRS study illustrated net positive impacts from the three economic perspectives. Benefits remained positive across a range of assumptions for project costs or avoided wastewater and water supply costs. The net benefit for the Total Society perspective is estimated at $5 million. Total capital costs in 2000 dollars are estimated at $10.1 million, with an annual operation and maintenance cost of $100,000. Per acre-foot costs are estimated at $700-800 in 2000 dollars.

Implementation issues include institutional, regulatory/water quality, and economic equity. Multiple agencies in two counties would be involved, including two wholesale water agencies, two groundwater agencies, two sanitation districts, two regional water quality control boards, and seven retail water agencies, thus complicating coordination and equitable distribution of costs.

Central Orange County

The proposed Central Orange County STIP would continue to develop connections between existing recycled water systems in the IRWD and OCWD service areas, expand the recycled water service areas to include Newport Beach, Huntington Beach, Anaheim, Placentia, and Fullerton, construct a new 100 MGD recycled water facility, and construct approximately 55 miles of pipelines and a regional brineline. This proposed STIP includes the GWR SYSTEM facilities under construction. Existing facilities in the study area have treatment capacity of approximately 108 MGD for treatment to secondary standards and 40.5 MGD for treatment to tertiary standards. By 2010, 137 MGD of tertiary treatment capacity is planned. In 2010, approximately 94.5 MGD of recycled water is allocated under the STIP, resulting in a remaining supply of approximately 98.8 MGD after losses associated with the treatment process. The STIP has identified approximately 93,100 acre-feet per year of demand that would be served by the project in 2010, including landscape, industrial, agriculture-tolerant, groundwater, and seawater intrusion barrier users.

Sensitivity analyses for the three economic perspectives indicate net benefits for each perspective. For Total Society a net benefit of $476.6 million is estimated as the groundwater and seawater intrusion barriers create significant water supply savings. With the STIP, an avoided cost of $150 million associated with the construction of a second outfall would be achieved. Capital and annual operation and maintenance costs per year in 2000 dollars are estimated at $683.1 million and $32.4 million, respectively.

Implementation issues include institutional, regulatory/water quality, and economic equity. Multiple agencies would be involved, including two wholesale water agencies, two groundwater agencies, two sanitation districts, one regional water quality control board, and sixteen retail water agencies, thus complicating coordination and equitable distribution of costs.

Upper Oso

The proposed Upper Oso STIP focuses on expanding and developing connections between the recycled water systems in the SOCWA service area, including the former Los Alisos Water District portion of IRWD, El Toro Water District, Moulton Niguel Water District, and Santa Margarita Water District. Plans include the construction of approximately 38 miles of pipeline. Treatment facilities in the area have a capacity of approximately 28.5 MGD of secondary treatment and 13.3 MGD of tertiary treatment capacity. By 2010, tertiary treatment capacity is expected to increase to 24.7 MGD. In 2010, allocated recycled water supplies are estimated to be 6.5 MGD with a remaining supply of 5.9 MGD. Demands of 4,100 acre-feet per year are identified in the STIP for 2010, including 3,300 ACRE-FEET PER YEAR for landscape use and 800 acre-feet per year for agriculture-tolerant use.

Conclusions of the economic analysis for the three perspectives indicate that there is a net benefit for all three perspectives. Total Society has a net benefit of $10.2 million. Capital costs are estimated at $48.4 million in 2000 dollars with an annual associated O&M cost of $1.1 million in 2000 dollars. Per acre-foot annual costs are estimated between $800 and $1,000 in 2000 dollars.

Implementation issues include institutional, regulatory/water quality, and economic equity. Multiple agencies in would be involved including two wholesale water agencies, one joint powers sanitation agency, two regional water quality control boards, and five retail water agencies with many providing both water and wastewater services complicating coordination and equitable distribution of costs.

San Juan

Implementation plans for the San Juan STIP focus on expanding existing systems and interlinking the systems for the city of San Clemente, city of San Juan Capistrano, and the Santa Margarita Water District. Construction of 52 miles of pipelines with varying diameters is proposed under this plan. The plan would utilize existing recycled water facilities in the area as a supply and the Portola Reservoir as a storage facility. Planned capacities for 2010 for tertiary treatment are 17 MGD and 33.3 MGD for secondary treatment. Allocated water supplies in 2010 are 25.3 MGD with an available supply of 0.5 MGD. Demands of 16,300 acre-feet per year are identified in the STIP for 2010, including 3,300 acre-feet per year for groundwater, 12,000 acre-feet per year for landscape, and 1,000 acre-feet per year for miscellaneous use.

An economic analysis for the three perspectives indicated that there is a net benefit for all three perspectives. Total Society has a net benefit of $90.5 million. Capital costs are estimated at $123.6 million in 2000 dollars, with an annual associated operation and Maintenance cost of $4.8 million in 2000 dollars. Per acre-foot annual costs are estimated between $600 and $700 in 2000 dollars.

Implementation issues include institutional, regulatory/water quality, and economic equity. Multiple agencies would be involved, including two wholesale water agencies, one joint powers sanitation agency, two regional water quality control boards, and six retail water agencies, with many providing both water and wastewater services, thus complicating coordination and equitable distribution of costs.

Long-Range Implementation Plan

The *Orange County long range implementation plan* builds upon the STIPs by expanding the treatment capacities of the treatment plants to adequately handle anticipated 2040 flows. Expansion of the recycled water system would consist of serving additional users that are not served by the STIPs. Expansion areas would include Anaheim, Anaheim Hills, Buena Park, Cypress, Fullerton, Garden Grove, Laguna Niguel, San Juan Capistrano, and Yorba Linda. As part of the long term plan, the seven treatment facilities and recycled water storage reservoirs would be linked, creating one regional system and expanding the trunk line from the GWR SYSTEM to Kramer Basin and the Jay B. Latham WRP trunk line. The plan allocates an additional 52,500 acre-feet per year to the existing planned recycling projects by local agencies up to 2040. Estimated capital costs in 2000 dollars to supply the additional 52,500 acre-feet per year is $519 million with an estimated operation and maintenance of $29 million in 2000 dollars per year.

6.5.2 Potential Recycled Water Use in the MWDOC Service Area

MWDOC conducted a survey of its member agencies to determine potential recycled water projects, as illustrated in Table 6-5-2-A. Potential uses of recycled water identified within the SCCWRRS study are based on pre-2000 data and do not reflect the latest available information. As identified there, potential recycled water projects include the sum of planned recycled water projects, as listed in Table 6-3-B, and potential recycled water projects. Between 2010 and 2030 potential recycled water use is expected to increase by 85,600 acre-feet per year. The GWR System project has the greatest potential to increase recycled water use if all three phases are constructed. Potential use related to the GWR System project reflects operation of all three phases of the project. In 2030, wastewater treated to recycled standards for the MWDOC service area is estimated to be 234,996 acre-feet per year, with 134,618 acre-feet per year allocated to projected recycled water projects resulting in the availability of 100,378 acre-feet per year for potential recycled water projects. Implementation of the identified potential recycled water projects and planned recycled water projects for the year 2030 total 202,226 acre-feet per year and will result in disposing approximately 32,770 acre-feet per year of water that has been treated to recycled standards.

Table 6-5-2- A: Orange County Potential Recycled Water Uses

Acre-feet Per Year					
User type	2010	2015	2020	2025	2030
Agriculture/Landscape/ Industrial/Commercial					
City of Fountain Valley	1,500	1,500	1,500	1,500	1,500
City of Newport Beach	444	478	500	500	500
City of San Clemente	1,256	1,767	2,300	2,300	2,300
City of San Juan Capistrano	2,056	2,556	3,039	3,350	3,350
El Toro Water District	575	575	575	575	575
Irvine Ranch Water District	27,797	31,359	33,941	36,246	34,246
Mesa Consolidated Water District	1,231	1,240	1,240	1,240	1,240
Moulton Niguel Water District	10,168	11,500	11,500	11,500	11,500
Santa Margarita Water District	9,109	10,978	12,866	14,515	14,515
South Coast Water District	1,000	1,000	1,000	1,000	1,000
Trabuco Canyon Water District	956	1,000	1,000	1,000	1,000
Subtotal	56,092	63,953	69,461	73,726	71,726
Groundwater Recharge					
GWR System	38,000	65,000	96,500	96,500	96,500
Sea Water Barrier					
GWR System	34,000	34,000	34,000	34,000	34,000
Total	128,092	162,953	199,961	204,226	202,226

Source : Municipal Water District of Orange County, Survey conducted in 2004

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

6.5.3 Barriers to Expansion of Existing Recycled Water Users

Barriers to expanding recycling water systems vary by retail agencies as agencies in Orange County have many unique constraints. The ability to serve end users must take into account the size of end users, the type of water use, proximity to existing recycled water systems, and willingness to use recycled water and the cost effectiveness for agencies and end users. An underlying theme limiting expansion of most recycled water systems in MWDOC's service area is the significant capital and operation and maintenance costs. As expansion of existing recycled water systems continues, the cost tends to increase for each new connection, as most of the recycled water systems already serve those end users where capital and operation and maintenance costs are the lowest.

Trabuco Canyon Water District

Trabuco Canyon Water District currently utilizes approximately 850 acre-feet per year of recycled water. Trabuco Canyon Water District 's master

plan calls for expansion of the existing Robinson Ranch Wastewater Treatment Plant in logical increments to serve the remaining proposed developments. However, the central portion of Trabuco Canyon Water District, located in remote canyon areas, is currently unsewered as the 250 existing dwelling units are served by septic systems or a small package treatment plant in the case of the Joplin Boys' Ranch. As the area in the central portion of the District develops, it is contemplated that sewers will be added in the areas that are currently served by septic systems. The cost of the recycled water would be expensive due to elevation differences. Additionally, when the recycled system is expanded, Trabuco Canyon Water District may need to supply additional staff to properly manage the system.

South Coast Water District

South Coast Water District utilizes approximately 890 acre-feet per year of recycled water. South Coast Water District's system currently has a recycled water capacity that is greater than the demand. The main barrier towards connecting additional users in the future is the cost associated with retrofitting existing landscaping systems, in particular small homeowners associations with less than 15 acres in area. Large irrigation users, such as large homeowners associations greater than 15 acres in size, and two golf courses already utilize recycled water. Landscape retrofitting costs for small users are more difficult to justify as less benefits per dollar spent are received as compared to large users that utilize greater volumes of recycled water.

Moulton Niguel Water District

Moulton Niguel Water District currently uses approximately 7,868 acre-feet per year of recycled water. Within MNWD numerous items present barriers to future expansion of their recycled water facilities. Athletic facilities that have relied on recycled water in the past have been converted to artificial turf, reducing demands for recycled water. Compared to other areas Moulton Niguel Water District is more restrictive and conservative in its retrofit inspections, increasing the cost to end users associated with converting from potable water to recycled water for irrigation needs.

Mesa Consolidated Water District

In 2005, Mesa Consolidated Water District expects to use approximately 1,000 acre-feet of recycled water. Mesa Consolidated Water District currently obtains its recycled water supplies from the Green Acres Project. In the winter, source water is supplied by IRWD, and in the summer, by OCSD. Available supplies from GAP are limited, thus restricting future expansion of Mesa Consolidated Water District's system. Costs to hook-up end users are expensive such that it deters end users from utilizing recycled water. The state hospital located within the Mesa Consolidated Water

District's service area is a potential future user of recycled water for irrigation needs, but institutional issues currently exist. Water quality in the form of total dissolved solid levels is also a concern limiting expansion of recycled water use. Golf courses are concerned that total dissolved solid levels are too high on occasion to meet their requirements.

City of San Juan Capistrano

The city of San Juan Capistrano does not currently use recycled water, but rather treats non-potable groundwater at its non-potable domestic treatment plant for distribution in its non-potable water system. Currently, approximately 460 acre-feet per year of non-potable water is used per year. In the future, the city plans to blend discharge from its wastewater treatment plant with the non-potable groundwater and further treat the water at its non-domestic treatment plant prior to distribution to its non-potable water system. Multiple barriers are foreseen as limiting the city's ability to expand its non-potable/recycled water system in the future. A recycled water use master plan was completed in 1999 documenting costs associated with expansion and potential expansion areas. Main barriers include costs associated with expanding the system and hiring additional staff, raising needed capital for reservoirs and pipelines. Because of limited resources, the priority has been to provide potable needs over recycled water needs. The city requires all new developments to be dual piped for common area irrigation with non-potable/recycled water, but the existing non-potable/recycled water system has not been expanded to physically connect to many of these developments. Currently, the city is revising its master plan and expects to release a new master plan in September, 2005.

City of Newport Beach

The city of Newport Beach expects to utilize approximately 317 acre-feet per year in 2005. The city obtains its recycled water from GAP. Problems that limit future expansion of the city's recycled water system include pressure issues, limited supply, and high salinity (TDS) levels in the summer months when water is provided by OCSD. One high school and multiple parks are currently ready to tie into the system, but have not connected to the system as a result of an unreliable supply of recycled water. Existing users have also expressed concerns about TDS levels. If these concerns were alleviated, future barriers to expansion of the system would be reduced.

City of Fountain Valley

In 2005, the city of Fountain Valley expects to utilize approximately 1,260 acre-feet per year of recycled water. Recycled water distributed within the city is obtained from GAP. As with other GAP users, the current limited supply is viewed as a barrier to potential future expansion of the recycled

water system. Potential large users of recycled water include a high school and Southern California Edison easement lessees. However, without an available supply, future expansion of the system to these users is not feasible.

City of San Clemente

The city of San Clemente expects to use approximately 552 acre-feet of recycled water in 2005. Future expansion of recycled water use in the city of San Clemente is linked to obtaining adequate funding. In 1995, the city completed a recycled water use master plan that identified an additional potential demand of 2,500 acre-feet per year beyond 2005 levels and associated costs with serving the potential demand. If funding becomes available, the city may possibly pursue serving the identified potential demands.

El Toro Water District

In 2005, El Toro Water District expects to use approximately 430 AF of recycled water. Barriers to future expansion of El Toro Water District's recycled water system include the cost of expanding its recycled water distribution system. The area within its jurisdiction is built out, thus any expansion of the recycled water distribution system would result in extensive work beneath existing roadways. However, in the early 1990s El Toro Water District completed a recycled water master plan study indicating a future potential demand of up to 2,500 acre-feet per year beyond the current 2005 use and the cost associated with expansion of the recycled water system beyond its current size. El Toro Water District is considering building a regional facility to produce recycled water with the intent of selling the water to other agencies that have unmet demands.

Santa Margarita Water District

Santa Margarita Water District expects to use approximately 3,972 acre-fee of recycled water in 2005. Santa Margarita Water District has an ongoing capital improvement program to expand its recycled water system. However, this program is limited by the cost associated with expansion projects. Build out of the system requires the construction of a seasonal reservoir proposed for construction in the next 5 to 7 years. The community of Rancho Santa Margarita may not be connected to the recycled water system in the future as construction of the distribution system may be economically unfeasible. At this time, no formal analysis or study beyond an initial staff analysis has been completed to document the economic unfeasibility of connecting Rancho Santa Margarita to the existing recycled water system. All new developments within Santa Margarita Water District are dual plumbed to allow landscape areas to be connected to the system when the distribution system is expanded.

Irvine Ranch Water District

Irvine Ranch Water District (IRWD) has been recognized for its aggressive recycled water programs. In 2005, IRWD produced 15,296 acre-feet of recycled water and demands for non-potable water were 22,878 acre-feet. In 2003, IRWD completed a Wastewater Treatment Master Plan which provided a guide for phased upgrade and expansion of IRWD's reclamation plants to handle projected wastewater flows, to meet effluent quality requirements and to satisfy a portion of the non-potable water demands. IRWD will seek phased expansions/upgrades to allow for maximized wastewater recycling within the service area. This decision will be based on economic factors including availability of regional, state and federal funding assistance, as well as avoided cost.

6.6 Encouraging Recycled Water Use

Recycled water use is encouraged throughout MWDOC's service area using various methods. MWDOC itself does not produce recycled water, but as a member of Metropolitan it represents retail agencies that produce and distribute recycled water. On the regional level, Metropolitan is involved with funding local projects, facilitating partnerships, regulatory issues, brine disposal, and public acceptance. These benefits are passed through MWDOC to the individual retail agencies. Assigning projected yields as a result of these recycled water encouragement mechanisms is not feasible, except for financial assistance provided by Metropolitan. These recycled water encouragement mechanisms are known to encourage recycled water production and use, but the extent that any mechanism influences a retail agency's decision-making process and is directly attributable to a portion of produced yields is unknown, except for direct funding provided by Metropolitan, per acre-foot produced.

6.6.1 Funding

Capital risks associated with recycled water projects are significant hurdles towards increased recycled water production and use. Similar to a potable water system, treatment facilities, distribution networks, pumping stations, and storage reservoirs are required to adequately supply a reliable source of recycled water. These expensive capital investments result in high per unit costs, especially if demand is limited in the beginning of the project. Many times the cost per unit is more than purchasing other non-recycled supplies.

To assist in offsetting the cost of recycled water production and delivery per unit, Metropolitan has developed the Local Resources Program (LRP) to replace previous funding programs. The primary objective of the LRP is to support the development of cost-effective water recycling and groundwater projects that reduce demands for imported potable water. Incentives are provide on a contractual basis for locally developed yield. In 1998, Metropolitan offered incentives up to $250 per acre-foot for the

development of up to 53,000 acre-feet in the Metropolitan service area by 2010. In the 2003 funding cycle, two MWDOC-sponsored projects were selected for funding: the IRWD Recycled Water System Upgrade and the Groundwater Replenishment System. Contributions per acre-foot on behalf of Metropolitan are $117 and $100-$137, respectively. Yields are 8,500 and 31,000 per acre-foot per year, respectively. Funding can be up to 25 years. Eleven MWDOC projects have received financial funding from Metropolitan as illustrated in Table 6-6-1-A. A more detailed discussion of the Metropolitan Incentive Program is contained in Section 4.1.5 of this Plan.

Table 6-6-1-A: Metropolitan Financial Incentive Funding

Project	Contract Yield (AFY)
Groundwater Replenishment System	31,000
IRWD Recycled Water System Upgrade	8,500
IRWD Michelson Reclamation Project	10,000
Moulton Niguel Water Reclamation Project Phase II-III	8,000
Moulton Niguel Water Reclamation Project Phase IV	1,276
San Juan Capistrano Valley Non-Domestic	2,895
San Clemente Water Reclamation Project	1,500
SMWD Oso Water Reclamation Project	3,360
SMWD Chiquita Water Reclamation Project	2,772
Trabuco Canyon Reclamation Expansion Project	800
Green Acres Reclamation Project	7,000
Total	77,103

Sources:
1) Municipal Water District of Orange County, *MWDOC 2000 UWMP*
2) Metropolitan, D*raft 2005 Regional UWMP*

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Federal funding is also available to encourage recycled water use. The United States Bureau of Reclamation's Title XVI program has resulted in appropriations totaling approximately $152 million in Metropolitan's service area. In Orange County, appropriations have included the GWR System project. United States Environmental Protection Agency funds have also been allocated for the GWR System project.

State propositions have dedicated allocations for water recycling. Proposition 204 provides funding up to $60 million for water recycling loans in California. Proposition 13, provides up to $40 million in grants and low-interest loans. The Santa Ana Watershed Project Authority (SAWPA) obtained $235 million from Proposition 13 with a portion of that expected to be used for water recycling-related projects in MWDOC's service area.

Financial incentives drive down the per-unit cost of recycled water and assist in encouraging recycled water use. CALFED has recommended that the state and federal government spend $1.5 to $2 billion over the next seven years on water use efficiency, including water recycling.

6.6.2 Partnerships to Encourage Water Recycling

Partnerships between agencies are another means of encouraging recycled water use. Both OCWD and OCSD are jointly funding GWR SYSTEM as both agencies will benefit. OCSD will not have to construct a new outfall as GWR System will recycle the treated wastewater. Financially, the initial capital investment is spread between two agencies.
Most recycled water production efforts require close coordination between multiple agencies. At a minimum, wastewater, groundwater, and water agencies are all impacted by recycled water production. Recycled water production efforts tend to cross jurisdiction boundaries and require new management strategies to ensure all parties' concerns are met. The formation of SOCWA provides a mechanism for wastewater and water agencies to discuss projects and work toward achieving greater levels of recycling. Additionally, the previously discussed joint agency SCCWRRS fostered coordination among wastewater, groundwater, and water agencies in MWDOC's service area.

Projected yields from promoting partnerships to encourage recycled water use are unknown and cannot be readily allocated from total project yields.

6.6.3 Regulatory Issues

On behalf of its member agencies, including MWDOC, Metropolitan is actively involved in regulatory issues that safely address recycled water. Both the Regional Water Quality Control Board and Department of Health Services are involved with water recycling use. The local Regional Water Quality Control Board is the permitting authority and Department of Health Services regulates recycled water use from a health concern and standards viewpoint. Title 22 of the California Code of Regulation provides specific regulations for treatment levels and reuse applications. Currently, there are no uniform criteria for regulating groundwater recharge applications requiring state agency review on a case-by-case basis. Metropolitan is involved in regulatory issues to ensure streamlined administration, public health, and environmental protection. Uniform criteria for regulating groundwater recharge would encourage agencies that are reluctant to currently pursue such options based on unknown requirements to pursue groundwater recharge with recycled water.
Projected yields from involvement in regulatory issues to encourage recycled water use are unknown and cannot be readily allocated from total project yields.

6.6.4 Brine Line Construction

Through MWDOC's membership in Metropolitan, MWDOC agencies also receive benefits from Metropolitan's other programs that encourage recycled water use. Metropolitan is actively involved in research related to recycled water, including brine disposal. Recycled water projects produce brine as a by-product of the treatment process. Metropolitan, in conjunction with the U.S. Bureau of Reclamation, conducted a Salinity Management Study identifying the need for approximately $200 million in brine lines. As an outgrowth of the study, the Southern California Salinity Coalition has lobbied for state and federal assistance for the construction of brine lines. Offsetting the cost of brine lines with outside funding will reduce capital investments required on behalf of recycled water producers.

Projected yields from brine line construction to encourage recycled water use are unknown and cannot be readily allocated from total project yields.

6.6.5 Research to Encourage Recycling Use

Metropolitan supports research efforts to encourage recycled water efforts. These include conducting studies and research to address public concerns, developing new technologies, and assessing health effects. Addressing public concerns is required to gain the support of stakeholders early in the planning process. From an aesthetic standpoint, the public tends to have negative connotations associated with recycled wastewater. Education is required to inform the public of treatment processes. Developing new technologies is a prerequisite to help reduce the cost of producing recycled water. Health effects assessments have a two-fold purpose of alleviating public concerns and ensuring the protection of public health and the environment. Further research supported by Metropolitan will have the benefit of reducing risks for MWDOC's retail agencies.

Projected yields from research to encourage recycled water use are unknown and cannot be readily allocated from total project yields.

6.7 Optimizing Recycled Water Use

Over the next 25 years, recycled water use is projected to increase four-fold to 136,463 acre-feet per year in 2030. This means more than 25% of the wastewater generated in the MWDOC service area will be recycled, becoming a significant and valuable resource. To assist in meeting these projections, MWDOC plans to take numerous actions to facilitate the use and production of recycled water within its service area. However, MWDOC is a wholesaler and, as such, cannot impose development requirements or enact ordinances that require the use of recycled water. Most recycled water projects that provide the greatest benefit for the cost have been developed or are planned. In many cases, additional recycled water production and use is economically unfeasible given the current cost of potable water supplies in comparison to recycled water costs. As described in the

SCCWRRS study, further recycled water production will require a regional approach to water recycling. MWDOC has taken the following actions to facilitate further production and use of recycled water:

- Sponsoring member agencies in obtaining Local Resource Program incentives from the Metropolitan;
- Assisting and supporting member agencies in applications made for bond funds such as Proposition 13 and Proposition 50;
- Encouraging Metropolitan to participate in studies that will benefit recycled water production;
- Supporting Metropolitan in deriving solutions to regulatory issues;
- Participating in sub-regional studies, such as the South Orange County Integrated Regional Water Management Plan;
- Participating in regional studies such as the South Orange County Integrated Regional Water Management Plan;
- Participating in an upcoming study with city of Long Beach and retail water agencies/cities in west Orange County. MWDOC may consider the opportunity to purchase recycled water from the city of Long Beach. This transaction could comprise up to 10,000 acre-feet per year of recycled water available to the MWDOC service area;
- Advocating and participating in a 1998 U.S. Bureau of Reclamation/Metropolitan Salinity Management Study, which recommended that Metropolitan adopt a salinity goal of 500 mg/l for the water it delivers to its customers; and
- Working cooperatively with member agencies, Metropolitan and its member agencies, and other Orange County water and wastewater agencies to encourage recycled water use and to develop creative solutions to increasing recycled water use.

Additional funding and removal of recycled water implementation barriers at the state level would assist in increasing recycled water production within MWDOC's service area. State funding assistance could reduce the overall cost per acre-foot of recycled water so that it is comparable to potable water allow the development of more expensive recycled water projects in an earlier timeframe. There are numerous barriers to increasing water recycling that the State could assist with removing. These include establishment of uniform Regional Water Quality Control Board requirements for recycled water, especially in areas where water and wastewater agency jurisdictions cross Regional Water Quality Control Board jurisdictions resulting in varying requirements; partnering in health studies to

illustrate the safety of recycled water; increasing public education; and establishing uniform requirements for retrofitting facilities to accept recycled water.

Past planning efforts in MWDOC's service area have led to innovative recycled water projects. As previously discussed, GWR System is an innovative and technologically advanced means to increase recycled water production and ultimately increase water supply reliability in MWDOC's service area. Continuing the aforementioned actions that MWDOC has already taken to facilitate further recycled water production and investigating new opportunities when they arise will lead to increased recycled water use in MWDOC's service area.

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7.0 WATER SHORTAGE CONTINGENCY PLAN

7.1 Introduction

During water shortages, Municipal Water District of Orange County (MWDOC) manages its water supply to ensure it meets the demands of its member (retail) water agencies. In turn, retail water agencies must manage their local supplies and supplies they receive from MWDOC utilizing various mechanisms to ensure the reliability of their supply. Water shortages may result from variations in weather and natural and unnatural catastrophes such as, but not limited to, earthquakes, pipeline failures, supply contamination, and transmission facility failures. The discussion in this chapter focuses on MWDOC's water shortage planning efforts.

7.2 Stages of Drought Action

MWDOWC is responsible for exercising its authority over water it sells in a manner that is consistent with law, conditions of use placed on the water by Metropolitan Water District of Southern California (Metropolitan), and that reasonably meets the needs of its customers. MWDOC will determine specific stages of shortage actions in conjunction with local ordinances of member agencies and other relevant water actions by local government. Thus, as in the past, MWDOC will adopt Board Resolution urging its retail agencies to develop and implement water shortage plans, calling upon each agency to adopt and enforce regulations prohibiting the waste of water, and implementing an allocation plan for available imported water consistent with reductions, incentives, and penalties imposed on MWDOC by the Metropolitan

MWDOC receives its imported water from Metropolitan. Metropolitan has a *Water Surplus and Drought Management* (WSDM) *Plan* for the management of its imported water. The WSDM Plan has identified seven stages of water shortages caused by dry years and drought, with each one getting significantly more severe (see Table 7-2-A).

It is anticipated that water shortages would have to be extremely severe for Metropolitan to implement the action listed for stage 7, which is to allocate its imported water supplies to its member agencies. For example, even with significant reductions in Colorado River water supplies and a repeat of the 1987-1992 drought on the State Water Project, Metropolitan could meet all retail water needs of its member agencies by implementing stages one through six of the WSDM Plan until 2025 (*Metropolitan Integrated Resources Plan Update*, 2004).

Table 7-2-A: Water Supply Shortage Stages and Conditions (Metropolitan's Water Surplus and Drought Management Plan)

Water Supply Shortage Stages and Conditions Rationing Stages	
Stage No.	**Actions**
1	Withdraw stored water from Diamond Valley Lake
2	Stage 1 plus draw from out of region groundwater storage
3	Stage 2 plus curtail/temporarily suspend deliveries to local groundwater and surface storage replenishment in accordance with their discounted rates
4	Stage 3 plus draw from local Conjunctive Use Groundwater Programs & SWP terminus reservoirs
5	Stage 4 plus extraordinary conservation through coordinated outreach and curtail Interim Agricultural Water Program deliveries in accordance with discounted rates
6	Stage 5 plus exercise water transfer option contracts and/or buy water on open market for consumptive use or for delivery to regional storage facilities
7	Stage 6 plus allocation of imported water to member agencies based upon adopted principles of fairness and need

Source: Metropolitan, *Water Surplus and Drought Management Plan*

Although Metropolitan's WSDM Plan did not specify the exact formula for how imported water would be allocated in Stage 7, it did include some principles for allocation. Metropolitan's board of directors adopted the WSDM Plan and principles for imported water allocation in 1999.

Should the severity of drought warrant the need to allocate imported water, Metropolitan would do so following an overall principle of equity, and on the basis of meeting agencies' retail needs. Metropolitan will consider the following in the equitable allocation of imported water:

1. Impact on retail water customers and economy;
2. Investments in recycling and conservation;
3. Population change;
4. Overall investment in local resources;
5. Changes and/or loss of local supply;
6. Participation in Metropolitan's non-firm (interruptible) programs; and
7. Investment in Metropolitan's facilities.

During a severe water shortage (such as a Stage 7 supply reduction as defined by Metropolitan), the MWDOC Board would exercise its authority consistent with law, giving due consideration to the Metropolitan WSDM Plan and to the contingency plans of its retail agencies.

MWDOC's authority for stages of drought action relate only to the imported water MWDOC provides. As Metropolitan moves through its stages of action, MWDOC would assist and facilitate actions at the retail agency level within MWDOC's service area. Under the WSDM Plan, imported water only becomes allocated at the Stage 7 drought condition as declared by Metropolitan. Therefore, the requirements stated in Urban Water Management Act Section 10632 (a) for defining stages of water supply shortage up to a 50% reduction are not applicable to MWDOC. It is more appropriate for the stages of drought action to be implemented to the public through the retail agencies.

Within MWDOC's service area local retail agencies have adopted or are in the process of developing ordinances that address urban water shortage requirements. Table 7-2-B shows two examples of shortage action plans prepared by MWDOC's local retail agencies:

Table 7-2-B: Examples of Water Shortage Stage and Action, Irvine Ranch Water District and Santa Margarita Water District

Irvine Ranch Water District			
Stage	**Water Supply Condition**	**% Shortage**	**Action**
1	Drought Warning and low level shortage condition	10%	See Appendix 7-B "IRWD Water Shortage Contingency Plan"
2	Significant drought condition	10% to 25%	See Appendix 7-B "IRWD Water Shortage Contingency Plan"
3	Emergency condition	25% to 40%	See Appendix 7-B "IRWD Water Shortage Contingency Plan"
Final Stage	Crisis condition of water supply shortage	40%+	See Appendix 7-B "IRWD Water Shortage Contingency Plan"
Santa Margarita Water District			
Stage	**Water Supply Condition**	**% Shortage**	**Action**
1	Voluntary Conservation	10%	Customers are encouraged to voluntarily conserve water
2	Mandatory Conservation - Drought	20%	Prohibit using potable water for street washing
			Prohibit using potable water for dust control for construction activity
3	Mandatory Conservation - Serious Drought	30%	Limiting outdoor irrigation to restricted times
			Prohibit washing of vehicles
			Refilling or filling artificial lakes by permit only
			Prohibit using potable water for operation of fountains
			Use of potable water for construction by permit only
4	Mandatory Conservation - Severe Drought	40%	Prohibit using potable water for outdoor irrigation
			Prohibit filling ponds, artificial lakes, pools and spas
			Prohibit using potable water for construction

Sources:
Irvine Ranch Water District 2005 Urban Water Management Plan (Draft)
Santa Margarita Water Distric 2005 Urban Water Management Plan (Draft)

7.3 Three-Year Minimum Water Supply

Through its modeling efforts, MWDOC has determined minimum water supplies available for retail consumption for each of the next three years, 2006-2008. Table 7-3-A compares supplies available under normal conditions and supplies available under a hypothetical repeat of the historical driest three-year period for MWDOC's service area, 1959-1961. During multiple dry years, less local supplies are available for retail consumption and retail demands increase, resulting in the use of increased imported supplies from Metropolitan to offset the reduction in local supplies.

Even with decreased local supplies available, MWDOC is expected to meet all retail consumption during a three-year dry period of 2006-2008 based on the three

driest years on record. Metropolitan is expected to be able to supply all of MWDOC's imported water during the same period. Metropolitan's 2005 Regional Urban Water Management Plan (Draft) indicates that Metropolitan can provide 100% of the supply demanded by its member agencies until 2030.

Table 7-3-A: Three-Year Estimated Minimum Water Supply for Direct Consumption in MWDOC's Service Area– Based on Multiple Dry Years

Acre-feet per Year						
Source	Normal			Multiple Dry Year		
	2006	2007	2008	2006	2007	2008
Local Supplies	272,824	295,193	320,046	263,142	270,408	305,886
Imported Supply	253,756	239,271	221,919	299,887	285,695	267,948
Total	526,580	534,464	541,965	563,029	556,102	573,833

Source: Municipal Water District of Orange County, output of "Water Balance" Model

7.4 Catastrophic Supply Interruption Plan

From a regional perspective, Orange County and all of Southern California is heavily dependent upon imported water supplies from Metropolitan. Imported water is conveyed through the State Water Project (SWP) and Colorado River Aqueduct (CRA), which travel hundreds of miles to reach urban Southern California, and specifically to Orange County. Additionally, this water is distributed to customers through an intricate network of pipes and water mains that are susceptible to damage from earthquakes and other disasters. Regional storage for Southern California and Orange County is provided by Metropolitan to mitigate an outage of either the SWP or CRA. The recently completed Diamond Valley Lake is an 800,000 acre-foot reservoir, of which about 400,000 acre-feet of water is reserved for catastrophic emergencies. In fact, protection from catastrophic events such as earthquakes was a major reason for the construction of Diamond Valley Lake.

In 1983, the Orange County water community developed a *Water Supply Emergency Preparedness Plan* to respond effectively to disasters impacting the regional water distribution system. This plan was jointly funded by three regional water agencies; MWDOC, Coastal Municipal Water District (later merged with MWDOC), and Orange County Water District (OCWD), with the support and guidance from the Orange County Water Association. The collective efforts of these agencies resulted in the formation of the Water Emergency Response Organization of Orange County (WEROC) to coordinate emergency response on behalf of all Orange County water agencies, develop an emergency plan to respond to disasters, and conduct disaster training exercises for the Orange County water community. WEROC is unique in its ability to provide a single point of contact for representation of all water utilities in Orange County during a disaster. This representation is to the county, state, and federal disaster coordination agencies. Within the Orange County Operational Area, WEROC is the recognized contact for emergency disaster response for the water community. Table 7-4-A summarizes

possible catastrophe scenarios and actions that would be taken in response to a catastrophe.

Each local water utility is responsible for developing its own disaster preparedness and response plan to meet emergencies within their service area. WEROC performs coordination of information and mutual-aid requests among water agencies, and with Metropolitan.

In the event of a major emergency or regional disaster WEROC would perform the following functions:

- Collect damage assessment reports from Orange County water utilities;
- Assess the overall condition of Orange County water supply system;
- Identify needs of water utilities;
- Quantify available resources;
- Determine optimal use of resources;
- Establish repair priorities;
- Recommend water allocations;
- Liaison with water utilities, Metropolitan, and County Operational Area; and
- Document remedial actions taken during the disaster operation.

Two dedicated WEROC Emergency Operations Centers (EOCs) are located within Orange County. Both sites are maintained in a state of readiness in the event that they will be activated following a major emergency disaster. WEROC EOCs are staffed by trained personnel from the water community. WEROC's Emergency Radio Communication System consists of two mountain-top radio repeaters and several control stations. WEROC is a flexible and dynamic program that continues to make improvements to its emergency preparedness plan, emergency response facilities, and its training program to address new issues as they surface.

During a disaster, WEROC will work cooperatively with Metropolitan through their Member Agency Response System to facilitate the flow of information and requests for mutual-aid within Metropolitan's 5,100 square mile service area. WEROC also provides updated information to Metropolitan's EOC at Eagle Rock.

Table 7-4-A: Preparation Actions for a Catastrophe

Possible Catastrophe	Summary of Actions*
Regional power outage	Coordinate communication with So. CA. Edison and Sempra Energy Co. for restoration of services. Provide contacts for vendors of rental generators and initiate mutual assistance between unaffected and affected agencies for emergency backup power. Consult with the California Department of Health for water quality concerns and public notices.
Earthquake	Coordinate the resources necessary for repair of the Orange County retail water agencies' infrastructure. Facilitate mutual aid from outside agencies through Metropolitan, California Utilities Emergency Association, and the Orange County Operational Area. Utilize vendor lists to identify available water haulers, temporary water lines, piping, heavy equipment, etc.
Tsunami	If time allows, notify coastal agencies to shut down operations in inundation zone, including but not limited to: wells and pumps. Request California Department of Health Services support in evaluating water contamination via salt water intrusion and backflow of raw sewer water. Support agency efforts to restore water flow in unique conditions of flooding (safety) and probably lack of electricity (refer to above actions). Continue support similar to an earthquake response.
Malicious Act	Since such an incident typically involves a long term response with law enforcement, WEROC could support the agency with staff, communications with the County, and temporary water facilities/pipelines. In addition, coordination of WEROC water quality advisors, California Department of Health Services, and public information officers will be critical.
Flooding	Coordination with the Orange County Resource and Development Management Department for flood control support. Coordination of mutual assistance for repair of infrastructure.
Dam Failure	Coordinate communications of inundation zone evacuation through the local law enforcement. Identify water losses and what the loss means for the county during the current weather season and conditions. Evaluate the need and ability for immediate reconstruction and restoration of services.
SONGS - Nuclear Release	Work with Orange County retailers that have open water sources: consider shutting down those systems. Work with California Department of Health Services for effects and countermeasures. Also work with agencies within the fall out zone to determine future use of infrastructure in the affected area.
Wild Land Fire	Coordinate with the Orange County Fire Authority to ensure that they have enough water for fire flow. Refer to "Actions To a Regional Power Outage" for loss of power to pumps due to fire. Identify available emergency generators for backup power supply. If ongoing, fire response may coordinate county wide water reduction campaign, and reallocate and move water towards incident area. If infrastructure is within the fire path, identify secondary routes of delivery and services depending on the location of the incident.
Water Contamination	Contamination can be from multiple sources: malicious, sewer leak, underground contaminate plume, etc. WEROC would work with the agency to coordinate with California Department of Health Services and local laboratory to identify the contaminate and action needed. Will utilize Orange County retail agency support in trying to reroute water where possible, and to provide water haulers when needed. The WEROC Public Information Officer will work with the agency and the media to ensure proper information is provided to the public for their health and safety.
Hazardous Materials Spill/Release	Depending on the material the response would vary. Any aerosolized material release would require coordination with the local law enforcement for evacuation, and would only affect open source water supplies. Notification of agencies with open source water supplies to adjust their water supply to non-open source if available. A release within a particular agency's facility that is contained would require coordination of cleanup and potentially a secondary water supply for only that agency. Lastly, the release of a liquid hazard would require coordination with the local sanitation agency for treatment of cleanup byproduct.

* As a wholesale water district the Municipal Water District of Orange County has no facilities of its own to ensure their protection and integrity. The Water Emergency Response Organization of Orange County (WEROC) was created to ensure that the water supply to all of Orange County is protected and restored in as efficiently a manner as possible. This is done through the coordination of WEROC with Metropolitan, the Orange County Operational Area, and all of the Orange County retail water districts to ensure the sharing of resources and a unified response. The WEROC program includes a Regional Emergency Response Plan, two emergency operation centers, and a communications system that includes a dedicated radio communications system, cell and landline phones, fax, and internet.

Source: Municipal Water District of Orange County

Day-to-day management of WEROC is provided by MWDOC, and program oversight is conducted by the WEROC Executive Committee. The Executive Committee includes representatives from MWDOC and OCWD. A WEROC Steering Committee serves as an advisory group providing general guidance to the program, and includes representatives from member agencies, Metropolitan, California Department of Health Services, and the County Operational Area.

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

7.5 Water Reduction Mechanisms

Working with its member agencies, MWDOC is able to reduce its demands on Metropolitan during water shortages. Although MWDOC requires more water during water shortages to offset losses of local supplies, it is able maintain this demand at a lower level than would be possible if water reduction mechanisms were not implemented. A variety of mechanisms, such as mandatory prohibitions, consumption reductions, and penalties and charges has been and can be implemented during water shortages.

7.5.1 Mandatory Water Use Prohibitions

Because MWDOC's powers to enforce restriction of use are confined to imported water, as a practical matter, mandatory use prohibitions would be difficult for MWDOC to enforce given the different sources of water accessed by end users. The establishment of mandatory prohibitions on water usage during water shortages are therefore not part of MWDOC's Plan under Water Code Section 10620 (c). However, historically MWDOC has focused its activity in developing shortage allocation plans that include water purchase allocations and penalties. In addition, MWDOC has urged its retail agencies to develop specific shortage management plans to meet targeted reduction in total water demand during a shortage. Retail agencies of MWDOC will address mandatory prohibitions during water shortages in their individual UWMPs.

7.5.2 Water Reduction Methods

As mentioned in Section 7.5.1 of this Plan, MWDOC's powers to enforce the restriction of use of water are confined to imported water. Therefore, it is more appropriate for water reduction methods to be applied to the public through the retail agencies. Reductions in water consumption by

MWDOC's retail agencies during water shortages will ultimately reduce MWDOC's overall demands on Metropolitan. MWDOC's Board has the authority to provide for a method of allocation for available supplies, as the Board may determine necessary, through adoption of a Water Shortage Management Plan for all classes of service. Each retail agency decides how it will allocate supplies it receives from MWDOC during water shortages. Retail agencies of MWDOC will address water reduction methods during water shortages in their individual UWMPS.

7.5.3 Penalties for Excessive Water Use

Should Metropolitan have to allocate imported water during a severe water shortage, as identified in Stage 7 of its Water Surplus and Drought Management Plan, Metropolitan can impose surcharges (penalty pricing) on water consumption in excess of the imported water allocation. Penalties are expected to be severe, as much as three times Metropolitan's full service water rate.

MWDOC's Board has the authority to adjust water rates to reflect any penalties imposed by Metropolitan under Metropolitan's WSDM Plan or other allocation programs as determined necessary by the Board. Rates may also be adjusted based on any Water Shortage Management Plan or other allocation program implemented by MWDOC as determined necessary by the Board.

7.6 Water Reduction Impacts on Revenues and Expenditures

During water shortages, MWDOC's revenues and expenditures simultaneously increase as MWDOC purchases more water from Metropolitan to offset reductions in local supplies. There are two potential revenue related issues for which MWDOC must plan: loss of Incremental Rate Revenue due to reduced water sales in a shortage, and increased cost to purchase Tier 2 water during high demand episodes caused by drought conditions.

MWDOC Incremental Water Rate

MWDOC's operating budget is funded from two rate components. One is a fixed annual Retail Meter Charge collected from MWDOC's member agencies for each retail water meter in their service area. This charge provides a stable source of revenue that does not vary with weather or water sales. The other is a commodity Incremental Water Rate (per acre foot of water sold). Revenue from this Incremental Rate increases when water sales rise, and decreases when sales fall. To the extent a water shortage causes water sales to drop, the shortfall in revenue would be made up from reserves held by MWDOC for this purpose.

Metropolitan Tiered Supply Rate and MWDOC Melded Supply Rate

Metropolitan charges for its supply to MWDOC using a Tiered Rate. MWDOC has the ability to buy up to 222,924 acre-feet at the Tier One supply rate. However, additional water purchased above pre-determined Tier One demand is at Metropolitan's Tier Two water rate. Tier Two water is sold at a higher price than Tier One water. MWDOC sells water to its retail agencies at a Melded Supply rate. The rate is set each year based on the expected combined cost of Tier One and Tier Two purchases – plus or minus any adjustment to add or decrease from reserves.

In June of 2002, MWDOC adopted a resolution establishing a Tier Two Contingency Fund to offset any Tier Two costs that MWDOC may incur. The goal of the Tier Two Contingency Fund is to maintain stable water rates regardless of weather variations or other unexpected increases in demand of imported water. The melded water supply rate is higher than Metropolitan's Tier One water supply rate. The revenue difference between MWDOC's Melded Supply rate and Metropolitan's Tier One rate is deposited into a restricted fund, the Tier Two Contingency Fund.

Uses of funds in the Tier Two Contingency Plan are restricted to the following:

- Payment of Tier Two costs if MWDOC's water purchases from Metropolitan exceed the Tier One level;

- Advances to the General Fund to pay charges imposed on MWDOC by Metropolitan, in which the revenues are collected in a period that is different than the payment date. All advances are repaid to the Fund when the charges are collected from the retail agencies; and

- If the funds are not immediately needed for the previous two items, the Board may utilize the funds to offset any increase in water rates or charges imposed by Metropolitan which would require a rate increase by MWDOC.

If the Board determines that any portion of the Tier Two Contingency Fund is no longer needed for the purposes they were designated, then the Board will declare those funds surplus. The Board may either adjust the melded rate to reflect the surplus or distribute the surplus to each retail water agency in proportion to the amount of the melded rate water each agency purchased in the preceding two fiscal years.

7.7 Water Shortage Contingency Ordinance

In a water shortage event, MWDOC will adopt a Water Shortage Management Resolution or Ordinance. In past shortages, MWDOC has adopted Board Resolutions urging its retail agencies to develop and implement water shortage plans, calling upon each member agency to adopt and enforce regulations prohibiting the waste of water, and implementing an allocation plan for available imported water consistent with reductions, incentives, and penalties imposed on

MWDOC by Metropolitan. MWDOC has adopted a resolution pertaining to water shortage conditions during the late 1980s and early 1990s drought. A copy of that resolution is provided in *Appendix 7-A*. In the event of a water shortage, MWDOC will adopt a Water Shortage Management Resolution that reflects the needs and conditions of the current drought. Such reflection would include the same allocation principles identified by Metropolitan at the time of the drought. However, as mentioned in Section 7.2 of this Plan, MWDOC will consult with the retail agencies regarding the development of local principles or adjustments to the Metropolitan allocation.

7.8 Methods to Determine Water Consumption Reductions

The establishment of a method to measure water consumption reductions during water shortages is necessary to determine the effectiveness of water reduction mechanisms. Although MWDOC, as a wholesale supplier, would have difficulty enforcing water reduction mechanisms upon end users, MWDOC does work closely with its member agencies to develop plans to meet targeted reductions. To monitor the effectiveness, MWDOC generally relies on monthly reading of Metropolitan's meter connection. Monthly reading would allow MWDOC to evaluate the trends of consumption at the retail agency level.

MWDOC's Retail agencies will address methods to determine water consumption reductions in their individual UWMPs.

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8.0 URBAN WATER MANAGEMENT PLAN (UWMP) ADOPTION AND IMPLEMENTATION

8.1 UWMP adoption process

The adoption process for the Municipal Water District of Orange County's (MWDOC) Draft 2005 Urban Water Management Plan (Plan) formally commenced on October 12, 2005 with the beginning of the 30-day public comment period. Letters of notification announcing the availability of the Draft Plan, the 30-day comment period, and the day, time, and place of the Public Hearing were sent to approximately 250 stakeholders, including:

- City council members from Orange County's 34 municipalities
- City managers from Orange County's 34 municipalities
- Appropriate County of Orange staff members
- MWDOC's member agencies (30)
- Representatives of local environmental groups, and
- Residents and business owners who attended one or both of MWDOC's Urban Water Management Plan community information meetings

To reach the broadest audience possible, MWDOC also ran a display ad in the October 27, 2005 edition of the *Orange County Register* announcing the Public Hearing and where and how to obtain a copy of the Draft Plan. (See *Appendix 8-A(i).*)

The Draft Plan, in its entirety, was also posted on MWDOC's website on October 12, 2005. The document was divided into sections, which allowed readers to easily identify and access those sections of greatest interest to them.

Board Review

Throughout the yearlong information-gathering, writing, and public participation process, staff kept the Board of Directors apprised of its progress on Plan development.

Staff presented copies of the Draft Plan to MWDOC's governing board in late September 2005 as part of the agenda package for the October 2005 Planning and Operations Committee meeting. (Planning and Operations is one of three board working committees.) During the committee meeting, which was held October 3, 2005, staff also presented a review of the draft document and answered questions from committee members.

Upon the recommendation of the Planning and Operations Committee on October 12, 2005, the full seven-member Board of Directors approved the distribution of the Draft Plan and the proposed 30-day public review and comment period.

Public Hearing

A Public Hearing for MWDOC's Draft Plan was held Thursday, November 3, 2005. The hearing was conducted during a special meeting of the MWDOC Board of

Directors at MWDOC's offices in Fountain Valley. For the public's convenience, the hearing was held from 6-8 p.m.

A 45-minute staff report, which reviewed the information-gathering process, the data obtained from MWDOC member agencies and other resource planning agencies, and the conclusions that served as the basis of the Draft Plan, began the special meeting. The President of the Board of Directors then opened the Public Hearing, which was videotaped to ensure all comments were recorded in their entirety.

While seven members of the general public attended the hearing, only one person spoke. She did not comment on the Draft Plan, but rather had questions related to the availability of demand projections beyond the 25-year window, the accuracy of past demand projections, and future allocations of Colorado River water.

Comment cards were also provided for those attendees who preferred to submit their comments in writing.

Please see *Appendix 8-A(ii)* for the record of attendance, presentations, and videotape of the Public Hearing.

Written Comments

When the 30-day comment period closed on November 16, 2005, MWDOC had received 10 written comments from MWDOC's member agencies and zero from the general public. Those that made the comments are Irvine Ranch Water District, Santa Margarita Water District, Orange County Water District, City of San Clemente, Moulton Niguel Water District, El Toro Water District, Trabuco Canyon Water District, Yorba Linda Water District, City of Garden Grove, and City of La Habra. Based on the comments received, staff revised and finalized the UWMP.

Adoption

Members of the Board of Directors reviewed the Final Draft Plan during the December 5, 2005 Planning and Operations Committee meeting. The Committee recommended that the Board of Directors approve the 2005 Urban Water Management Plan at its December 2005 meeting.

The seven-member MWDOC Board of Directors approved the 2005 Urban Water Management Plan at its final meeting of the year, which was held on December 21, 2005.

Filing

Before December 31, 2005, the Adopted 2005 MWDOC Urban Water Management Plan is filed with California State Department of Water Resources, California State Library, County of Orange, and cities within MWDOC's service area.

8.2 Review the Implementation of Water Conservation and Water Recycling Programs in 2000 Plan

As required by California Water Code, Municipal Water District of Orange County (MWDOC) summarizes the implementation of the Water Conservation and Water Recycling Programs to date, and compares the implementation to those as planned in its 2000 Urban Water Management Plan (2000 UWMP).

8.2.1 Comparison of 2000 Planned Water Conservation Programs with 2005 Actual Programs

As a wholesaler, MWDOC did not contain a specific implementation plan its 2000 UWMP. However, as a signatory to the Memorandum of Understanding regarding urban water use efficiency, MWDOC's commitment to implement Best Management Practice-based water use efficiency program continues today. For MWDOC's specific achievements in the area of conservation, please see Section 5 of this Plan.

8.2.2 Comparison of 2000 Projected Recycled Water Use with 2005 Actual Use

Current recycled water projections for 2005 for MWDOC's service area are 25% less than previously forecasted for 2005 in the 2000 UWMP for the agricultural/landscape/industrial/commercial use category, as illustrated in Table 8-2-2-A.

Table 8-2-2-A: Recycled Water Uses in MWDOC's Service Area– 2000 Projection Compared with 2005 Actual

Acre-feet Per Year		
User type	2000 Projection for 2005	2005 Actual Use
Landscape		
City of Fountain Valley	1,300	1,260
City of Huntington Beach	400	No Use
City of Newport Beach	500	317
City of San Clemente	1,000	552
El Toro Water District	600	430
Irvine Ranch Water District	16,853	15,296
Mesa Consolidated Water District	1,000	1,000
Moulton Niguel Water District	9,000	7,868
Santa Margarita Water District	5,700	3,972
South Coast Water District	1,000	890
Trabuco Canyon Water District	900	850
Subtotal	38,253	32,435
Sea Water Barrier		
Initial 5-MGD of GWR System		4,000
Total	38,253	36,435

Sources :

1) Municipal Water District of Orange County, *2000 MWDOC Urban Water Management Plan*

2) Municipal Water District of Orange County

Notes:

[1]WaterFactory 21 is not included as it was demolished in 2004. GWR System's Initial-5-MGD Plant was not included in 2000 for 2005.

In the event of a discrepancy between the information shown above and that contained within a local retail agency's Urban Water Management Plan, the local retail agency's data control.

Current 2005 forecasts indicate that approximately 29,287 acre-feet of recycled water will be consumed by these user types, while the 2000 UWMP forecasted 39,600 acre-feet of recycled water use by 2005.

On a percentage basis, the city of San Clemente satisfied the least amount of their 2000 projection for 2005 and will only meet 55% of its forecast. Additionally, the city of Huntington Beach has not started using recycled water as previously forecasted. The Green Acre Project, an Orange County Water District project, was expected to serve the city of Huntington Beach, but was not extended into the city as was anticipated. Discrepancies between the current 2005 expected use of recycled water and the 2000 forecast are attributable to numerous reasons, including a lack of funding and complex interagency agreements. Discussions of individual agency discrepancies in recycled water use should be available in their respective Urban Water Management Plans.

APPENDIX C

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA REGIONAL URBAN WATER MANAGEMENT PLAN, SEPTEMBER 2005

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

REGIONAL URBAN WATER MANAGEMENT PLAN

Prepared by:

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
Water Resource Management Group
700 North Alameda Street
Los Angeles, CA 90012

November 2005

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DWR Checklist

Coordination with Appropriate Agencies (Water Code § 10620 (d)(1)(2))

Participated in area, regional, watershed or basin wide plan

See Section II, especially pages II-1 to II-3

Describe the coordination of the plan preparation and anticipated benefits.

See Section II, especially pages II-1 to II-3

Describe resource maximization / import minimization plan (Water Code §10620 (f))

Describe how water management tools / options maximize resources & minimize need to import water

The IRP discussion in Section II provides an overview of this approach. See pages II-1 through II-5. Further details are provided in Sections III-2 (conservation, pages III-7 through III-24) and III-3 (recycling, groundwater recovery and desalination, pages III-25 through III-39)

City and County Notification and Participation (Water Code § 10621(b))

Notify any city or county within service area of UWMP of plan review & revision

Consult and obtain comments from cities and counties within service area

Page A.4-2 and beginning on page II-33.

Service Area Information (Water Code § 10631 (a))

Include current and projected population

Population analysis discussed in Appendix 1, page A.1-3. Projections are on page A.1-10, Table A.1-2.

Population projections were based on data from state, regional or local agency

See footnote Table A.1-2, page A.1-10

Describe climate characteristics that affect water management

Page I-13 through I-15

Describe other demographic factors affecting water management

Page I-12

Water Sources (Water Code § 10631 (b))

Identify existing and planned water supply sources

Provide current water supply quantities

Provide planned water supply quantities

Historic and current water supplies are described in Appendix A.2. Planned water supplies are discussed in Section II, and details are provided in Appendix A.3, and particulary inTable 3-7, pages A.3-40 through A.3-54

If Groundwater identified as existing or planned source (Water Code §10631 (b)(1-4))

Metropolitan does not supply groundwater. However, Metropolitan does use groundwater basins for groundwater banking. See Chapter III-4 for a discussion of issues related to groundwater basins.

Reliability of Supply
(Water Code §10631 (c) (1-3)

Describes the reliability of the water supply and vulnerability to seasonal or climatic shortage

Section II, pages II-11 though II-15 and the "Issues" discussions of Sections III-5 and III-7.

Basis of Water Year data

Section II, pages II-11 though II-15

Water Sources Not Available on a Consistent Basis
(Water Code §10631 (c))

Describe the reliability of the water supply due to seasonal or climatic shortages

Describe the vulnerability of the water supply to seasonal or climatic shortages

Section II and the "Issues" discussion at the beginning of Sections III-5 and III-7.

Describe plans to supplement or replace inconsistent sources with alternative sources or DMMs

Sections II and III.

Transfer or Exchange Opportunities
(Water Code §10631 (d))

Describe short term and long term exchange or transfer opportunities

Section III-4 (pages III-40 through III-46) describes plans for banking, exchange and transfer opportunities within the local region.

Section III-5 (pages III-47 through III-57) describes plans for banking, exchange and transfer opportunities within the State Water Project.

Section III-6 (pages III-58 through III-62) describes plans for banking, exchange and transfer opportunities within the Central Valley.

Section III-7 (pages III-63 through III-68) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct.

Further details including dry year supply projections are provided in Appendix 3, particularly Table A.3.7 on pages A.3-42 through A.3-56.

Water Use Provisions
(Water Code §10631 (e)(1)(2))

Quantify past water use by sector

Quantify current water use by sector

Project future water use by sector

Past, current and future water uses are shown in Table A.1-14 on page A.1-16. Water uses by sector and county are shown in Tables A.1-6 through A.1-11 on pages a.1-12 through A.1-14.

Identify and quantify sales to other agencies

Historic sales are presented in Table A.2-2 on page A.2-3. Metropolitan does not project sales by individual agency. However, total projected sales to other agencies are shown in Section II.

2005 Urban Water Management Plan "Review of DMMs for Completeness" Form
(Water Code §10631 (f)

See CUWCC filings in Attached Documents

Planned Water Supply Projects and Programs, including non-implemented DMMs
(Water Code §10631 (g))

See discussion on the conservation credits program (page III-9) and implementation approach, pages III-7 through III-18.

Planned Water Supply Projects and Programs
(Water Code §10631 (h))

Detailed description of expected future supply projects & programs
Timeline for each proposed project
Quantification of each projects normal yield (AFY)
Quantification of each projects single dry-year yield (AFY)
Quantification of each projects multiple dry-year yield (AFY)

Section III-4 (pages III-40 through III-46) describes plans for future supply projects and programs within the local region.

Section III-5 (pages III-47 through III-57) describes plans for future supply projects and programs within the State Water Project.

Section III-6 (pages III-58 through III-62) describes plans for future supply projects and programs within the Central Valley.

Section III-7 (pages III-63 through III-68) describes plans for future supply projects and programs along the Colorado River and Aqueduct.

Further details including normal, single dry year and multiple dry year supply projections are provided in Appendix 3, particularly Table A.3.7 on pages A.3-42 through A.3-56.

Opportunities for development of desalinated water
(Water Code §10631 (i))

Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply

See pages III-33 and III-34

District is a CUWCC signatory
(Water Code § 10631 (j))

Agency is a CUWCC member
2003-04 annual updates are attached to plan
Both annual updates are considered completed by CUWCC website

See Section III.2 and attached documents

If Supplier receives or projects receiving water from a wholesale supplier
(Water Code § 10631 (k))

Provided written water availability projections, by source, to member agencies

See pages II-33 & II-34 plus Appendix A.3-43 through A.3-57

Water Shortage Contingency Plan Section
(Water Code § 10632)
Stages of Action
(Water Code § 10632 (a))

Provide stages of action
Provide the water supply conditions for each stage
Includes plan for 50 percent supply shortage

See Section II, pages II-15 through II-17

Three-Year Minimum Water Supply
(Water Code §10632 (b))

Identifies driest 3-year period

Minimum water supply available by source for the next three years

See Table A.3-8. Metropolitan has also projected multiple dry year periods for years ending in "0" or "5". Its planning for multiple dry years is based on the three years of shortest supplies (1990-1992 hydrology).

Preparation for catastrophic water supply interruption
(Water Code §10632 (c))

Provided catastrophic supply interruption plan

Regional power outage

Earthquake

Delta levee failure

Aqueduct failure

See Section II, pages II-11 through II-21

Prohibitions
(Water Code § 10632 (d))

List the mandatory prohibitions against specific water use practices during water shortages

Not applicable

Consumption Reduction Methods
(Water Code § 10632 (e))

List the consumption reduction methods the water supplier will use to reduce water use in the most restrictive stages with up to a 50% reduction.

See Section II, especially page II-18

Penalties
(Water Code § 10632 (f))

List excessive use penalties or charges for excessive use

See Section II, pages II-17 through II-20.

Revenue and Expenditure Impacts
(Water Code § 10632 (g))

Describe how actions and conditions impact revenues

Describe how actions and conditions impact expenditures

Describe measures to overcome the revenue and expenditure impacts

See Section II, page II-25.

Water Shortage Contingency Ordinance/Resolution
(Water Code § 10632 (h))

Attach a copy of the draft water shortage contingency resolution or ordinance.

Not applicable to Metropolitan. The WSDM plan adopted to deal with shortages is discussed in Section II, pages II-15 and II-16

Reduction Measuring Mechanism
(Water Code § 10632 (i))

Provided mechanisms for determining actual reductions

Metropolitan's water sales are metered (Section II)

Recycling Plan Agency Coordination
Water Code § 10633

Describe the coordination of the recycling plan preparation information to the extent available..

See Section III-3, pages III-25 through III-39.

Wastewater System Description
(Water Code § 10633 (a))

Describe the wastewater collection and treatment systems in the supplier's service area

Quantify the volume of wastewater collected and treated

Page III-26

Wastewater Disposal and Recycled Water Uses
(Water Code § 10633 (a - d))

Describes methods of wastewater disposal

Page III-26

Describe the current type, place and use of recycled water

Page III-28

Describe and quantify potential uses of recycled water

Page III-28

Determination of technical and economic feasibility of serving the potential uses

Pages III-29 through III-32

Projected Uses of Recycled Water
(Water Code § 10633 (e))

Projected use of recycled water, 20 years

Table III-12, page III-25.

Compare UWMP 2000 projections with UWMP 2005 actual

See Issues, page III-26

Plan to Optimize Use of Recycled Water
(Water Code § 10633 (f))

Describe actions that might be taken to encourage recycled water uses

Describe projected results of these actions in terms of acre-feet of recycled water used per year

Provide a recycled water use optimization plan which includes actions to facilitate the use of recycled water (dual distribution systems, promote recirculating uses)

See Section III-3, Recycling, Groundwater Recovery and Desalination, particularly pages 34 through 39.

Water quality impacts on availability of supply
(Water Code §10634)

Discusses water quality impacts (by source) upon water management strategies and supply reliability

See Section IV, Water Quality, pages IV-1 through IV-17

Supply and Demand Comparison to 20 Years
(Water Code § 10635 (a))

Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments.

See Section II and Table A.3-7 in Appendix A.3 (pages A.3-42 through A.3-56).

Supply and Demand Comparison: Single-dry Year Scenario
(Water Code § 10635 (a))

Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments.

See Section II and Table A.3-7 in Appendix A.3 (pages A.3-42 through A.3-56).

Supply and Demand Comparison: Multiple-dry Year Scenario
(Water Code § 10635 (a))

Project a multiple-dry year period occurring between 2006-2010 and compare projected supply and demand during those years

Project a multiple-dry year period occurring between 2011-2015 and compare projected supply and demand during those years

Project a multiple-dry year period occurring between 2016-2020 and compare projected supply and demand during those years

Project a multiple-dry year period occurring between 2021-2025 and compare projected supply and demand during those years

Metropolitan has projected multiple dry year periods for years ending in "0" or "5". Its planning for multiple dry years is based on the three years of shortest supplies (1990-1992 hydrology). The results presented in Section II 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. See Table A.3-7 on p. A.3-42 through A.3-56, and particularly Table A.3-8 on p. A.3-57.

Review of implementation of 2000 UWMP
(Water Code § 10643)

Metropolitan has conducted a review of its planning progress through the IRP Update, discussed in Section II. In addition, in each section Metropolitan has included a "Progress to Date" that discusses progress towards its planning goals, and "Issues" section that discusses potential problems with continued implementation of the plan.

DMM Programs

Metropolitan is a member of CUWCC, and has submitted its recent DMM reports to the CUWCC to comply with the UWMP requirements. In addition, Metropolitan has discussed its conservation plan and approach in Section III-2. Individual conservation programs are discussed on pp. III-7 through III-18.

I. INTRODUCTION TO THIS DOCUMENT AND THE AGENCY

1.1 Introduction To This Document

Urban Water Management Planning Act

This report has been prepared in compliance with Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Chapter 1009, and became effective on January 1, 1984. This Act, which was adopted by the legislature through Assembly Bill (AB) Number 797, requires that "every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually prepare and adopt, in accordance with prescribed requirements, an urban water management plan." These plans must be filed with the California Department of Water Resources (DWR) every five years. Urban water management plans (UWMP) are due to DWR by December 31, 2005. The Act's requirements include:

- Detailed evaluation of the supplies necessary to meet demands over at least a 20-year period in a single year and multi-year drought and average year conditions,
- Documentation of the stages of actions it would undertake to address up to 50% reduction in its water supplies,
- Description of the actions to be undertaken in the event of a catastrophic interruption in water supplies, and
- Evaluation of reasonable and practical efficient water uses, recycling, and conservation activities.

Changes in the Act Since 2000

Since its passage in 1983, several amendments have been added to the Act, the most recent coming in 2004. Some of the amendments provided for additional emphasis on metering, drought contingency planning, and water recycling. The following is a summary of the significant changes in the Act that have occurred from 2000 to the present:

- New legislative findings concerning water quality (Water Code § 10610.2, subds. (a)(4) – (a)(9), (b));
- A new requirement to describe water management tools that maximize local resources and minimize imported water supplies (§ 10620, subd. (f));
- A new requirement to notify all cities and counties within the service area where a plan or plan amendment is being prepared (§ 10620, subd. (b));
- A new requirement for additional information on groundwater where groundwater is identified as an existing or planned water source (§ 10631, subd. (b));
- Revised listing of water demand management measures to be described (CUWCC members may still elect to submit their conservation annual reports to meet this requirement) (§ 10631, subd. (f)(1));

- A new requirement to describe specific water supply projects and implementation schedules to meet projected demands over the 20-year planning horizon (§ 10631, subd. (h));
- A new requirement for data sharing between contracting water suppliers (i.e., wholesale, intermediate, and retail agencies) and a provision allowing suppliers to rely on information provided by a wholesale agency (§ 10631, subd. (j));
- A new provision allowing DWR to consider a water supplier's achievements and implementation plans for water conservation when evaluating applications for grants and loans (§ 10631.5);
- A new requirement to describe quantities of recycled water (§ 10633, subds. (b), (g));
- A new requirement to describe water quality over the 20-year planning horizon (§ 10634);
- A new requirement to notify all cities and counties within the service area of the time and place of the public hearing on plan adoption (§ 10642);
- A new requirement to file the plan or plan amendment with all cities and counties within the service area (§ 10644, subd. (a));
- For a water supplier that does not comply with the Act, a new requirement that DWR make that supplier ineligible to receive Prop 204 or Prop 13 funding (§ 10656); and
- A new provision allowing DWR to consider a water supplier's compliance with the plan requirements in determining the eligibility of receiving any funds from DWR-administered programs (§ 10657).

The full text of the current version of the Act can be found at http://www.owue.water.ca.gov/docs/UWMPAct.pdf.

Senate Bills 610 and 221 of 2001

In addition to the changes to the Act, the state legislature passed two bills in 2001 that amended state law to require that counties and cities consider information relating to the availability of water to supply certain new large proposed development. For these development projects to receive public approval, this water supply information must be included in the administrative record. SB 610 affects projects that are subject to the California Environmental Quality Act, and it requires that water agencies provide specific information to local governments for use in environmental documents. SB 221 requires that city or county approval of certain residential subdivisions include written verification that sufficient water supply is available to serve that subdivision.

Both SB 610 and 221 identify adopted Urban Water Management Plans (UWMP) as a source document that may be used to fulfill these legislative requirements. To assist local agencies in meeting these requirements, Metropolitan has extended its planning timeframe for its Regional Urban Water Management Plan (RUWMP) out through 2030. This change ensures that the Metropolitan's 2005 RUWMP may be used as a source document for meeting the requirements of SB 610 and 221 until the next scheduled update is completed in 2010. In addition, the RUWMP includes a "Justification For Supplies" appendix that details the planning, legal, financial, and regulatory basis for including each source of supply in the plan. The full text of

these bills can be found at
http://www.groundwater.water.ca.gov/water_laws/index.cfm#otherleg.

Metropolitan's Responsibilities Under This Legislation

As with Metropolitan's previous plans, this plan does not explicitly discuss specific activities undertaken by member agencies unless they relate to one of Metropolitan's water demand or supply management programs. Presumably, each member agency will discuss these activities in its Urban Water Management Plan. Information from this Plan will likely be used by many of the local water suppliers in the preparation of their own plans, but elements of this Plan do not necessarily have to be adopted by the urban water suppliers or the public agencies directly providing retail water because participation in any regional planning activity is voluntary (pursuant to Water Code Section 10620). By law, an urban water supplier that provides water *indirectly* (such as Metropolitan) may not include planning elements in its water management plan that would be applicable to agencies that provide water *directly,* without the consent of those agencies.

DWR Guidance

DWR has provided guidance materials to aid water districts in developing their 2005 urban water management plans. These materials simultaneously help water districts comply with the law and help DWR staff review submitted plans for regulatory compliance. The guidance materials consist of a series of worksheets detailing acceptable responses to the requirements set forth in the Urban Water Management Planning Act. DWR also provides a checklist for cross-referencing sections of the respondent water agency's Plan with the relevant sections of the water code to be sure that it addresses all relevant provisions of the Urban Water Management Planning Act. DWR provides two versions of the checklist, one organized by water code section and the other by subject. Metropolitan has used these materials in the development of this plan; the checklist, organized by water code section, appears after the List of Tables at the beginning of this document.

Organization of this Document

This document contains five sections. The first section is this Introduction. The second describes the planning efforts that Metropolitan has undertaken to ensure appropriate management of the region's water supplies. The third describes the actions Metropolitan has taken to implement these plans. The fourth addresses the issue of water quality. The fifth section contains appendices, including the justifications for supply projections.

I.2 The Metropolitan Water District Of Southern California

Formation and Purpose

The Metropolitan Water District of Southern California (Metropolitan) is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities. The agency was enabled by the adoption of the original Metropolitan Water District Act (Metropolitan Act) by the California Legislature "for the purpose of developing, storing, and distributing water" to the residents of Southern California. The Metropolitan Act also allows Metropolitan to sell additional water, if available, for other beneficial uses. In 1992, the Metropolitan Board of Directors adopted the following mission statement: "to provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way."

The first function of Metropolitan was building the Colorado River Aqueduct to convey water from the Colorado River. Deliveries through the aqueduct began in the early 1940s and supplemented the local water supplies of the original Southern California member cities. In 1960, to meet growing water demands in its service area, Metropolitan contracted for additional water supplies from the State Water Project (SWP) via the California Aqueduct, which is owned and operated by the State of California Department of Water Resources (DWR). SWP deliveries began in 1972. Metropolitan currently receives imported water from both of these sources: (1) the Colorado River water via the Colorado River Aqueduct and (2) the State Water Project

Service Area

Metropolitan's service area covers the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north to the international boundary with Mexico border on the south, and it reaches as far as 70 miles inland from the coast (Figure I-1). The total area served is nearly 5,200 square miles, and it includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Table I-1 shows that although only 13 percent of the land area of the 6 Southern California counties is within Metropolitan's service area, nearly 90 percent of the populations of those counties reside within Metropolitan's boundaries.

Member Agencies

Metropolitan is currently composed of 26 member agencies, including 14 cities, 11 municipal water districts, and one county water authority. Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities. Table 1-2 shows the member agencies of Metropolitan, as well as the cities and communities served by those member agencies. Figure I-1 also shows the geographical area served by the member agencies.

Currently, member agencies receive water from Metropolitan at various delivery points, and they pay for service through a rate structure made up of multiple components. The majority of these components consist of uniform volumetric rates, and the majority of the revenue is collected

through a tiered volumetric supply charge. The second tier of this rate is set at the cost of developing new supplies.

Table I-1
January 1, 2005 Area And Population In The Six Counties Of Metropolitan's Service Area

County	Total County	In MWD Service Area	*Percent In MWD*
Land Area (Square Miles)			
Los Angeles	4,061	*1,408*	*35*
Orange	789	*699*	*89*
Riverside	7,208	*1,057*	*15*
San Bernardino	20,052	*242*	*1*
San Diego	4,200	*1,420*	*33*
Ventura	1,845	*365*	*20*
Total	**38,155**	***5,178***	***13***
Population (Thousands)			
Los Angeles	10,227	*9,392*	*92*
Orange	3,057	*3,057*	*100*
Riverside	1,887	*1,358*	*72*
San Bernardino	1,946	*797*	*41*
San Diego	3,051	*2,951*	*97*
Ventura	813	*588*	*72*
Total	**20,971**	***18,143***	***87***

Source: California Department of Finance, California Statistical Abstract, and Metropolitan-developed statistics.

To aid in planning future water needs, member agencies advise the Chief Executive Officer/ General Manager annually (in April of each year) of how much water they anticipate they will need during the next five years. In addition, Metropolitan works with its member agencies to forecast future water demands.

Metropolitan is a water wholesaler with no retail customers. It provides treated and untreated water directly to its member agencies. Metropolitan's 26 member agencies deliver to their customers a combination of local groundwater, local surface water, recycled water, and imported water purchased from Metropolitan. For some member agencies, Metropolitan supplies all the water used within that agency's service area, while others obtain varying amounts of water from Metropolitan to supplement local supplies. The district has provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its service area.

TABLE I-2
Member Agencies

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Municipal Water Districts (11)

Calleguas	Orange County
Central Basin	Three Valleys
Foothill	Upper San Gabriel Valley
Inland Empire	West Basin
Eastern	Western
Las Virgenes	

Member Cities (14)

Anaheim	Glendale	San Marino
Beverly Hills	Long Beach	Santa Ana
Burbank	Los Angeles	Santa Monica
Compton	Pasadena	Torrance
Fullerton	San Fernando	

County Water Authorities (1)

San Diego

Cities Within Member Agencies

CALLEGUAS MWD
- Camarillo
- Camarillo Heights*
- Fairview*
- Las Posas Valley*
- Moorpark
- Oak Park*
- Oxnard
- Port Hueneme (annexed)
- Santa Rosa Valley*
- Simi Valley
- Thousand Oaks

CENTRAL BASIN MWD
- Artesia
- Bell
- Bellflower
- Cerritos
- Commerce
- Cudahy
- Downey
- East Compton*
- East La Mirada*
- East Los Angeles*
- Florence*
- Graham*
- Hawaiian Gardens
- Huntington Gardens*
- Huntington Park
- La Habra Heights
- Lakewood
- Los Nietos*
- La Mirada
- Lynwood
- Maywood
- Montebello
- Norwalk
- Paramount
- Pico Rivera
- Santa Fe Springs
- Signal Hill
- South Gate
- South Whittier*
- Vernon
- Walnut Park*
- West Compton*
- West Whittier*
- Whittier
- Willowbrook*

FOOTHILL MWD
- Altadena*
- La Canada-Flintridge
- La Crescenta*
- Montrose*

INLAND EMPIRE
- Chino
- Chino Hills
- Fontana
- Monclair
- Ontario
- Rancho Cucamonga
- Upland

EASTERN MWD
- East Hemet*
- Good Hope*
- Hemet
- Homeland*
- Lakeview-Nuevo*
- Mead Valley*
- Moreno Valley
- Murrieta Hot Springs*
- Perris
- Quail Valley*
- Romoland*
- San Jacinto
- Sun City*
- Sunnymead*
- Temecula
- Valle Vista*
- Winchester*

LAS VIRGENES MWD
- Agoura Hills
- Calabasas
- Chatsworth Lake Manor*
- Hidden Hills
- Malibu Lake*
- Monte Nido*
- Westlake Village

MWD OF ORANGE COUNTY
- Aliso Viejo
- Brea
- Buena Park
- Capistrano Beach*
- Corona del Mar*
- Costa Mesa
- Cypress
- Dana Point
- El Toro*
- Fountain Valley
- Garden Grove
- Huntington Beach
- Irvine
- Lake Forest
- Laguna Beach
- Laguna Hills
- Laguna Niguel
- Laguna Woods
- La Habra
- La Palma
- Los Alamitos
- Mission Viejo
- Newport Beach
- Orange
- Placentia
- Rancho Santa Margarita
- Rossmoor*
- San Clemente
- San Juan Capistrano
- Seal Beach
- South Laguna*
- Stanton
- Tustin
- Tustin Foothills*
- Villa Park
- Westminster
- Yorba Linda

THREE VALLEYS MWD
- Charter Oak*
- Claremont
- Covina Knolls*
- Diamond Bar
- Glendora
- Industry
- La Verne
- Pomona
- Rowland Heights*
- San Dimas
- So. San Jose Hills*
- Walnut

UPPER SAN GABRIEL VALLEY MWD
- Arcadia
- Avocado Heights*
- Baldwin Park
- Bradbury
- Citrus*
- Covina
- Duarte
- El Monte
- Hacienda Heights*
- Irwindale
- La Puente
- Mayflower Village*
- Monrovia
- Rosemead
- San Gabriel*
- South El Monte
- South Pasadena
- San Gabriel
- Temple City
- Valinda*
- West Covina
- West Puente Village*

WEST BASIN MWD
- Alondra Park*
- Angeles Mesa*
- Carson
- Culver City
- Del Aire*
- El Nido-Clifton*
- El Segundo
- Gardena
- Hawthorne
- Hermosa Beach
- Inglewood
- Ladera Heights*
- Lawndale
- Lennox*
- Lomita
- Malibu
- Manhattan Beach
- Marina del Rey*
- Palos Verdes Estates
- Point Dume*
- Rancho Palos Verdes
- Redondo Beach
- Rolling Hills

WEST BASIN MWD (cont.)
- Rolling Hills Estates
- Ross Sexton*
- Topanga Canyon*
- Victor*
- View Park*
- West Athens*
- West Carson*
- West Hollywood
- Westmost*
- Windsor Hills*
- National Military Home*
- Wiseburn*

WESTERN MWD OF RIVERSIDE COUNTY
- Bedford Heights*
- Corona
- Eagle Valley*
- El Sobrante*
- Green River*
- Lake Elsinore
- March AFB*
- Murrieta
- Norco
- Riverside
- Temescal
- Woodcrest*

SAN DIEGO CWA
- Alpine*
- Bonita*
- Camp Pendleton*
- Carlsbad
- Casa De Oro*
- Castle Park*
- Chula Vista
- Del Mar
- El Cajon
- Encinitas
- Escondido
- Fallbrook*
- Imperial Beach
- Lakeside*
- La Mesa
- Lemon Grove
- Mount Helix*
- National City
- Oceanside
- Otay*
- Poway
- Rainbow*
- Ramona*
- Rancho Santa Fe*
- San Diego
- San Marcos
- Santee
- Solana Beach
- Spring Valley*
- Valley Center*
- Vista

* Denotes unincorporated areas

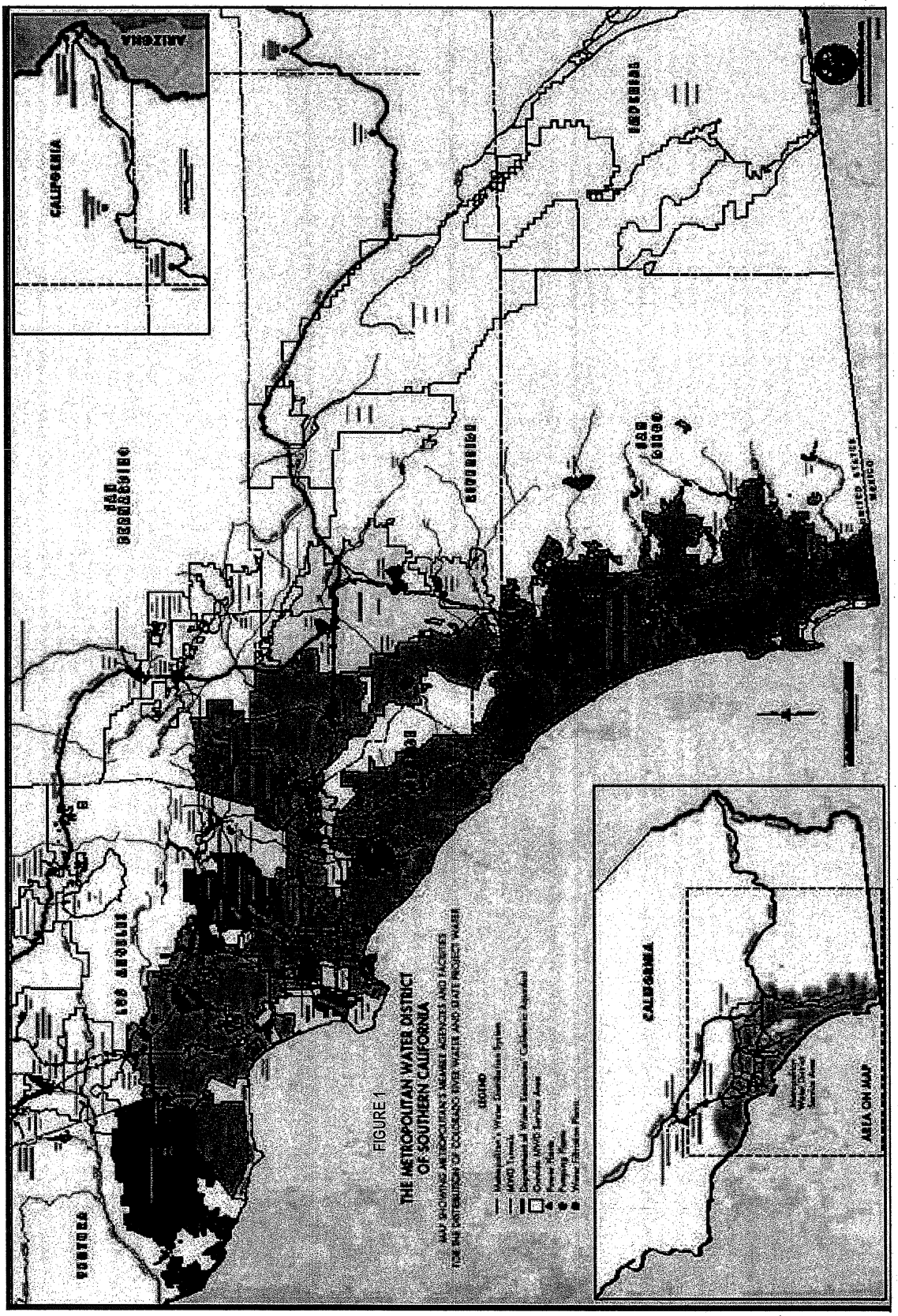

ARIZONA
CALIFORNIA
AREA ON MAP
LOS ANGELES
SAN BERNARDINO
RIVERSIDE
ORANGE
VENTURA
SAN DIEGO
IMPERIAL
LEGEND
THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

FIGURE 1

The remaining water supply comes from local wells, local surface water, recycling, and from the city of Los Angeles' aqueduct from the eastern Sierra Nevada. In 2003, the San Diego County Water Authority began receiving of water transfers from the Imperial Irrigation District that are delivered by an exchange of water supplies with Metropolitan.

Some member agencies provide retail water service, while others provide water to the local area as wholesalers. As shown in Table I-3, 15 member agencies provide retail service to customers, 9 provide only wholesale service, and 2 provide a combination of both. Throughout Metropolitan's service area, approximately 250 retail water supply agencies directly serve the population.

Board of Directors and Management Team

Metropolitan's Board of Directors currently consists of 37 directors. The Board consists of at least one representative from each member agency, with each agency's assessed valuation determining its additional representation and voting rights. Metropolitan does not compensate directors for their service.

The Board administers its policies through the Metropolitan Water District Administrative Code (Administrative Code), which the Board adopted in 1977. Periodically, the Board amends the Administrative Code to reflect new policies or changes in existing policies. The policies established by the Board are subject to all applicable laws and regulations. The management of Metropolitan is under the direction of its Chief Executive Officer/General Manager, who serves at the discretion of the Board, as do Metropolitan's General Auditor, General Counsel and Ethics Officer.

Table I-3
Type Of Water Service Provided
By Metropolitan's Member Agencies

Member Agency	Retail or Wholesale
Los Angeles County	
Beverly Hills	Retail
Burbank	Retail
Central Basin MWD	Wholesale
Compton	Retail
Foothill MWD	Wholesale
Glendale	Retail
Las Virgenes MWD	Retail
Long Beach	Retail
Los Angeles	Retail
Pasadena	Retail
San Fernando	Retail
San Marino	Retail
Santa Monica	Retail
Three Valleys MWD	Wholesale
Torrance	Retail
Upper San Gabriel MWD	Wholesale
West Basin MWD	Wholesale
Orange County	
Anaheim	Retail
Fullerton	Retail
MWD of Orange County	Wholesale
Santa Ana	Retail
Riverside	
Eastern MWD	Retail & Wholesale
Western MWD	Retail & Wholesale
San Bernardino County	
Inland Empire Utilities Agency	Wholesale
Ventura County	
Calleguas MWD	Wholesale
San Diego County	
San Diego County Water Authority	Wholesale

I.3 Regional Historical Information

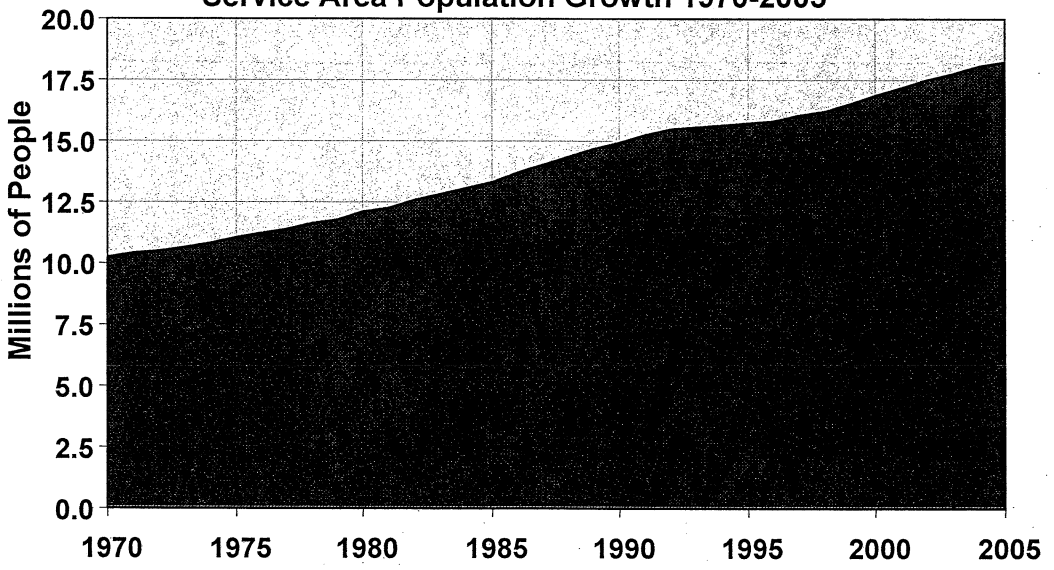
Population

In 1990, the population of Metropolitan's service area was approximately 14.8 million people. By 2005, it had grown to 18.1 million, which represents about 50 percent of the state's population. In the past, annual growth has varied from about 200,000 annually in the 1970s and early-to-mid-1980s to more than 300,000 annually in the late 1980s. Population growth slowed during the early 1990s to just over 50,000 in 1995, before again rising to more than 300,000 per year in the period 1999 through 2002. Growth has continued at just under 300,000 since that time. Figure I-2 shows the current, historic and projected changes in population.

The most populated cities within Metropolitan's service area are Los Angeles (largest city in the state), San Diego (second largest in the state), Long Beach, Anaheim, Santa Ana and Riverside. Between 2000 and 2003 the largest population increases occurred in the city of Los Angeles and in the service area of the San Diego County Water Authority. However, the over-563,000-person increase in population estimated for Los Angeles County over the most recent five-year time period only represents a 1.6% average annual population growth rate, as shown in Figure I-3. In Riverside County, the average annual population grew at a rate of nearly 4.0%, making it the area with the fastest rate of growth within Metropolitan's service area between the years 2000 and 2005.

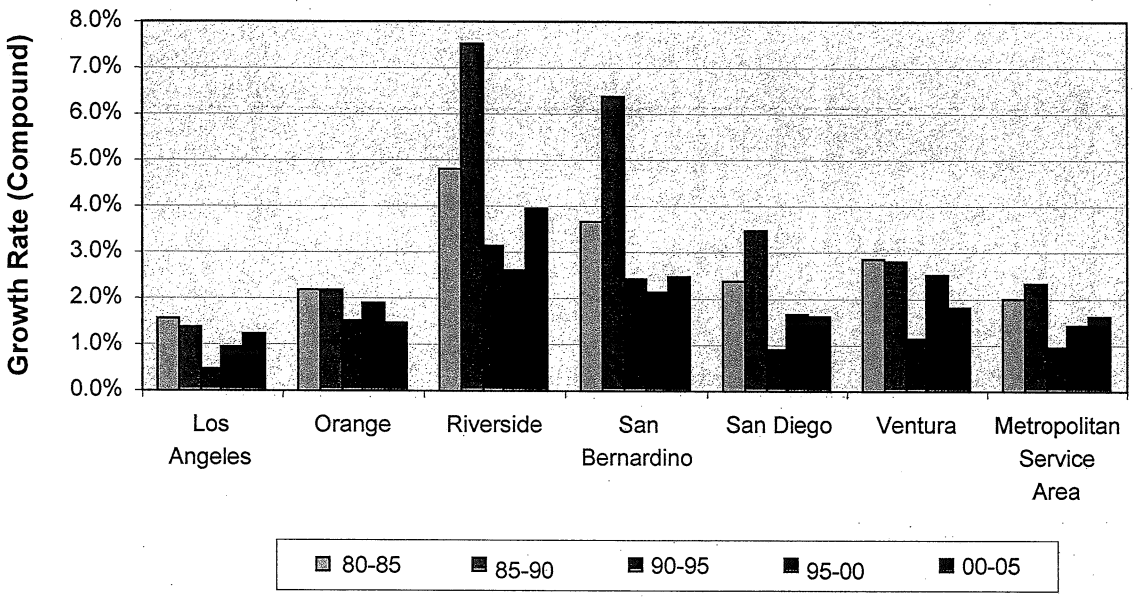
Figure I-2

Service Area Population Growth 1970-2005



Source: US Census, California Department of Finance, SCAG and SANDAG

Figure I-3
Average Annual Population Growth Rates by Served County



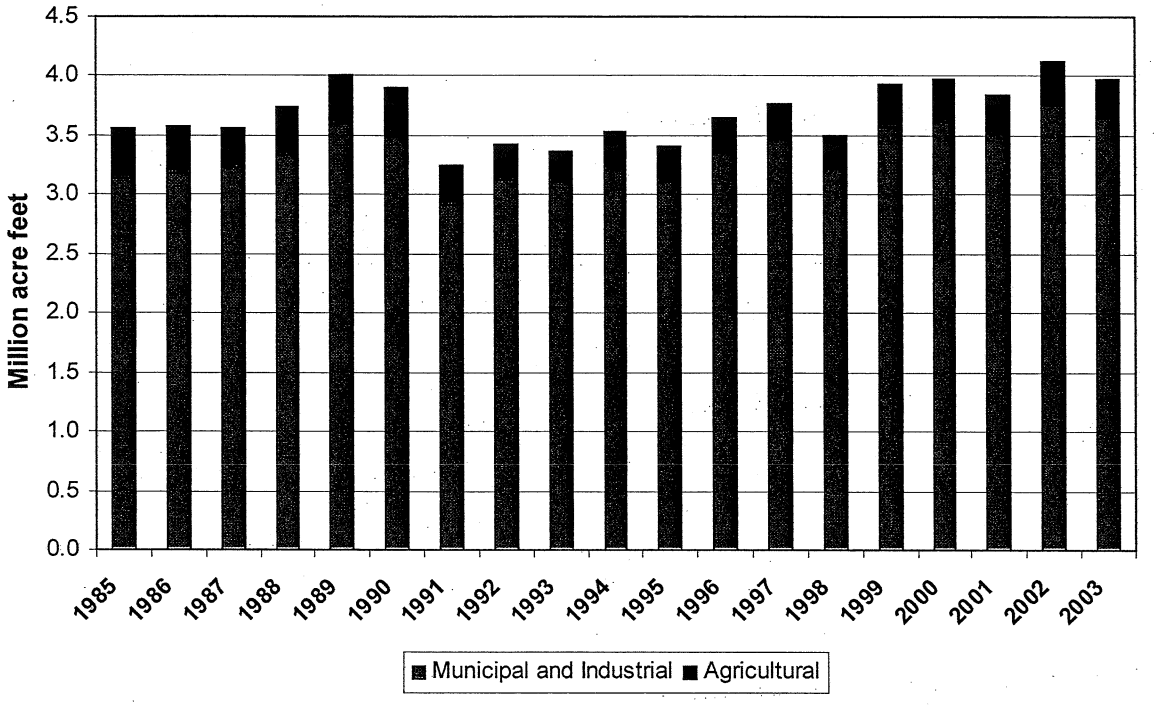
Source: US Census, California Department of Finance, SCAG and SANDAG

Historical Retail Water Demands

Figure I-4 presents historical retail water demands on a calendar year basis in Metropolitan's service area. Since 1980, retail water demands varied from 3.0 million acre feet (maf) in 1983 to 4 maf in 1989. Due to the economic recession, drought impacts, and conservation, water use declined to 3.3 maf in 1991. Demand remained below the 1989 peak level as a result of continuing effects from the recession and the drought coupled with a number of wet years and ongoing conservation efforts. In 2002, retail demands reached an estimated 4.2 maf, approaching the earlier peak level for the first time in the decade.

Of the 4.1 maf projected to be used in 2005, 3.8 maf (92 percent) are estimated to be used for municipal and industrial purposes (M&I), and 0.3 maf (8 percent) for agricultural purposes. The relative share of M&I water use to total water use has been increasing over time as agricultural water use has declined due to urbanization and market factors, including the price of water. Agricultural water use accounted for 19 percent of total regional water demand in 1970, 14 percent in 1980, 11 percent in 1990 and 8 percent in 2003.

Figure I-4
Retail Demand In Metropolitan's Service Area



Per Capita Water Use

Per capita water use does not express the amount of water actually used by an individual, because it includes all categories of urban water use, including residential, commercial, industrial, fire fighting and other. Furthermore, per capita water use is not a good measure of water use efficiency. Per capita water use can be a useful measure of how water use within a particular region is changing over time. Figure I-5 shows the change in per capita water use within Metropolitan's service territory. This shows that per capita water use fell from a high of 219 gallons per capita per day (gpcd) in 1989 to a low of 171 gpcd in 1991, at the time of water-use restrictions. Since that time, per capita use has varied between 176 and 193 gpcd, which is well below the pre-drought levels. Much of the year-to-year variation results from local precipitation.

A number of factors affect per capita water use in a particular location, including the relative share of residential versus nonresidential water use in an area, the number and type of housing units, the number of employees, the types of businesses, persons per household, lot sizes, income levels, and climate. Table I-4 shows per capita water use by county within Metropolitan's service area. Water use varies widely between counties. In Southern California, many of the differences in per capita water use among the counties can be attributed to climate differences. Within Metropolitan's service area, the inland counties of Riverside and San Bernardino account for the greatest levels of M&I per capita water use, and the coastal plain counties – Los Angeles, Orange, San Diego, and Ventura – have lower M&I per capita water use.

Figure I-5
Per Capita Water Use in Metropolitan's Service Territory

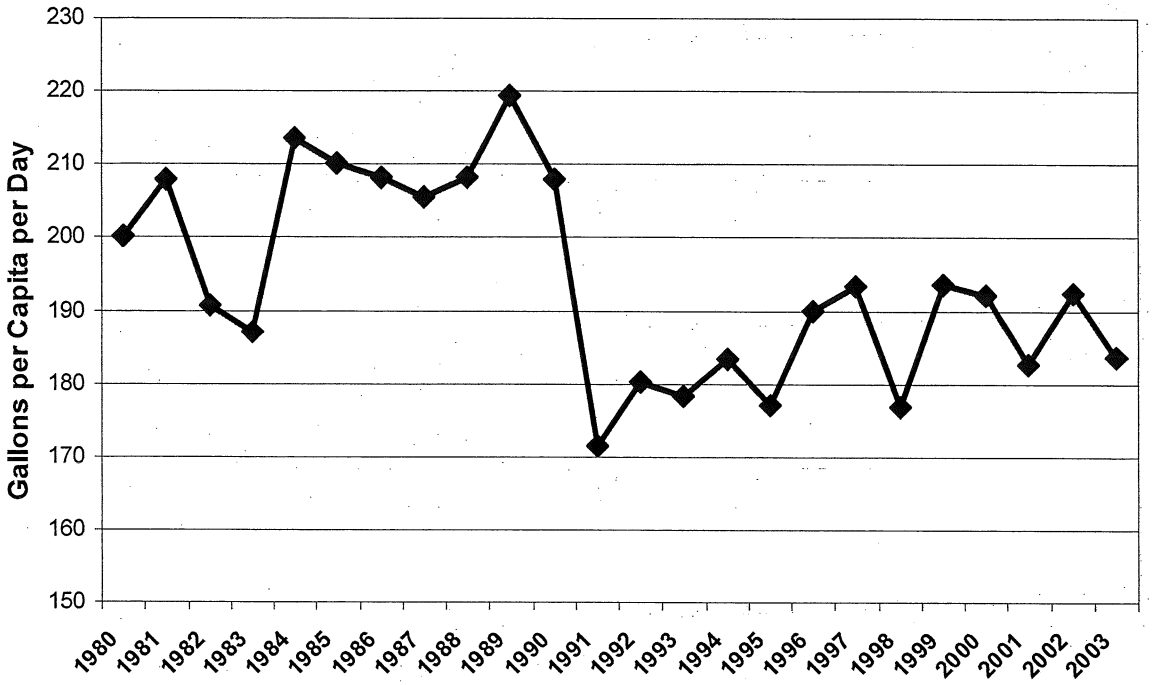


Table I-4
Municipal and Industrial Per Capita Water Use
(gallons per person per day)

County	Preemption (Dry) 1990	(Wet) 1995	(Average) 2000
Los Angeles	188	167	174
Orange	231	196	209
Riverside	293	219	257
San Bernardino	273	213	267
San Diego	204	164	185
Ventura	227	179	197
Metropolitan Total	**208**	**177**	**192**

Climate and Rainfall

As Figure I-6 shows, Metropolitan's service area encompasses three major climate zones. Table I-5 reports the 30-year (1975-2004) average temperature, rainfall and evapotranspiration (expressed as Et_o) information for representative locations within those three zones. Annual rainfall also varies within the region: average annual rainfall in Pasadena from 1980 through 2003 was more than double the 11 inches received at the San Diego airport and Culver City. Region wide, annual rainfall routinely varies by more than 100% from year to year.

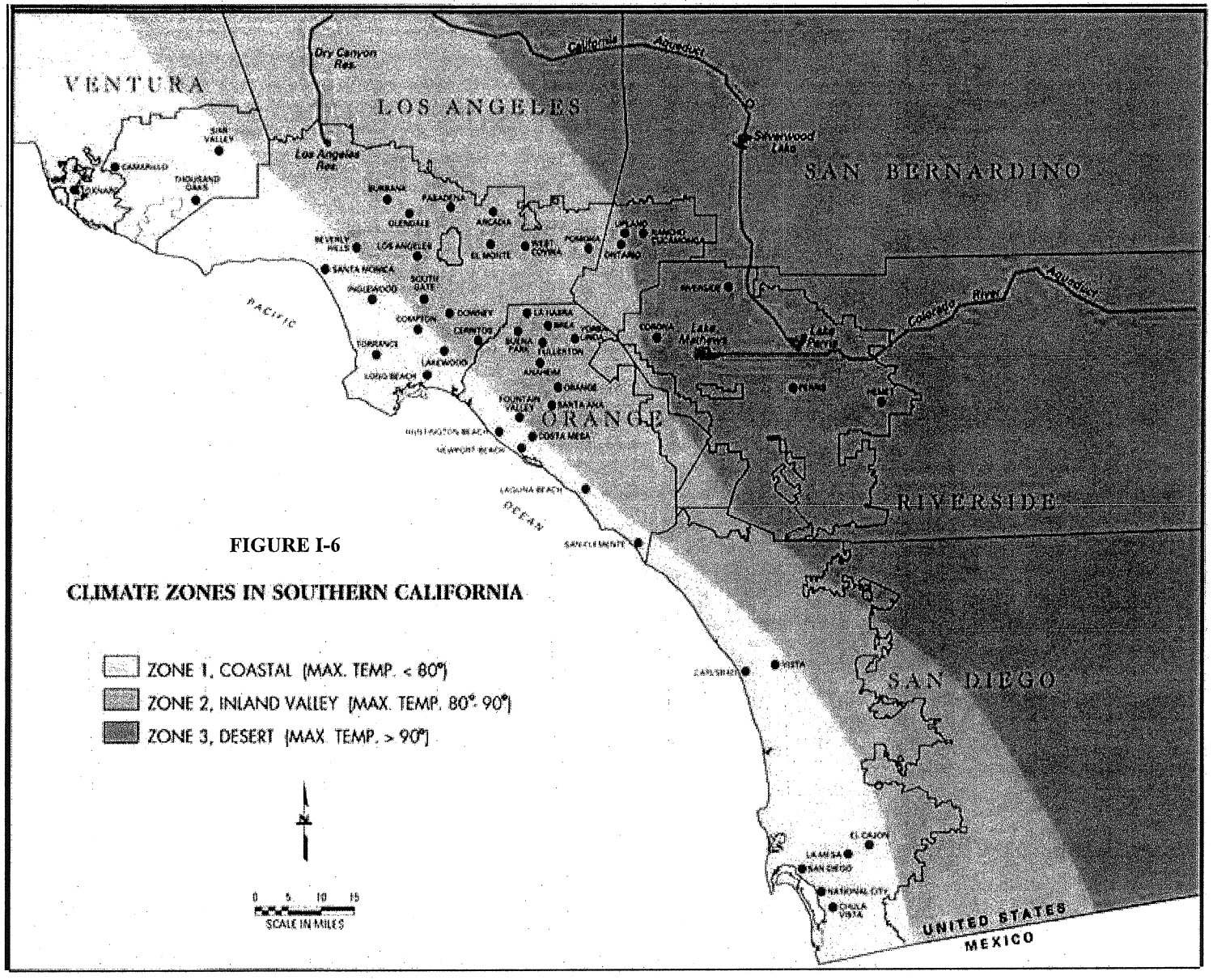


FIGURE I-6

CLIMATE ZONES IN SOUTHERN CALIFORNIA

Water Supplies

Historically, Metropolitan has been responsible for obtaining water for the region through its operation of the Colorado River Aqueduct and its contract with the state for State Water Project supplies. To date, Metropolitan has increased its ability to supply water, particularly in dry years, through the implementation of storage and transfer programs. Figure I-7 presents historical annual regional water supplies, and Figure I-8 shows Metropolitan's historical annual imported water supplies.

Table I-5
Weather Variables in Three Zones in Metropolitan's Service Area

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Temperature													
Los Angeles	59.00	60.09	61.33	63.94	66.62	70.38	74.22	75.10	74.27	69.67	63.26	58.93	66.40
Riverside	54.83	56.10	58.11	62.05	66.73	72.08	77.33	77.99	74.99	67.86	59.41	54.65	65.23
San Diego	57.99	58.80	60.08	62.42	64.64	67.32	70.73	72.21	71.60	67.59	61.87	57.64	64.41
Average Precipitation													
Los Angeles	3.12	4.08	3.14	0.87	0.33	0.09	0.01	0.12	0.32	0.51	1.03	1.96	15.59
Riverside	2.39	2.58	2.23	0.68	0.23	0.09	0.04	0.17	0.26	0.38	0.78	1.13	10.80
San Diego	2.24	2.27	2.21	0.83	0.18	0.07	0.03	0.09	0.20	0.50	0.97	1.30	10.91
Et_o													
Los Angeles	2.20	2.45	3.64	4.74	5.31	6.06	6.75	6.66	5.01	3.95	2.73	2.31	51.81
Riverside	2.49	2.91	4.16	5.27	5.94	6.56	7.22	6.92	5.35	4.05	2.94	2.56	56.37
San Diego	1.83	2.20	3.42	4.49	5.25	5.67	5.86	5.61	4.49	3.42	2.36	1.83	46.43

Figure I-7
Annual Regional Water Supplies In Metropolitan's Service Area

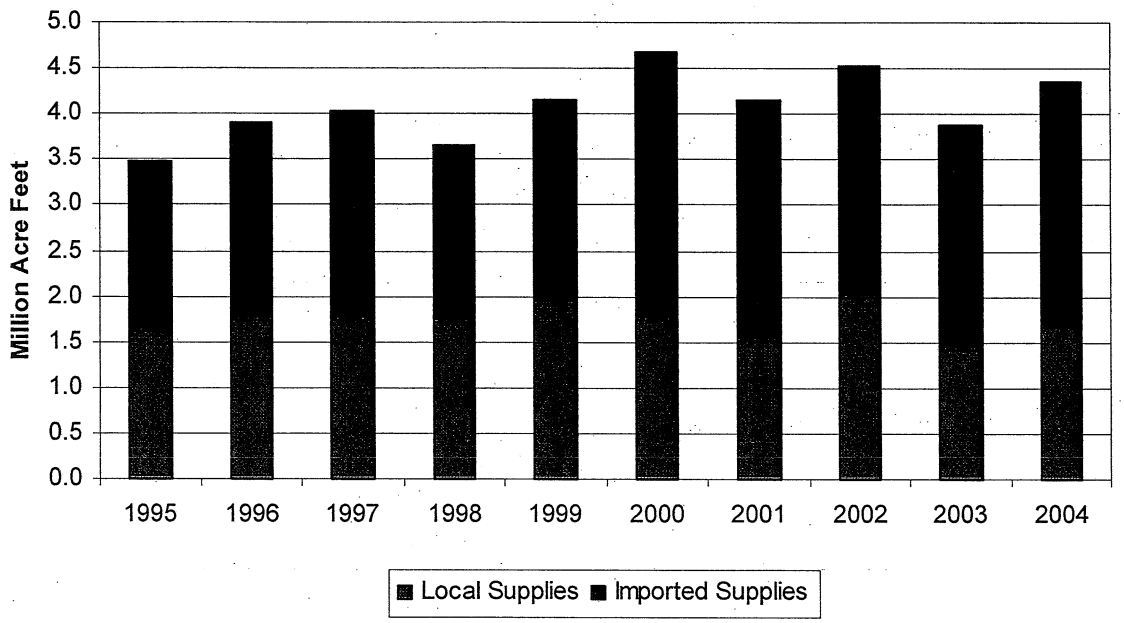
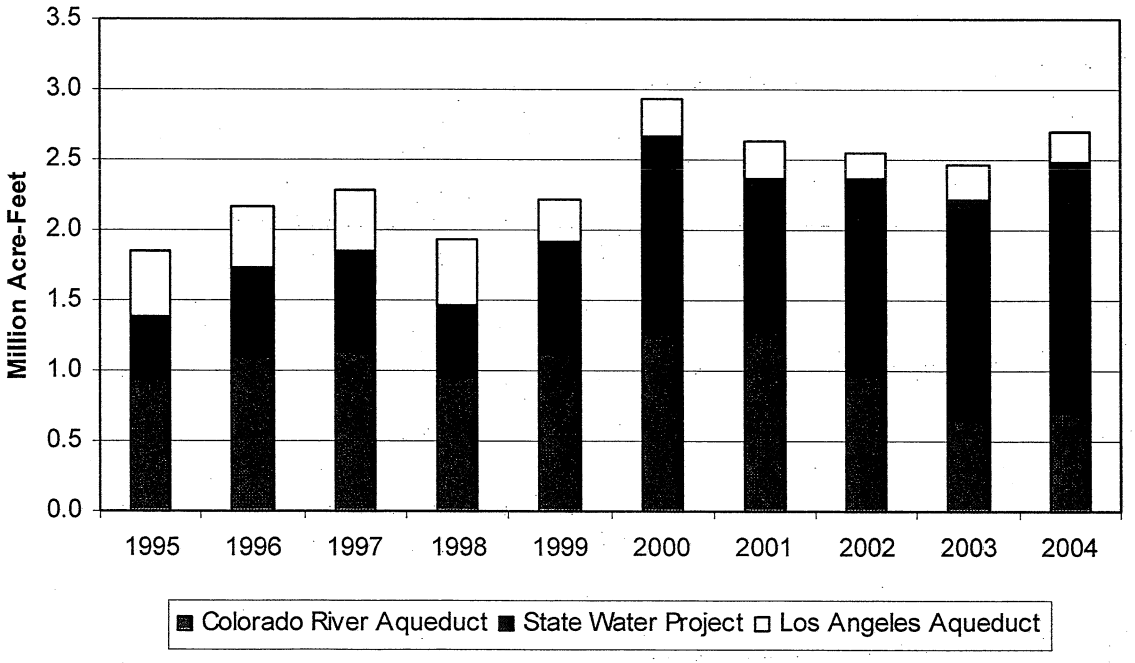


Figure I-8
Imported Water Supplies In Metropolitan's Service Area



II. PLANNING FOR THE FUTURE

In its role as supplemental supplier to the Southern California water community, Metropolitan faces ongoing challenges in meeting the region's needs for water supply reliability and quality. Increased environmental regulations and competition for water from outside the region have resulted in changes in delivery patterns and timing of availability of imported water supplies. At the same time, the Colorado River basin has experienced a five-year drought that is unprecedented in recorded history, while total water demand continues to rise within the region because of population and economic growth.

As described in the previous chapter, the water used in Southern California comes from a number of sources. About one-third comes from local sources, and the remainder is imported from three sources: the Colorado River, the Sacramento-San Joaquin River Delta (via the State Water Project), and the Owens Valley and Mono Basin (through the Los Angeles Aqueducts).[1]

Because of competing needs and uses associated with these resources, and because of concerns related to regional water operations, Metropolitan has undertaken a number of planning initiatives over the past ten years. This Regional Urban Water Management Plan summarizes these efforts, which include the Integrated Resources Plan (IRP), the IRP Update, the Water Surplus and Drought Management Plan, Strategic Plan and Rate Restructure. Together, they provide a policy framework, guidelines and resource targets for Metropolitan to follow into the future.

While Metropolitan coordinates regional water supply planning for the region through its inclusive integrated planning processes, Metropolitan's member agencies also conduct their own planning analyses – including their own urban water management plans - and may develop projects independently of Metropolitan. Appendix 6 shows a list of these potential future local projects provided to Metropolitan by its member agencies.

[1] Although the 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.

II.1 Integrated Resource Planning

The 1996 IRP Process

In the 1990s, drought and regulatory requirements were affecting the reliability of Metropolitan's water supplies while the region's population continued to grow. To address this challenge, Metropolitan and its member agencies conducted an Integrated Resource Planning (IRP) process to determine the appropriate level of supply reliability and to establish cost-effective approaches to achieving that goal. This process was conducted in two phases. The first phase consisted of gathering and analyzing data that would help forecast future demands, the long-term status of existing supplies, and new supply alternatives that could be harnessed to meet future water needs. The second phase consisted of evaluating the supply alternatives to develop a Preferred Resource Mix. Metropolitan kept the process open and participatory by directly involving the staff of Metropolitan and its member agencies, and by inviting other water resource agencies, environmental groups and the general public to contribute via workgroup meetings, regional assemblies, public forums and member agency workshops.

The Preferred Resource Mix developed through this process relied on a diverse mix of resources. The adopted plan established a goal of 100 percent reliability for full-service demands through 2020 through the attainment of regional targets set for conservation, local supplies, State Water Project supplies, Colorado River supplies, groundwater banking, and water transfers. By adopting this diverse portfolio of supply resources, Metropolitan and its member agencies explicitly recognized the benefits of avoiding over-reliance on any single water resource.

By design, the 1996 IRP process remained dynamic, open to revisions as they became necessary in light of changing conditions. This approach has defined the policy and strategic approach of regional water supply planning.

The IRP Update

In 2001, Metropolitan completed its Strategic Plan, Rate Restructure and IRP Review, all of which provided essential input to the IRP Update. In November 2001 Metropolitan's Board approved an action plan to conduct the first update of the 1996 IRP. The goals of this task were:

- To review the achievements to date, and measure them against the goals adopted in 1996;
- To identify changed conditions that might require adjustments to the adopted plan; and
- To extend the planning period from 2020 through 2025.

During 2002 and the first half of 2003, Metropolitan staff presented reports to its Water Planning, Quality and Resources Board Committee. In August of 2003, Metropolitan circulated a draft Update Report to the member agencies for review and comment. A copy of the report can be found at http://usmet11.mwd.dst.ca.us/idmweb/cache%5C003677571-1.pdf.

Results of the IRP Update

The first step of the IRP Update entailed identifying and quantifying those conditions that had changed since the 1996 IRP that could change the outlook for supply/demand balance. The most significant change involved increased participation by local agencies in developing local supplies and promoting savings from conservation. The analysis also identified local infrastructure needs, as well as the need to maintain contingency planning that would allow the region the flexibility needed to manage and overcome supply risks.

Metropolitan then used these changed conditions to evaluate the reliability outlook for the region's water supplies and to update the resource plan to provide for 100 percent reliability, assuming a repeat of the historic hydrology through the year 2025. The resulting changes in the IRP resource targets are shown in Table II-1 and serve as the foundation for the planning assumptions used in the RUWMP.

In adopting the IRP Update, Metropolitan's Board directed staff to develop a process for annually reporting on the implementation progress in meeting the IRP Update goals.

Table II-1
Comparison of Resource Targets
(Thousand Acre-feet)

Resource	1996 IRP 2020	IRP Update 2020	Change	IRP Update 2025
Local Resources				
Conservation	882	1,028	+146	1,107
Recycling/ Groundwater Recovery/ Desalination	500	750	+250	750
Colorado River Aqueduct*	1,200	1,250	+50	1,250
State Water Project	593	650	+57	650
Conjunctive Use	300	300	0	300
CV Storage and Transfer	300	550	+250	550
MWD Surface Storage**	620	620	0	620

*The 1,250,000 acre-feet supply from the Colorado River Aqueduct is a target for specific year types when needed. Metropolitan is not depending upon a full aqueduct in every year.
**Target for Surface Storage represents the total amount of water that can be extracted from storage.

IRP Update Outreach

In keeping with the practice adopted in the first IRP, the Update process included extensive cooperation among Metropolitan, its member agencies, and other organizations. Table II-2 contains the schedule of meetings and names of the involved stakeholder groups, and Table II-3 contains the schedule of outreach programs that member agencies conducted for the purpose of informing the public and inviting comment.

Table II-2
Stakeholder Participation in IRP Update

Year	Month	Meeting
2001	November December	*SAWPA*[1] *Meeting:* Review and discuss IRP Update process *Northern Caucus*[2] *Meeting*: Review and discuss IRP Update process
2002	January	*Member Agency Managers Meeting*: Review and discuss Jan. Board Report. Sent out *IRP Report Card #1* *SAWPA* Meeting: Review and discuss IRP Update progress
	February	*Member Agency Managers Meeting:* Review and discuss Feb. Board Report Request member agency input/verification on Local Supply Information *SAWPA Meeting:* Review and discuss IRP Update progress
	March	*Member Agency Managers Meeting:* Review and discuss March Board Report *SAWPA Meeting:* Review and discuss IRP Update progress.
	April	*Member Agency Meeting:* Review initial conclusions of IRP *SAWPA Meeting:* Review and discuss IRP Update progress *Central /West Basin Caucus Meeting*[3]*:* Review and discuss IRP Update progress *Southern California Water Dialogue*[4]*:* Review and discuss IRP Update progress
	May	*Member Agency Managers Meeting:* Review and discuss May Board Report *SAWPA Meeting:* Review and discuss IRP Update progress
	September	*Member Agency Technical Review Meeting*: Review Resource Assumptions Sent out *IRP Report Card #2*
	October	*Member Agency Managers Meeting*: Review and discuss local data and buffer scenario[5]
	November	*Member Agency Managers Meeting:* Review and discuss Nov. Board Report *Member Agency Advisory Meeting:* Consensus on buffer
2003	January	*Member Agency Managers Meeting:* Review Final IRP Recommendation with policy question
	August	Sent out draft IRP Update Report for member agency review/comment
	September	*Member Agency Managers Meeting:* Review Draft IRP Update Report *Member Agency Workshop:* Review Draft IRP Update Report

[1] The Santa Ana Watershed Project Authority (SAWPA) includes representation from Inland Empire Utilities Agency, Eastern Municipal Water District, San Bernardino Valley Municipal Water District, Western Municipal Water District, and Orange County Water District

[2] The Northern Caucus consists of managers from member agencies in the north of Metropolitan's service area.

[3] The Central/West Basin Caucus consists of board members and staff from the Central/West Basin sub-agencies.

[4] The Southern California Water Dialogue is a voluntary public group that meets most months to consider issues related to Southern California's future water supply.

[5] A "buffer" of additional recycled water projects were identified that would be considered if proposed recycled water projects failed to be successful.

Source: Metropolitan's Integrated Water Resources Plan Update, July, 2004.

Table II-3
IRP Update Public Outreach 2004

Month	Day	Organization/Audience
April	1	*Water Policy Forum:* MWDOC (Event #1)
	7	*Western MWD Cal Fed Outreach:* Board, public
	7	*Eastern MWD:* Board, public, local officials, constituents
	8	*City of Long Beach – IRP Forum:* Water Commissioners
	19	*Central Basin MWD/West Basin MWD*: Local constituents, elected officials, public
	20	*LADWP – Southern California Water Dialogue:* Elected officials, environmental interests, public, LADWP staff, DWR staff
	22	*MWDOC – IRP Forum (Event #2)*Member agencies, public, local officials, staff
	22	*City of Beverly Hills:* Commissioners, staff
	27	*San Diego County Water Authority:* Board, local agencies, general public
	28	*Three Valleys/IEUA:* Board, local agencies, staff, local officials
May	14	*MWDOC - Event # 3: Water Advisory Committee of Orange County*: Board members, elected officials, city staff, community members
	19	*Foothill MWD:* Board, local agencies, general public
	19	*West Basin Water Association:* Local boards, elected officials, staff, community leaders
	24	*Calleguas and Las Virgenes:* Board, local agencies, general public
June	24	*City of Pasadena:* Board, general public

Source: Metropolitan's Integrated Water Resources Plan Update, July, 2004.

II.2 Evaluating Supply Reliability

The Act requires that three fundamental planning analyses be performed to evaluate supply reliability as part of the development of a Plan. The first is a water supply reliability assessment, which requires development of a detailed evaluation of the supplies necessary to meet demands over at least a 20-year period in average, single year, and multi-year drought conditions. The second is a water shortage contingency plan that documents the stages of actions needed to address up to a 50 percent reduction in an agency's water supplies. Finally, the Act requires the development of a plan that defines the actions to be taken in the event of a catastrophic interruption in water supplies.

To complete these analyses, Metropolitan developed estimates of future demands and supplies from Metropolitan and local sources. Supply and demand analyses for the single and multiple year droughts were based on conditions for the SWP. For this source, the single driest year was 1977, and the three-year dry historical period was 1990-1992. The SWP provides the optimal basis for analysis because it is Metropolitan's largest and most variable supply. For the average year, the analysis used 83 years of historic hydrology (1922 to 2004) to develop estimates of supply and demands.

Estimating Demands on Metropolitan

Metropolitan derived its demand forecasts by first estimating total retail demands for the region and then factoring in the impacts of conservation. Details of this step are detailed in Appendix A.1 of this report. Next, it derived projections of local supplies using data on current and expected local supply programs and the IRP Local Resource Program Target. The difference between the resulting total demands, including conservation, and local supplies is the expected regional demand on Metropolitan supplies. These estimates of demands on Metropolitan were developed for a single dry year, multiple dry years, and average years. Tables II-4 through II-6 show these estimates. Metropolitan has shared these underlying supply assumptions with its member agencies.

Retail Demands

Retail M&I demands represent the full spectrum of water use within the region, including residential, commercial, industrial, institutional and un-metered uses. To forecast urban water demands, Metropolitan used the MWD-MAIN Water Use Forecasting System (MWD-Main), which is a combination of statistical and end-use methods that has been adapted to conditions in Southern California. The analysis based its population estimates on projections developed for the SCAG 2004 Regional Transportation Plan and SANDAG 2030 Forecast. Output from MWD-Main was then adjusted for expected conservation.

Conservation

The forecast of future conservation included a detailed accounting of water conservation that distinguished between:

- *Code-based Conservation* – Water saved as a result of changes in water efficiency requirements for plumbing fixtures in plumbing codes.

- *Active Conservation* – Water saved directly as a result of conservation programs by water agencies (includes implementation of Best Management Practices.)
- *Price-effect Conservation* – Water saved by retail customers attributable to the effect of changes in the real (inflation-adjusted) price of water.

After including the effects of conservation in the retail demands, the analysts calculated forecasts of local supplies.

Local Supplies

These forecasts of local supplies relied on information gathered from a number of sources including past urban water management plans, Metropolitan's annual local supply surveys, and communications between Metropolitan and member agency staff. The 2005 RUWMP includes only existing projects, projects with firm contracts for LRP funding, and projects that have met specific environmental documentation and financing criteria. Appendix 5 provides lists of the projects meeting these criteria.

Firm Demands

After calculating the expected regional demands on Metropolitan supplies, projected firm demands were calculated based on Metropolitan's established reliability goal. For the purposes of reliability planning, the 1996 IRP established a reliability goal that states that full service demands at the retail level would be satisfied under all "foreseeable hydrologic" conditions through 2020. This goal allows for intermittent interruptions to non-firm, discounted rate supplies sold under the Seasonal Storage Program and the Interim Agricultural Water Program. Thus, firm demand on Metropolitan equals Full Service demands (Tier I and Tier II) plus 70% of the Interim Agricultural Water Program. For the purpose of analysis, "foreseeable hydrologic conditions" is understood to mean under "historical hydrology," which presently covers the range of historical hydrology spanning the years 1922 through 2004. Tables II-4 through II-6 show estimates of firm demands on Metropolitan for single dry year, multiple dry years and average years.

Table II-4
Metropolitan Regional Water Demands
Single Dry Year
Acre Feet

	2010	2015	2020	2025	2030
A. Total Demands[1]	**5,546,000**	**5,782,000**	**6,037,000**	**6,248,000**	**6,454,000**
Retail Agricultural	337,000	303,000	271,000	239,000	221,000
Retail Municipal and Industrial	4,978,000	5,225,000	5,502,000	5,745,000	5,971,000
Groundwater Replenishment	182,000	192,000	198,000	198,000	196,000
Seawater Barrier	49,000	62,000	66,000	66,000	66,000
B. Total Conservation[2]	**865,000**	**955,000**	**1,028,000**	**1,107,000**	**1,188,000**
Existing Active (through 2004)[3]	94,000	92,000	92,000	91,000	91,000
Code-based, Price-Effect, and Remaining IRP Target	521,000	613,000	686,000	766,000	847,000
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C. Total Local Supplies	**2,159,000**	**2,414,000**	**2,552,000**	**2,575,000**	**2,593,000**
Groundwater	1,375,000	1,394,000	1,399,000	1,412,000	1,430,000
Surface Water	93,000	93,000	93,000	93,000	93,000
Los Angeles Aqueduct	96,000	95,000	95,000	95,000	95,000
Groundwater Recovery	87,000	115,000	115,000	115,000	115,000
Total Recycling	310,000	387,000	408,000	408,000	408,000
Desalination	28,000	128,000	150,000	150,000	150,000
Other Imported Supplies	170,000	202,000	292,000	302,000	302,000
D. Total Metropolitan Demands (D=A-B-C)	**2,523,000**	**2,414,000**	**2,457,000**	**2,565,000**	**2,671,000**
Full Service (Tier I and Tier II)	2,274,000	2,170,000	2,220,000	2,347,000	2,476,000
Replenishment Service[4]	144,000	153,000	159,000	159,000	145,000
Interim Agricultural Water Program	105,000	91,000	78,000	59,000	50,000
Firm Demands on Metropolitan[5]	**2,348,000**	**2,234,000**	**2,275,000**	**2,388,000**	**2,511,000**

Notes:
All units are acre-feet unless specified, rounded to the nearest hundred
Totals may not sum due to rounding

(1) Growth Projections: SCAG 2004 Regional Transportation Plan; SANDAG 2030 Forecast
(2) The 2030 savings target is derived from the 2003 IRP Update forecast projections for 2030; it is not an official target for 2030.
(3) Includes code-based savings originated through an active implementation program
(4) Replenishment Service as defined in MWD Administrative Code Section 4114
(5) Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands

Table II-5
Metropolitan Regional Water Demand
Multiple Dry Year
(acre feet)

	2010	2015	2020	2025	2030
A. Total Demands[1]	**5,575,000**	**5,848,000**	**6,103,000**	**6,329,000**	**6,542,000**
Retail Agricultural	337,000	306,000	274,000	243,000	222,000
Retail Municipal and Industrial	5,012,000	5,294,000	5,567,000	5,823,000	6,057,000
Groundwater Replenishment	178,000	189,000	196,000	197,000	197,000
Seawater Barrier	48,000	59,000	66,000	66,000	66,000
B. Total Conservation[2]	**865,000**	**955,000**	**1,028,000**	**1,107,000**	**1,188,000**
Existing Active (through 2004)[3]	94,000	92,000	92,000	91,000	91,000
Code-based, Price-Effect, and Remaining IRP Target		613,000	686,000	766,000	847,000
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C. Total Local Supplies	**2,140,000**	**2,396,000**	**2,559,000**	**2,587,000**	**2,593,000**
Groundwater	1,378,000	1,409,000	1,412,000	1,425,000	1,431,000
Surface Water	78,000	79,000	79,000	79,000	79,000
Los Angeles Aqueduct	97,000	104,000	104,000	108,000	108,000
Groundwater Recovery	108,000	114,000	115,000	115,000	115,000
Total Recycling	300,000	375,000	407,000	408,000	408,000
Desalination	9,333	114,000	150,000	150,000	150,000
Other Imported Supplies	170,000	201,000	292,000	302,000	302,000
D. Total Metropolitan Demands (D=A-B-C)	**2,570,000**	**2,499,000**	**2,515,000**	**2,635,000**	**2,761,000**
Full Service (Tier I and Tier II)	2,346,000	2,277,000	2,300,000	2,436,000	2,573,000
Replenishment Service[4]	119,000	130,000	136,000	137,000	137,000
Interim Agricultural Water Program	105,000	92,000	79,000	62,000	51,000
Firm Demands on Metropolitan[5]	**2,420,000**	**2,341,000**	**2,355,000**	**2,479,000**	**2,609,000**

Notes:
All units are acre-feet unless specified, rounded to the nearest hundred
Totals may not sum due to rounding
(1) Growth Projections: SCAG 2004 Regional Transportation Plan; SANDAG 2030 Forecast
(2) The 2030 savings target is derived from the 2003 IRP Update forecast projections for 2030; it is not an official target for 2030.
(3) Includes code-based savings originated through an active implementation program
(4) Replenishment Service as defined in MWD Administrative Code Section 4114
(5) Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands

Table II-6
Metropolitan Regional Water Demand
Average Year

	2010	2015	2020	2025	2030
A. Total Demands[1]	**5,520,000**	**5,759,000**	**6,010,000**	**6,220,000**	**6,419,000**
Retail Agricultural	326,000	294,000	263,000	233,000	215,000
Retail Municipal and Industrial	4,945,000	5,190,000	5,466,000	5,707,000	5,931,000
Groundwater Replenishment	200,000	213,000	215,000	214,000	207,000
Seawater Barrier	49,000	62,000	66,000	66,000	66,000
B. Total Conservation[2]	**865,000**	**955,000**	**1,028,000**	**1,107,000**	**1,188,000**
Existing Active (through 2004)[3]	94,000	92,000	92,000	91,000	91,000
Code-based, Price-Effect, and Remaining IRP Target	521,000	613,000	686,000	766,000	847,000
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C. Total Local Supplies	**2,393,000**	**2,614,000**	**2,748,000**	**2,771,000**	**2,770,000**
Groundwater	1,416,000	1,430,000	1,431,000	1,444,000	1,442,000
Surface Water	100,000	99,000	99,000	99,000	99,000
Los Angeles Aqueduct	252,000	253,000	253,000	253,000	254,000
Groundwater Recovery	111,000	115,000	115,000	115,000	115,000
Total Recycling	316,000	387,000	408,000	408,000	408,000
Desalination	28,000	128,000	150,000	150,000	150,000
Other Imported Supplies	170,000	202,000	292,000	302,000	302,000
D. Total Metropolitan Demands (D=A-B-C)	**2,262,000**	**2,191,000**	**2,234,000**	**2,341,000**	**2,460,000**
Full Service (Tier I and Tier II)	1,994,000	1,925,000	1,977,000	2,102,000	2,236,000
Replenishment Service[4]	169,000	180,000	183,000	183,000	177,000
Interim Agricultural Water Program	99,000	86,000	74,000	56,000	47,000
Firm Demands on Metropolitan[5]	**2,063,000**	**1,985,000**	**2,029,000**	**2,141,000**	**2,269,000**

Notes:
All units are acre-feet unless specified, rounded to the nearest hundred
Totals may not sum due to rounding
(1) Growth Projections: SCAG 2004 Regional Transportation Plan; SANDAG 2030 Forecast
(2) The 2030 savings target is derived from the 2003 IRP Update forecast projections for 2030; it is not an official target for 2030.
(3) Includes code-based savings originated through an active implementation program
(4) Replenishment Service as defined in MWD Administrative Code Section 4114
(5) Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands

II.3 Water Supply Reliability

After estimating demands for single dry year, multiple dry years, and average years the water reliability analysis requires urban water suppliers to identify projected supplies to meet these demands. Table II-7 summarizes the sources of supply for the single dry year (1977 hydrology), while Table II-8 shows the region's ability to respond in future years under a repeat of the 1990-92 hydrology. Table II-8 provides results for the average of the three dry years rather than a year-by-year detail, because most of Metropolitan's dry-year supplies are designed to provide equal amounts of water over each year of a three-year period. These tables show that the region can provide reliable water supplies under both the single driest year and the multiple dry year hydrologies. Table II-9 reports the expected situation on average over all of the historic hydrologies. Appendix A-3 contains detailed justifications for the sources of supply used for this analysis.

The reliability analyses in the IRP Update report showed that Metropolitan can maintain reliable supplies under the conditions that have existed in past dry periods throughout the period 2010 through 2025. As the tables provided below show, that level of reliability extends through 2030. Metropolitan has also identified buffer supplies, including additional SWP groundwater storage and transfers that could serve to supply the additional water needed.

Table II-7
Single Dry-Year
Supply Capability[1] & Projected Demands
(Repeat of 1977 Hydrology)
(acre-feet per year)

	2010	2015	2020	2025	2030
Current Supplies					
In-Basin Storage	1,149,000	1,161,000	1,113,000	1,066,000	1,017,000
California Aqueduct[2]	777,000	777,000	777,000	777,000	777,000
Colorado River Aqueduct[3]	722,000	699,000	699,000	699,000	699,000
Supplies Under Development					
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
California Aqueduct	330,000	259,000	350,000	350,000	350,000
Colorado River Aqueduct	95,000	460,000	400,000	400,000	400,000
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability	***3,151,000***	***3,424,000***	***3,407,000***	***3,360,000***	***3,311,000***
Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF[4]	***3,151,000***	***3,356,000***	***3,309,000***	***3,252,000***	***3,203,000***
Firm Demands on Metropolitan[5,6]	***2,348,000***	***2,234,000***	***2,275,000***	***2,388,000***	***2,511,000***
Potential Reserve & Replenishment Supplies	**803,000**	**1,122,000**	**1,034,000**	**864,000**	**692,000**

[1] Represents supply capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct
[3] Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct
[4] Maximum CRA deliveries limited to 1.25 MAF including SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.
[5] Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation, SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.
[6] Includes projected firm sales plus 70% of projected IAWP agricultural sales

Table II-8
Multiple Dry-Year
Supply Capability[1] & Projected Demands
(Repeat of 1990-92 Hydrology)
(acre-feet per year)

	2010	2015	2020	2025	2030
Current Supplies					
In-Basin Storage	514,000	518,000	502,000	487,000	470,000
California Aqueduct[2]	912,000	912,000	912,000	912,000	912,000
Colorado River Aqueduct[3]	722,000	699,000	699,000	699,000	699,000
Supplies Under Development					
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
California Aqueduct	330,000	215,000	299,000	299,000	299,000
Colorado River Aqueduct	95,000	460,000	400,000	400,000	400,000
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability	***2,651,000***	***2,872,000***	***2,880,000***	***2,865,000***	***2,848,000***
Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF[4]	***2,651,000***	***2,804,000***	***2,782,000***	***2,757,000***	***2,740,000***
Firm Demands on Metropolitan[5,6]	***2,420,000***	***2,341,000***	***2,355,000***	***2,479,000***	***2,609,000***
Potential Reserve & Replenishment Supplies	**231,000**	**463,000**	**427,000**	**278,000**	**131,000**

[1] Represents supply capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct
[3] Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct
[4] Maximum CRA deliveries limited to 1.25 MAF including SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.
[5] Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation, SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.
[6] Includes projected firm sales plus 70% of projected IAWP agricultural sales

Table II-9
Average Year
Supply Capability[1] & Projected Demands
(Average of 1922 – 2004 Hydrologies)
(acre-feet per year)

	2010	2015	2020	2025	2030
Current Supplies					
In-Basin Storage	0	0	0	0	0
California Aqueduct[2]	1,772,000	1,772,000	1,772,000	1,772,000	1,772,000
Colorado River Aqueduct[3]	711,000	678,000	677,000	677,000	677,000
Supplies Under Development					
In-Basin Storage	0	0	0	0	0
California Aqueduct	185,000	185,000	240,000	240,000	240,000
Colorado River Aqueduct	0	0	0	0	0
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability	***2,668,000***	***2,600,000***	***2,654,000***	***2,654,000***	***2,654,000***
Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF[4]	***2,668,000***	***2,600,000***	***2,654,000***	***2,654,000***	***2,654,000***
Firm Demands on Metropolitan[5,6]	***2,063,000***	***1,985,000***	***2,029,000***	***2,141,000***	***2,269,000***
Potential Reserve & Replenishment Supplies	**605,000**	**615,000**	**625,000**	**513,000**	**385,000**

[1] Represents supply capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct
[3] Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct
[4] Maximum CRA deliveries limited to 1.25 MAF including SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.
[5] Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation, SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.
[6] Includes projected firm sales plus 70% of projected IAWP agricultural sales

II.4 Water Shortage Contingency Analysis

In addition to the Water Supply Reliability analysis addressing average year and drought conditions, the Act requires agencies to document the stages of actions that it would undertake in response to water supply shortages, including up to a 50% reduction in its water supplies. Metropolitan has captured this planning in its Water Surplus and Drought Management Plan (WSDM Plan) which guides Metropolitan's planning and operations during both shortage and surplus conditions.

Water Surplus and Drought Management Plan

In April of 1999, Metropolitan's Board of Directors adopted the Water Surplus and Drought Management Plan (WSDM Plan).[2] It provides policy guidance for managing regional water supplies to achieve the reliability goals of Southern California's Integrated Resources Plan (IRP). It identifies the expected sequence of resource management actions that Metropolitan will execute during surpluses and shortages to minimize the probability of severe shortages and eliminate the possibility of extreme shortages and shortage allocations. Unlike Metropolitan's previous shortage management plans, the WSDM Plan recognizes the link between surpluses and shortages, and it integrates planned operational actions with respect to both conditions.

Through effective management of its water supply, Metropolitan fully expects to be 100 percent reliable in meeting all non-discounted non-interruptible demands throughout the next twenty five years. The benefits of Metropolitan's contingency planning approach have been evident in recent years. Of particular note are the region's successes in dealing with operational constraints such as the rehabilitation of the Colorado River Aqueduct in 2003, the disruption to Delta diversions caused by the Jones Tract flooding in 2004, and the strong position of local storage despite five years of dry conditions.

WSDM Plan Development

Metropolitan and its member agencies jointly developed the WSDM Plan during 1998 and 1999. This planning effort included more than a dozen half-day and full-day workshops and more than three dozen meetings between Metropolitan and member agency staff. The result of the planning effort is a consensus plan that addresses a broad range of regional water management actions and strategies.

WSDM Plan Principles and Goals

The guiding principle of the WSDM plan is to manage Metropolitan's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortages to retail customers. From this guiding principle came the following supporting principles:

[2] Metropolitan Water District of Southern California. *Water Surplus and Drought Management Plan,* Report No. 1150, August, 1999.

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

The WSDM plan also declared that if mandatory import water allocations be necessary, they would be calculated on the basis of need, as opposed to any type of historical purchases. The WSDM plan contains the following considerations that would go into an equitable allocation of imported water:

- Impact on retail consumers and regional economy
- Investments in local resources, including recycling and conservation
- Population growth
- Changes and/or losses in local supplies
- Participation in Metropolitan's Non-firm (interruptible) programs
- Investment in Metropolitan's facilities.

Surplus and Shortage Stages

The WSDM Plan distinguishes between Surpluses, Shortages, Severe Shortages, and Extreme Shortages. Within the WSDM Plan, these terms have specific meanings relating to Metropolitan's ability to deliver water to its customers.

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

Shortage: Metropolitan can meet full-service demands and partially meet or fully meet interruptible demands, using stored water or water transfers as necessary.

Severe Shortage: Metropolitan can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation. In a Severe Shortage, Metropolitan may have to curtail Interim Agricultural Water Program deliveries.

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

The WSDM Plan also defines five surplus management stages and seven shortage management stages to guide resource management activities. These stages are not defined merely by shortfalls in imported water supply, but also by the water balances in Metropolitan's storage programs. Thus, a ten percent shortfall in imported supplies could be a stage one shortage if storage levels are high. If storage levels are already depleted, the same shortfall in imported supplies could potentially be defined as a more severe shortage. Each year, Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage for that year. Each stage is associated with specific resource management actions designed to (1) avoid an Extreme Shortage to the maximum extent possible and (2) minimize adverse impacts to retail customers if an Extreme Shortage occurs. The current

sequencing outlined in the WSDM Plan reflects anticipated responses based on detailed modeling of Metropolitan's existing and expected resource mix.

Surplus Stages

Metropolitan's supply situation is considered to be in surplus as long as net annual deliveries can be made to water storage programs. Deliveries for storage in the Diamond Valley Lake and in the SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from Diamond Valley Lake for regulatory purposes or to meet seasonal demands may occur in any stage. Deliveries to other storage facilities may be interrupted, depending on the amount of the surplus.

Shortage Actions

When Metropolitan must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Under most of these stages, it is still able to meet all end-use demands for water. For shortage stages 1 through 4, Metropolitan will meet demands by withdrawing water from storage. At shortage stages 5 through 7, Metropolitan may undertake additional shortage management steps, including issuing public calls for extraordinary conservation, considering curtailment of Interim Agricultural Water Program deliveries in accordance with their discounted rates, exercise water transfer options, or purchase water on the open market.

At shortage stage 7 Metropolitan will develop a plan to allocate available supply fairly and efficiently to full-service customers. The allocation plan will be based on the Board-adopted principles for allocation. Metropolitan intends to enforce these allocations using rate surcharges. Under the current WSDM Plan, the surcharges will be set at a minimum of $175 per af for any deliveries exceeding a member agency's allotment. Any deliveries exceeding 102% of the allotment will be assessed a surcharge equal to three times Metropolitan's full-service rate.

Figure II-1 shows the actions under surplus and shortage stages when an allocation plan would be necessary to enforce mandatory cutbacks. The overriding goal of the WSDM Plan is to never reach Shortage Stage 7, an Extreme Shortage. Given present resources, Metropolitan fully expects to achieve this goal over the next twenty five years.

Annual Reporting Schedule on Supply/Demand Conditions

Managing Metropolitan's water supply resources to minimize the risk of shortages requires timely and accurate information on changing supply and demand conditions throughout the year. To facilitate effective resource management decisions, the WSDM Plan includes a monthly schedule for providing supply/demand information to Metropolitan's senior management and Board of Directors, and for making resource allocation decisions. Table II-10 shows this schedule.

Figure II-1
Resource Stages, Anticipated Actions, And Supply Declarations

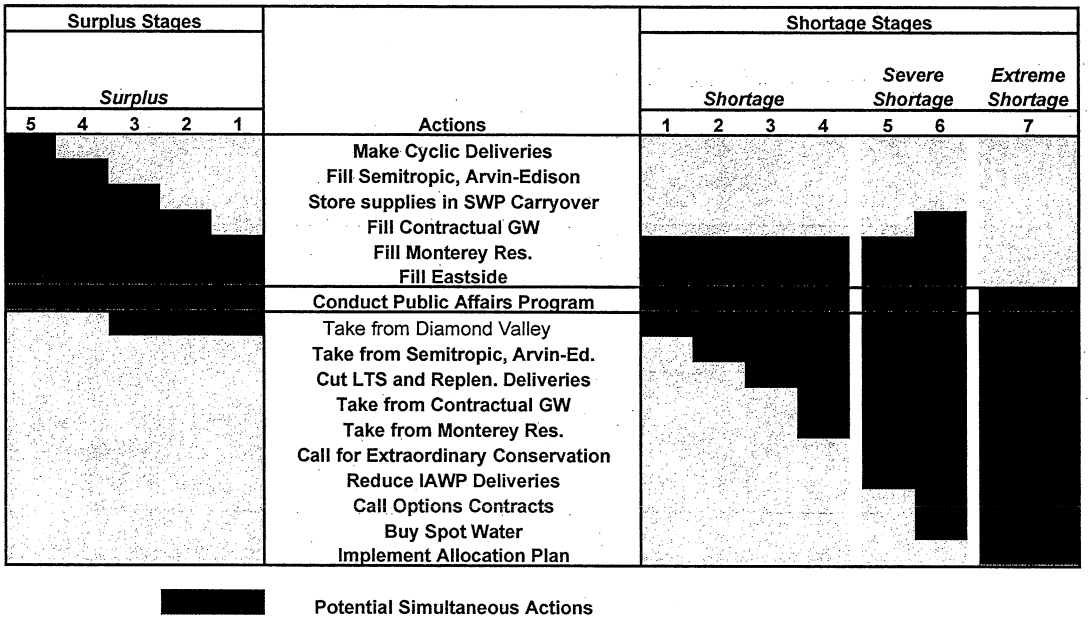


Table II-10
Schedule of Reporting and Resource Allocation Decision-Making

Month	Informational Report/Management Decision
Jan.	Initial supply/demand forecasts for year
Feb.-Mar.	Update supply/demand forecasts for year
Apr.-May	Finalize supply/demand forecasts Management decisions re: Contractual Groundwater and Option Transfer Programs Board decisions re: Need for Extraordinary Conservation
Oct.	Report on Supply and Carryover Storage
Nov.	Management decisions re: Long-Term Seasonal and Replenishment Groundwater Programs, Interruptible Agricultural Water Program

II.5 Catastrophic Supply Interruption Planning

The third type of planning needed to evaluate supply reliability is a catastrophic supply interruption plan that documents the actions necessary for a catastrophic interruption in water supplies. For Metropolitan this planning is captured in the analysis that went into developing the Emergency Storage Requirements.

Emergency Storage Requirements

Metropolitan established its criteria for determining emergency storage requirements in the October 1991 Final Environmental Impact Report for the Eastside Reservoir, which is now named Diamond Valley Lake. These criteria were again discussed in Southern California's 1996 Integrated Resources Plan. Metropolitan's Board has approved both of these documents.

These emergency storage requirements are based on the potential of a major earthquake damaging the aqueducts that transport Southern California's imported water supplies (SWP, CRA, and Los Angeles Aqueduct). The adopted criteria assume that damage from such an event could render the aqueducts out of service for six months. Therefore, Metropolitan has based its planning on a 100 percent reduction in its supplies for a period of six months, which is a greater shortage than required by the Act.

To safeguard the region from catastrophic loss of water supply, Metropolitan has made substantial investments in emergency storage. The emergency plan outlines that under such a catastrophe, interruptible service deliveries would be suspended, and firm supplies to member agencies would be restricted by a mandatory cutback of 25 percent from normal-year demand levels. At the same time, water stored in surface reservoirs and groundwater basins under Metropolitan's interruptible program would be made available, and Metropolitan would draw on its emergency storage, as well as other available storage. Metropolitan has reserved approximately one-third of Diamond Valley Lake storage to meet such an emergency, while the remainder is available for dry-year and seasonal supplies. In addition, Metropolitan has access to emergency storage at its other reservoirs, at the SWP terminal reservoirs, and in its groundwater conjunctive use storage accounts. With few exceptions, Metropolitan can deliver this emergency supply throughout its service area via gravity, thereby eliminating dependence on power sources that could also be disrupted by a major earthquake. The WSDM Plan shortage stages will guide Metropolitan's management of available supplies and resources during the emergency to minimize the impacts of the catastrophe.

In addition to the criteria used to develop the emergency storage requirements, Metropolitan cooperated with DWR and others in 2005 on a preliminary study of the potential effects of extensive levee failures in the Delta.[3] This study was limited in scope, and it investigated only two of a potential range of scenarios. Metropolitan's analysis showed that its investment in local storage and water banking programs south of the Delta would provide the resources necessary to continue operating under the scenarios investigated. In particular, Metropolitan's analysis showed that it would be able to supply all firm requirements to its member agencies under both scenarios, but that it would need to interrupt replenishment deliveries to the area's groundwater

[3] Jack R. Benjamin & Associates, Inc. *Preliminary Seismic Risk Analysis Associated with Levee Failures in the Sacramento-San Joaquin Delta*, June, 2005.

basins and curtail water supplies to one third of the interruptible agriculture within its service territory. Metropolitan's analysis further suggested that the scenarios investigated were not the worst-case situation. Under more extreme hydrologies, Metropolitan might have to reduce firm deliveries to Metropolitan's member agencies by as much as 10 percent.

Electrical Outages

Metropolitan has also developed contingency plans that enable it to deal with both planned and unplanned electrical outages. These plans include the following key points:

- In event of power outages, water supply can be maintained by gravity feed from Diamond Valley Lake.
- Maintaining water treatment operations is a key concern. As a result, all Metropolitan treatment plants have backup generation sufficient to continue operating in event of supply failure on the main electrical grid.
- Valves at Lake Skinner can be operated by the backup generation at the Lake Skinner treatment plant.
- Metropolitan owns mobile generators that can be transported quickly to key locations if necessary.

II.6 Other Supply Reliability Risks

In its IRP Update, Metropolitan identified two risks to its future supply reliability:

1. Implementation Risk. For local programs, Metropolitan has taken a region-wide, competitive approach to securing new supplies. This approach encourages innovation, and as a result some projects could either fail to meet their expected contribution to the IRP goals, or they could fail to do so in the expected timeframe. In addition, programs related to imported water supplies may not perform as expected.

2. Water Quality Issues. Concerns relating to water quality could pose an increasing challenge for water supply reliability. Water quality issues might threaten existing supplies through contamination, or water quality standards may become more stringent because of changing water quality regulation or the discovery of a previously unknown risk. These events may lead to the loss of a water supply source or a reduction in a source's usefulness because of a need to blend supplies to meet water quality standards.

The amount of water at risk because of these concerns cannot be quantified with current knowledge. To reduce the likelihood of such shortfalls, the IRP Update instituted a planning buffer of up to ten percent of regional demands. This buffer calls for the identification of an additional 500 taf of contingency supplies above that needed to meet demands in 2025. The buffer supplies would include an equal proportion of local and imported supplies. Projects identified as buffer supplies may not be implemented or may only be partially implemented, depending on future conditions and future Board actions. However, identifying these supplies will allow a more speedy response to events that might otherwise compromise regional reliability.

Climate Change

Another potential risk to future water supply reliability is posed by climate change. In recent years, as the science of climate change has become more broadly accepted and potential widespread implications to water resources have been identified, the issue has come to the forefront. As a major steward of the region's water supply resources, Metropolitan is committed to performing its due diligence with respect to climate change.

Current scientific research suggests that increasing concentrations of atmospheric greenhouse gases are producing global-scale temperature and precipitation changes. Global climate models predict that by the end of the century, average winter temperatures could increase by more than 7° Fahrenheit, and summer temperatures by as much as 18° Fahrenheit. The results of precipitation studies have been less definitive and vary widely between models and scenarios, predictions range from slight increases in precipitation to decreases of up to 30 percent.

Potential Impacts

While uncertainties remain regarding the exact timing, magnitude, and regional impacts of these temperature and precipitation changes, researchers have identified several areas of concern for California water planners. These include:

- reduction in Sierra Nevada snowpack
- increased intensity and frequency of extreme weather events, and
- rising sea levels resulting in
  - increased risk of damage from storms, high-tide events, and the erosion of levees, and
  - potential pumping cutbacks on the State Water Project (SWP) and Central Valley Project (CVP).

Other important issues of concern due to global climate change include:

- effects on local supplies such as groundwater
- changes in urban and agricultural demand levels and patterns
- impacts to human health from water-borne pathogens and water quality degradation
- declines in ecosystem health and function
- alterations to power generation and pumping regimes.

Metropolitan's Activities

An extended Colorado River drought put climate change on Metropolitan's radar screen in the mid-1990s. In 2000, Metropolitan's Board received a briefing on the potential impacts of climate change on water supply by leading experts in the field. Metropolitan then hosted a California Water Plan meeting on climate change and a held Drought Preparedness Workshop on similar issues. In March 2002, the Board adopted policy principles on global climate change as related to water resource planning. The Principles stated in part that 'Metropolitan supports further research into the potential water resource and quality effects of global climate change, and supports flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts.'

In support of the policy principles, Metropolitan has participated in or attended numerous regional, state and national climate change studies and workshops. These workshops include those held by Universities, State Agencies such as the California Energy Commission (CEC) and DWR, and national workshops such as those held by the American Water Works Association Research Foundation (AWWARF) and the National Center for Atmospheric Research. Most recently, Metropolitan helped sponsor and participated in a large international conference held in Orange County by GEWEX (the Global Energy and Water Experiment). Metropolitan's Chairman of the Board gave the Keynote address, discussing climate change information specifically relevant to water agencies.

Metropolitan's Integrated Resources Planning was recently featured as a regional utility case study for adapting to climate change. The case study, in AWWARF's *Climate Change and Water Resources: A Primer for Municipal Water Providers*, highlights several examples of how Metropolitan, in conjunction with its member agencies, is expanding its supply portfolio to maintain reliability and flexibility. This portfolio includes conservation and recycling, groundwater conjunctive use, transfer programs, and storage and conveyance facilities such as Diamond Valley Lake and the nearly completed Inland Feeder.

Looking Ahead

As the water industry begins to address the potential impacts of climate change, several challenges and uncertainties require additional work. Among these challenges is the need to gain understanding of the impact of climate change on precipitation. While many climate models show precipitation decreasing in response to climate change, others show precipitation increasing. This discrepancy has major implications in terms of water supply impacts. Another challenge is translating the global climate impacts to regional impacts, a process called "downscaling." More research is needed to generate reliable watershed-level climate and hydrological information that will be useful to water agencies. A major challenge for Metropolitan in assessing potential impacts is that our region's water supplies are derived from four geographically unique watersheds, managed by numerous federal, state and regional agencies.

Moving forward, a number of State and Federal agencies, stakeholders, universities, and other entities are beginning to perform and fund the kind of research needed to better understand the potential impacts of climate change on the State's water supply resources. Several of Metropolitan's member agencies are also beginning to address climate change impacts. Metropolitan realizes the importance of planning for future uncertainties, but it is also bound by the need to be prudent and fiscally responsible to its customers. We hope to see improvements in climate change science and modeling techniques and/or technology that will enable us to make sound policy and practical decisions in the future.

II.7 Pricing and Rate Structures

General Overview of MWD Rate Structure

This section provides an overview of Metropolitan's rate structure. The rate structure is designed to accomplish the following:

- Accountability - Define the linkage among costs, charges, and benefits through a cost of service approach consistent with industry guidelines and practices;
- Regional Provider - Ensure that regional services meet the existing and future needs of member agencies;
- Equity - Ensure that users, including member agencies and other entities, pay the same rates and charges for like classes of services and provide fair allocation of costs through rates and charges;
- Environmental Responsibility - Encourage wise environmental stewardship and effective demand management by funding conservation and recycling projects and programs, and use pricing to encourage investments in conservation, recycling and other economical local supplies;
- Choice and Competition - Offer choices for services to member agencies and accommodate the development of a water transfer market;
- Water Quality - Support source quality improvements and water treatment systems that are required to ensure safe drinking water and are required to make water recycling and groundwater management programs feasible; and
- Financial Integrity - Establish a financial commitment from the member agencies that provides financial security for Metropolitan and does not transfer undue risk to member agencies.

The rate structure includes the following benefits to how Metropolitan recovers the cost of providing services:

- The water rate used in the previous rate structure is unbundled into separate rates for supply, conveyance and distribution, water stewardship and power;
- A tiered pricing structure encourages the development of cost-effective local water resources, including conservation, water recycling, groundwater recycling and desalination. In addition, member agencies with increasing demands for Metropolitan system supplies will pay a larger proportion of the cost of developing supply;
- A Capacity Charge allocates a greater share of the cost of peak distribution capacity to member agencies that cause the greatest peak demands on the system; and

- A water stewardship rate provides a dedicated source of funding for the continuation of regional investments in conservation and recycling and other economical local resources.

Revenue Management

A high proportion of Metropolitan's revenues come from volumetric water rates. As a result, Metropolitan's revenues can vary according to regional weather and the availability of statewide water supplies. In dry years, local demands increase and Metropolitan may receive revenues in excess of its cost of service. In contrast, in wet years demands will decrease, and revenues may be below the cost of service. In addition, statewide supply shortages such as those in 1991 could cause a decrease in Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates and in Metropolitan's financial condition. To mitigate this risk, Metropolitan maintains reserves, with a minimum and maximum balance, to stabilize water rates during times of reduced water sales. The reserves hold revenues collected during times of high demand and are used to offset the need for revenues during times of low sales.

Rate Structure Components

The different elements of the rate structure are discussed below and summarized in Table II-11.

System Access Rate (SAR)
The SAR recovers the cost of the conveyance and distribution system that is used on an average annual basis through a uniform volumetric rate. All users pay the SAR for access to conveyance and distribution capacity in the Metropolitan system.

The SAR is charged for each acre-foot of water conveyed and distributed by Metropolitan. All users (member agencies and third parties) using the Metropolitan system to convey water pay the same SAR for the use of the system conveyance and distribution capacity used to meet average annual demands.

Water Stewardship Rate (WSR)
The WSR provides a dedicated source of funding for conservation and local resources development. The WSR supports Metropolitan's funding of future conservation and local supply projects. Because of the uniform benefits (e.g. greater available system capacity through reduced use by others) conferred on all system users by investments in conservation and local resources, all users of Metropolitan's conveyance and distribution system pay the water stewardship rate.

Table II-11
Rate Structure Components

Rate Design Elements	Service Provided/ Costs Recovered	Type of Charge
System Access Rate	Conveyance/Distribution (Average Capacity)	Volumetric ($/af)
Water Stewardship Rate	Conservation/Local Resources	Volumetric ($/af)
System Power Rate	Power	Volumetric ($/af)
Treatment Surcharge	Treatment	Volumetric ($/af)
Capacity Charge	Peak Distribution Capacity	Fixed/Volumetric ($/cfs)
Readiness-To-Serve Charge	Conv./Distr./Emergency Storage(Standby Capacity)	Fixed ($Million)
Tier 1 Supply Rate	Supply	Volumetric/Fixed ($/af)
Tier 2 Supply Rate	Supply	Volumetric ($/af)
Surplus Water Rates	Replenishment/Agriculture	Volumetric ($/af)

System Power Rate (SPR)
The SPR recovers the costs of energy required to pump water to Southern California through the State Water Project and Colorado River Aqueduct. The cost of power is recovered through a uniform volumetric rate. The SPR is applied to all deliveries to member agencies. Wheeling parties will pay for the actual cost (not system average) of power needed to move the water. For example, water wheeled through the California Aqueduct would pay the actual variable power cost incurred by DWR to move the water.

Treatment Surcharge
The treatment surcharge recovers the costs of providing treated water service through a uniform, volumetric rate.

Capacity Charge
The capacity charge is levied on the maximum summer day demand placed on the system between May 1 and September 30 for the three previous calendar-years. Demands measured for the purposes of billing the capacity charge include all firm demand and agricultural demands as well as wheeling service. Because it is interruptible with 24 hours notice, replenishment service is not included in the measurement of peak day demand for purposes of billing the capacity

charge. A member agency can reduce its capacity charge payments by reducing peak day demands on the system.

Readiness-To-Serve Charge (RTS)
The RTS is a fixed charge (currently totaling $80 million) that recovers the cost of the portion of system conveyance and storage capacity that is on standby to provide emergency service and operational flexibility.

The total RTS charge is allocated among the member agencies based on a ten-calendar-year rolling average of firm demands. Replenishment and agricultural deliveries are excluded, while water transfers and exchanges are included for purposes of calculating the ten-year rolling average used to allocate the RTS. At the option of the member agencies, a per-parcel standing charge is collected to offset a portion of the RTS obligation.

Tier 1 Supply Rate
The costs of maintaining existing supplies and developing additional supplies are recovered through a two-tiered pricing approach. The Tier 1 Supply Rate recovers the majority of the supply revenue requirement and reflects the cost of existing supplies. The amount of water an agency can purchase under the lower Tier 1 rate is determined by its base demand and whether or not the agency has chosen to sign a Purchase Order with Metropolitan. An agency's base demand is determined by the maximum annual amount of firm delivery purchased from Metropolitan in the 13 years ending June 30, 2002. Member agencies can choose to execute a Purchase Order that commits the agency to purchase a minimum average level of 60 percent of its base demand over the ten-year period ending 2012. Thus, if an agency's base demand was 20 taf, an executed Purchase Order would commit the agency to purchasing a total of 120 taf over the period 2003-2012 (20 taf base demand x 60 percent x 10 years). Member agencies with a Purchase Order can purchase up to 90 percent of their base demand at the Tier 1 rate, and any remaining needs would be purchased at the higher Tier 2 rate. Member agencies without a Purchase Order can pay the Tier 1 Supply Rate for firm demands up to 60 percent of their base demand, and pay the higher Tier 2 rates for the remainder of their purchases.

Tier 2 Supply Rate
The Tier 2 Supply Rate is set at Metropolitan's cost of developing new supply, thus encouraging the member agencies and their customers to protect existing local supplies and develop cost-effective local supply resources and conservation. The Tier 2 Supply Rate also recovers a greater proportion of the cost of developing additional supplies from member agencies that have increasing demands on the Metropolitan system. Therefore, the Tier 2 Supply Rate partially addresses customer equity between member agencies that are not increasing their demands on the system and member agencies that continue to need additional imported water supplies.

As described above, the Tier 2 Supply Rate will be charged for all firm water sales above 60 percent of a member agency's base demand unless the member agency elected to execute a Purchase Order. If a member agency submits a Purchase Order, it will pay the Tier 2 Supply Rate for all firm demands that exceed 90 percent of its base demand.

Replenishment Program and Agricultural Water Program

Metropolitan currently administers two pricing programs that make surplus system supplies (system supplies in excess of what is needed to meet consumptive municipal and industrial demands) available to the member agencies at a discounted water rate. The replenishment program provides surplus system supplies, when available, for the purpose of replenishing local storage. The interim agricultural water program also makes surplus system water available for agricultural purposes.

The following tables provide further information regarding Metropolitan's rates. Table II-12 summarizes the rates and charges to be effective January 1, 2005. Average costs by member agency will vary depending upon an agency's RTS allocation, capacity charge and relative proportions of treated and untreated Tier 1, Tier 2, Long-term Seasonal Storage, and agricultural water purchases. Table II-13provides a snapshot of the Capacity Charge, calculated for Calendar Year 2005. Table II-14 provides the details of the Readiness-to-Serve charge calculation broken down by member agency. Table II-15 provides the current Purchase Order commitment quantities by member agency.

Table II-12
Rates and Charges Summary

Rate Categories Volumetric ($/af) unless otherwise noted)	Effective 1/1/2005	Effective 1/1/2006
Water Supply Rate		
Tier 1	$73	$73
Tier 2	$154	$169
System Access Rate	$152	$152
Water Stewardship Rate	$25	$25
System Power Rate	$81	$81
Full Service Untreated Volumetric Cost		
Tier 1	$331	$331
Tier 2	$412	$427
Treatment Surcharge	$112	$122
Full Service Treated Volumetric Cost		
Tier 1	$443	$453
Tier 2	$524	$549
Other Volumetric		
Replenishment Water Rate: untreated	$238	$238
Interim Agricultural Water Program: untreated	$241	$241
Treated Replenishment Water Rate	$325	$335
Treated Interim Agricultural Water Program	$329	$339
Other Charges (non-volumetric)		
Readiness-to-Serve Charge (Total charge in $millions, allocated to members by share of 10 year demands)	$80	$80
Capacity Charge Three-year average of peak day demands($/cfs)	$6,800	$6,800

Table II-13
Capacity Charge Detail

	Peak Day Demand (cfs) (May 1 through September 30) Calendar Year				
AGENCY	2001	2002	2003	3-Year Peak	Calendar Year 2005 Capacity Charge ($6,800/cfs)
Anaheim	56.5	54.3	43.7	56.5	$ 384,200
Beverly Hills	32.3	30.1	29.6	32.3	219,640
Burbank	36.6	38.2	41.1	41.1	279,480
Calleguas	240.9	258.5	262.6	262.6	1,785,680
Central Basin	122.1	119.2	133.4	133.4	907,120
Compton	7.6	9.6	11.7	11.7	79,560
Eastern	186.6	204.3	219.0	219.0	1,489,200
Foothill	23.8	21.7	26.0	26.0	176,800
Fullerton	24.2	27.6	24.8	27.6	187,680
Glendale	58.6	56.3	60.0	60.0	408,000
Inland Empire	171.8	155.3	182.9	182.9	1,243,720
Las Virgenes	35.8	43.5	36.9	43.5	295,800
Long Beach	60.6	51.7	86.6	86.6	588,880
Los Angeles	404.9	645.0	671.1	671.1	4,563,480
MWDOC	452.7	479.2	520.0	520.0	3,536,000
Pasadena	43.2	75.5	57.1	75.5	513,400
San Diego [1]	1084.6	1241.4	1240.6	1296.0	8,812,800
San Fernando	0.1	0.0	0.0	0.1	680
San Marino	2.7	6.8	6.5	6.8	46,240
Santa Ana	24.8	39.6	28.8	39.6	269,280
Santa Monica	23.9	28.5	36.9	36.9	250,920
Three Valleys	188.3	203.8	211.0	211.0	1,434,800
Torrance	44.4	38.8	43.4	44.4	301,920
Upper San Gabriel	32.5	45.3	70.9	70.9	482,120
West Basin	248.3	256.0	260.5	260.5	1,771,400
Western	246.1	262.6	251.5	262.6	1,785,680
Total	**3,854**	**4,393**	**4,557**	**4,679**	**$ 31,814,480**

(1) San Diego capacity set at 1,296 cfs per surface storage operating agreement terms

Table II-14
Readiness-to-Serve Charge (by Member Agency)

Member Agency	Rolling Ten-Year Average Firm Deliveries (Acre-Feet) FY1992/93 - FY2001/02	RTS Share	6 months @ $80 million per year (7/04-12/04)	Rolling Ten-Year Average Firm Deliveries (Acre-Feet) FY1993/94 - FY2002/03	RTS Share	6 months @ $80 million per year (1/05-6/05)	Total RTS Charge
Anaheim	17,356	1.12%	$ 446,116	17,464	1.09%	$ 435,120	$ 881,236
Beverly Hills	13,301	0.85%	341,899	13,363	0.83%	332,960	674,859
Burbank	14,120	0.91%	362,930	13,514	0.84%	336,719	699,650
Calleguas MWD	95,365	6.13%	2,451,255	97,828	6.09%	2,437,467	4,888,722
Central Basin MWD	63,983	4.11%	1,644,617	64,476	4.02%	1,606,477	3,251,094
Compton	4,006	0.26%	102,968	3,733	0.23%	93,014	195,981
Eastern MWD	58,751	3.78%	1,510,133	62,106	3.87%	1,547,431	3,057,565
Foothill MWD	9,358	0.60%	240,530	9,675	0.60%	241,057	481,587
Fullerton	7,427	0.48%	190,904	7,738	0.48%	192,802	383,706
Glendale	27,151	1.74%	697,879	26,752	1.67%	666,552	1,364,431
Inland Empire Utilities Agency	44,473	2.86%	1,143,137	47,034	2.93%	1,171,888	2,315,024
Las Virgenes MWD	19,801	1.27%	508,957	20,184	1.26%	502,896	1,011,854
Long Beach	37,953	2.44%	975,531	37,670	2.35%	938,575	1,914,106
Los Angeles	190,217	12.22%	4,889,336	202,968	12.64%	5,057,144	9,946,480
Municipal Water District of Orange County	213,813	13.74%	5,495,840	216,197	13.47%	5,386,753	10,882,593
Pasadena	16,274	1.05%	418,304	17,963	1.12%	447,563	865,867
San Diego County Water Authority	414,479	26.63%	10,653,763	432,316	26.93%	10,771,569	21,425,332
San Fernando	76	0.00%	1,961	61	0.00%	1,520	3,481
San Marino	1,168	0.08%	30,025	1,111	0.07%	27,674	57,699
Santa Ana	11,670	0.75%	299,971	11,784	0.73%	293,600	593,571
Santa Monica	9,134	0.59%	234,791	9,907	0.62%	246,847	481,638
Three Valleys MWD	63,146	4.06%	1,623,095	65,362	4.07%	1,628,560	3,251,655
Torrance	21,416	1.38%	550,464	21,527	1.34%	536,359	1,086,823
Upper San Gabriel Valley MWD	9,172	0.59%	235,760	10,220	0.64%	254,646	490,406
West Basin MWD	147,247	9.46%	3,784,845	146,263	9.11%	3,644,289	7,429,135
Western MWD	45,323	2.91%	1,164,988	48,183	3.00%	1,200,519	2,365,506
MWD Total	1,556,178	100.00%	$ 40,000,000	1,605,396	100.00%	$ 40,000,000	$ 80,000,000

Table II-15
Purchase Order Commitments and Tier 1 Limits
(by Member Agency)

	Tier 1 Annual Limit	Purchase Order Commitment (acre-feet)
Anaheim	22,240	148,268
Beverly Hills	13,380	89,202
Burbank	16,336	108,910
Calleguas	103,801	692,003
Central Basin	72,360	482,400
Compton	5,058	33,721
Eastern	75,700	504,664
Foothill	10,997	73,312
Fullerton	11,298	75,322
Glendale	26,221	174,809
Inland Empire	59,752	398,348
Las Virgenes	20,565	137,103
Long Beach	39,471	263,143
Los Angeles	304,970	2,033,132
MWDOC	222,924	1,486,161
Pasadena	21,180	141,197
San Diego	500,705	3,338,035
San Fernando	630	-
San Marino	1,199	-
Santa Ana	12,129	80,858
Santa Monica	11,109	74,062
Three Valleys	70,400	469,331
Torrance	20,967	139,780
Upper San Gabriel	16,511	110,077
West Basin	156,874	1,045,825
Western	58,769	391,791
Total	**1,875,546**	**12,491,453**

II.8 Public Participation

Because of the diverse needs, interests, and institutional entities within the region, the IRP goals will only be achieved through an open and participatory process that involves the major stakeholders. The IRP process reached out to water managers, policy decision-makers, interest groups, and individuals. They provided valuable input and guidance regarding the preferred water resource strategy and carefully reviewed the technical analyses supporting the decision-making process. The 1996 IRP and the IRP Update contain details of the public participation.

Public involvement in Metropolitan's planning process continues and has been an integral part of the development of this UWMP report. In September 2004, Metropolitan kicked off the update of its Regional Urban Water Management Plan with a meeting at Metropolitan's headquarters. At that meeting an initial draft data set of demographics, total demands after conservation, local supplies, and demands on Metropolitan at the member agency and regional levels was distributed. In addition, Metropolitan staff held over 20 meetings with 14 different member agencies to review the initial draft data set. Based on these meetings, Metropolitan distributed a final draft data set to the member agencies in August 2005. Simultaneously, Metropolitan developed preliminary estimates of its existing and planned water sources in five-year increments under single and multiple year drought conditions as well as average year conditions as required under the Act.

These demand and supply estimates were included in the draft copy of the RUWMP distributed to the member agencies in May 2005. Following the distribution, member agencies hosted a series of six Metropolitan workshops to review and take comment on the draft report from member agencies and their subagencies. Metropolitan selected this number of workshops to keep the number of participants at each meeting low and to encourage an interactive review process. Table II-16 lists the workshops held.

Table II-16
Regional Urban Water Management Plan
Workshop Schedule

Date of Meeting	Member Agencies Attending
May 23	San Diego County Water Authority
May 25	Western MWD, Eastern MWD
June 6	Municipal Water District of Orange County, Santa Ana, Anaheim, Fullerton
June 7	Los Angeles Department of Water and Power, Beverly Hills, Burbank, Glendale, Pasadena, Santa Monica, San Fernando, Long Beach, Compton, Torrance
June 9	Three Valleys Municipal Water District, Inland Empire Utilities Agency, San Marino, Upper San Gabriel MWD, Foothill MWD
June 13	Las Virgenes MWD
June 2	West Basin and Central Basin

On August 24 2005, staff made a presentation on the soon-to-be-released final draft document to the Southern California Water Dialogue, encouraging members to comment on the draft and to attend and make comments at the public meeting. Through this group, outreach was attempted to over 400 individuals, affiliated with a broad and diverse set of agencies, consultants, environmental groups and other non-profit organizations. Participants represent organizations ranging from the Sierra Club, the Mono Lake Committee and The Nature Conservancy, to the Building Industry Association and the Southern California Water Committee, to agencies such as the Los Angeles Department of Water and Power, the San Diego County Water Authority, and the Mojave Water Agency. Over thirty people attended this meeting. A subsequent meeting was held with this group on September 28, 2005 to review and take comments and questions on the document.

The final draft was posted prominently on Metropolitan's website on September 12, 2005. In addition, notice of the availability of the document was sent to the member agencies as well as cities and counties in the Metropolitan service area. Appendix A.4 includes a copy of the letter sent to cities and counties in Metropolitan's service area notifying them of the meeting

Finally, Metropolitan held the publicly-noticed meeting required by the Urban Water Management Planning Act. Appendix A.4 also includes a copy of the Public Notice advertising the meeting that was included in Southern California newspapers on Monday, September 26 and Monday, October 3, 2005.

In summary, this Urban Water Management Plan involved a number of agencies and groups in its preparation:

Water Agencies assisted in plan development, received a copy of draft documents, commented on those documents, were invited to and attended the public meeting, and received notice of the intention to adopt.

Relevant Public Agencies such as cities and counties received notice that the document was available, were invited to comment on those documents, were invited to attend the public meeting, and received notice of the intention to adopt.

Other Groups such as the Southern California Water Dialogue, received a presentation on the draft, were invited to comment on those documents, were invited to attend the public meeting, and received notice of the intention to adopt. Through the Southern California Water Dialogue, outreach was attempted to over 400 individuals, affiliated with a very broad and diverse set of agencies, consultants, environmental groups and other non-profit organizations. Participants represent organizations ranging from the Sierra Club, the Mono Lake Committee and The Nature Conservancy, to the Building Industry Association and the Southern California Water Committee, to agencies such as the Los Angeles Department of Water and Power, the San Diego County Water Authority, and the Mojave Water Agency.

Website Posting: The final draft was posted prominently on Metropolitan's website on September 12, 2005.

III. IMPLEMENTING THE PLAN

The reliability evaluation conducted as part of the 1996 IRP revealed that without future investments in local and imported supplies, the region could experience a supply shortage of at least 0.79 million acre feet about 50 percent of the time (or once every other year) by 2020. Since that time Metropolitan, its member agencies, and other local agencies have worked to implement the goals identified in the IRP. The IRP Update demonstrated that these efforts have moved the region toward its goal of long-term regional water supply reliability.

Metropolitan has worked in many different areas to bring about this improved supply reliability. The major drivers have been:

- conservation
- water recycling and groundwater recovery
- storage and groundwater management programs within the Southern California region
- storage programs related to the State Water Project (SWP) and the Colorado River
- other water supply management programs outside of the region.

Many of these programs are already successfully implemented. Others, including institutional and facility changes in the Colorado River region and the SWP, will take more time to execute. Figure III-1 shows the expected ability to meet demands in future single dry years by water supply source. Table III-1 provides the details of the Metropolitan supplies to meet the regional demands. The following sections discuss each of these programs, distinguishing between successes to date and the programs that are still under way.

Figure III-1
Dry-Year Demand and Supplies

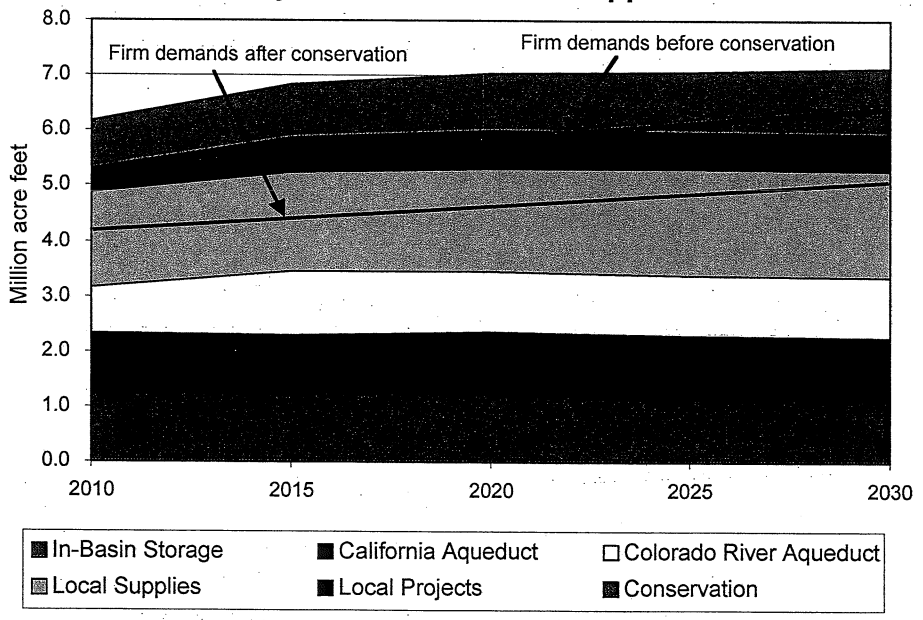


Table III-1
Single Dry-year Supply Capability[1] & Projected Demands
(Repeat of 1977 Hydrology)
(acre-feet per year)

	2010	2015	2020	2025	2030
Current Supplies					
In-Basin Storage	1,149,000	1,161,000	1,113,000	1,066,000	1,017,000
California Aqueduct[2]	777,000	777,000	777,000	777,000	777,000
Colorado River Aqueduct[3]	722,000	699,000	699,000	699,000	699,000
Supplies Under Development					
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
California Aqueduct	330,000	259,000	350,000	350,000	350,000
Colorado River Aqueduct	95,000	460,000	400,000	400,000	400,000
Transfers to Other Agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
Metropolitan Supply Capability	*3,151,000*	*3,424,000*	*3,407,000*	*3,360,000*	*3,311,000*
Metropolitan Supply Capability w/ CRA Maximum of 1.25 MAF[4]	***3,151,000***	***3,356,000***	***3,309,000***	***3,252,000***	***3,203,000***
Firm Demands on Metropolitan[5,6]	***2,348,000***	***2,234,000***	***2,275,000***	***2,388,000***	***2,511,000***
Potential Reserve & Replenishment Supplies	**803,000**	**1,122,000**	**1,034,000**	**864,000**	**692,000**

[1] Represents supply capability for resource programs under listed year type.

[3] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct

[2] Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct

[4] Maximum CRA deliveries limited to 1.25 MAF including SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.

[5] Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation, SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.

[6] Includes projected firm sales plus 70% of projected IAWP agricultural sales

III.1 Existing / Developed Local Supplies

Approximately 50 percent of the regional water supplies come from resources controlled or operated by local water agencies. These resources include water extracted from local groundwater basins, catchment of local surface water, and non-Metropolitan imported water supplied through the Los Angeles Aqueduct and the Colorado River Aqueduct.

Groundwater

The groundwater basins that underlie the region provide approximately 90 percent of the local water supply in Southern California. The major groundwater basins in the region provide an annual average supply of approximately 1.41 million acre-feet. Most of this water recharges naturally, but approximately 200 taf is replenished through imported supplies. By 2025, estimates show that groundwater production will increase to 1.44 million acre-feet.

Because the groundwater basins contain a large volume of stored water, it is possible to produce more than the natural recharge of 1.16 million acre feet and the replenishment amount for short periods of time. During a dry year, replenishment deliveries can be postponed, but doing so requires that the shortfall be restored in wet years. Similarly, in dry years the level of the groundwater basins can be drawn down, as long as the balance is restored to the natural recharge level by increasing replenishment in wet years. Thus, the groundwater basins can act as a water bank, allowing deposits in wet years and withdrawals in dry years.

Surface Water

In addition to the groundwater basins, local agencies maintain surface reservoir capacity to capture local runoff. The annual average yield captured from local watersheds is estimated to average approximately 100 taf per year. The majority of this supply comes from reservoirs within the service area of San Diego County Water Authority.

Los Angeles Aqueduct

Although the Los Angeles Aqueduct (LAA) imports water from outside the region, Metropolitan classifies water provided by the LAA as a local resource because it is developed and imported by a local agency (the Los Angeles Department of Water and Power). This resource is estimated to provide approximately 250 taf per year on average, which may be reduced to approximately 96 taf during a historical dry period.

IID/San Diego County Water Authority Transfer

The San Diego County Water Authority (SDCWA) has executed an agreement with the Imperial Irrigation District (IID) under which IID will transfer to SDCWA. The transfer began in 2003 with 10 taf made available to SDCWA in that year. The transfer volumes will increase in accordance with an annual build-up schedule, reaching 100 taf annually by 2013 and stabilizing at 200 taf annually in 2023. Currently, the water is being conserved through land fallowing arrangements made by IID with its customers. Beginning in 2013, IID will begin replacing land fallowing with irrigation efficiency measures that will allow farming operations

to continue with reduced amounts of applied water. By 2017 all of the transferred water should be made available through irrigation and distribution system efficiency measures. The water transferred by IID is made available by SDCWA to Metropolitan for diversion at Lake Havasu. Metropolitan provides a matching volume of water to SDCWA by exchange.

Coachella and All-American Canal Lining Projects

The Coachella Canal Lining Project consists of building a new 33-mile concrete-lined canal, including the construction of new siphons, to replace 34 miles of an existing earthen canal that currently results in water conveyance losses due to seepage. Project construction began in 2004 and is scheduled to be completed in January 2007. The project is expected to conserve 26 taf annually.

The All-American Canal Lining Project consists of replacing 23 miles of earthen canal with a concrete-lined canal constructed parallel to the existing canal. Construction is scheduled to begin in 2005 and end in the fall of 2008. This project is expected to conserve 67.7 taf annually.

Costs to construct these projects are to be advanced by the SDCWA and reimbursed with state funds. Pursuant to the QSA and related agreements, the total 93.7 taf of annual yield from these projects will be allocated as follows:

- 16 taf will be allocated to the San Luis Rey Settlement Parties in San Diego County to resolve a long-standing Indian water rights dispute;
- the remaining 77.7 taf will be allocated to SDCWA.

The conserved water will be made available at Lake Havasu for diversion by Metropolitan, and by exchange, Metropolitan will deliver the respective volumes of water to the San Luis Rey Settlement Parties and SDCWA.

Table III-2 provides an estimate of these supplies in average and dry years.

Table III-2
Local Supplies*
(Thousand Acre Feet)

	2010		2025		2030	
	Average Year	Dry Year	Average Year	Dry Year	Average Year	Dry Year
Local Groundwater						
From Natural Recharge	1,160.0	1,160.0	1,160.0	1,160.0	1,160.0	1,160.0
Replenishment	256.0	214.6	283.5	251.7	282.3	270.3
Local Runoff Stored	100.0	93.3	99.2	93.5	98.6	93.5
Los Angeles Aqueduct	252.5	95.5	253.2	95.3	253.6	95.3
IID/SDCWA Transfer	70.0	70.0	200.0	200.0	200.0	200.0
Coachella & All American Canal Lining	93.7	93.7	93.7	93.7	93.7	93.7
Total	1,932.2	1,727.1	2,089.6	1,894.2	2,088.2	1,912.8

* Does not include local projects such as groundwater recovery, recycling and desalination, which are discussed in Section III-3.

III.2 Conservation

Conservation is a core element of Metropolitan's long-term water management strategy. From 1992 through the end of FY 2004, Metropolitan has invested more than $213 million in conservation-related programs within the region.[1] Among other measures, this investment has resulted in the retrofit of more than 2.3 million toilets with ultra-low flow models (ULFTs) and the distribution of more than 93,000 high efficiency clothes washers (HECWs). Collectively, Metropolitan's conservation programs and other conservation in the region will reduce Southern California's reliance on imported water by more than 1 million acre-feet per year by 2025.

Metropolitan's conservation policies and practices are shaped largely by two factors: Metropolitan's IRP and the California Urban Water Conservation Council *Memorandum of Understanding Regarding Water Conservation in California* (Urban MOU). As a signatory to the Urban MOU, Metropolitan has pledged to make a good faith attempt to implement a prescribed set of urban water conservation Best Management Practices (BMPs). Many of Metropolitan's conservation programs exceed BMP requirements.

IRP Goals

Metropolitan's IRP places equal emphasis on local and imported resource development. The IRP treats conservation as a core local supply, on par with other resources such as water recycling and storage. As described in the IRP, conservation savings result from both "active" and "code-based" conservation efforts. "Active" conservation consists of water-agency funded programs such as rebates, installations, and education. "Code-based" conservation, formerly described as "passive" conservation, consists of demand reductions attributable to conservation-oriented plumbing codes and usage reductions resulting from increases in the price of water. Code-based conservation occurs without direct agency action targeted at conservation. Including regional pre-1990 conservation savings, Metropolitan's 2025 IRP total conservation target is approximately 1.1 million acre-feet per year. A large share of the target has already been achieved through existing Metropolitan and member agency programs, pre-1990 savings, price effects, and continued savings that accrue from plumbing codes. The remainder is expected to be achieved through additional agency-sponsored active conservation programs, plumbing code changes, and price effects.

Issues

Unlike traditional water supplies, conservation reduces water demand in ways that must be quantified indirectly. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures like ultra-low-flow toilets and showerheads. Quantifying and projecting conservation savings requires specially designed estimating models. Such models were used for both the 1996 IRP targets and IRP Update projections.

Conservation savings are commonly estimated from a base-year water-use profile. Metropolitan uses 1980 as the base year because the start of that year marked the effective date of a new plumbing code in California requiring toilets in new construction be rated at 3.5 gallons per flush or less. Between 1980 and 1990, the region saved an estimated 250,000 acre-feet per year as the

[1] Conservation achievements cited in this section are as of the end of FY 2004 unless otherwise noted.

result of this 1980 plumbing code and unrelated water rate increases. These savings are referred to as "pre-1990 savings." The 1996 IRP target combines pre-1990 savings and estimates of more recently achieved savings.

Distinguishing between active and code-based conservation can be analytically complex when, for example, active programs for fixtures are concurrent with conservation-related plumbing codes. This plan combines active and code-based conservation savings using methods that avoid double counting.

Metropolitan does not currently assign a savings value for public awareness campaigns and conservation education because any initial effect on demand reduction and the longevity of the effect are hard to measure. It is generally accepted that these programs prompt consumers to install water saving fixtures and, therefore, that they have a residual benefit of increasing the effectiveness of companion conservation programs.

Changed Conditions

Since the publication of the last Regional Urban Water Management Plan in 2000, two significant implementation successes are important to note. Both the achieved regional conservation savings and the member agencies' plans for increased local supply development have been greater than expected.

A more complete list of changes to the conservation projections in the IRP Update include the following changes in data and methods:

1. New demographic projections
2. New water savings estimates for high-efficiency fixtures
3. New projections of active conservation
4. Explicit handling of price-effect savings
5. Explicit differentiation between active and code-based savings.

The net effect of these changes is a higher projected level of conservation savings.

Implementation Approach

Metropolitan's implementation approach for achieving the revised conservation target includes support to member agencies in developing cost-effective BMP-oriented active conservation programs and in developing new, innovative programs that address regional water uses. Metropolitan's rate structure stewardship charge provides a funding mechanism for active programs. Metropolitan will continue to seek state and federal funding in coordination with the member agencies.

Implementation of Conservation "Best Management Practices"

These agency-sponsored programs are closely linked to the efforts of the California Urban Water Conservation Council (CUWCC)—the organization created to administer the Urban MOU. As a signatory to the CUWCC's Urban MOU, Metropolitan has pledged to make a good faith effort to

implement a prescribed set of urban water conservation BMPs. Metropolitan provides technical and financial support needed by member agencies in meeting the terms of the Urban MOU. Table III-3 provides a list of the BMPs and compares how they apply to Metropolitan, which is a water wholesaler, versus retail water agencies. Enclosed with this report are copies of the BMP reports Metropolitan has filed with the CUWCC.

In addition to implementing cost-effective BMPs, Metropolitan actively supports many program committee activities run by the CUWCC. For example, Metropolitan has historically provided staff time and financial resources in support of CUWCC's ongoing efforts to document and increase the effectiveness of BMP-related conservation efforts. Metropolitan staff members participate in several CUWCC governing committees. Metropolitan frequently supports CUWCC research studies. Presently, Metropolitan is represented on the following CUWCC committees:

- Steering Committee
- AB2717 Landscape Committee
- Commercial, Industrial, and Institutional Committee
- Residential Committee
- Landscape Committee
- Research and Evaluation Committee
- PBMP Subcommittee (Potential BMPs)

Table III-3
Urban Water Conservation Best Management Practices

BMP Number	BMP Description	Applies to Retailers	Applies to Wholesalers
1	Residential Water Surveys	Yes	No
2	Residential Plumbing Retrofits	Yes	No
3	System Water Audits, Leak Detection	Yes	Yes
4	Metering and Commodity Rates	Yes	No
5	Large Landscape Audits	Yes	No
6	High Efficiency Washing Machines	Yes	No
7	Public Information	Yes	Yes
8	School Education	Yes	Yes
9	Commercial, Industrial, & Institutional	Yes	No
10	Wholesale Agency Assistance	No	Yes
11	Conservation Pricing	Yes	Yes
12	Conservation Coordinator	Yes	Yes
13	Water Waste Prohibition	Yes	No
14	Residential ULFT Replacements	Yes	No

The following sections describe Metropolitan's conservation programs.

Conservation Credits Program

Metropolitan's Conservation Credits Program (CCP) provides the basis for financial incentives and funding for urban BMP and other demand management related activities. Established in 1988, this funding mechanism supports Metropolitan's commitment to conservation as a long-term water management strategy.

The basis of Metropolitan financial support to member agency conservation efforts is estimated as the lesser of $154 per acre-foot of water saved or one-half of the program cost. In general, CCP funded water conservation project proposals must:

- Have demonstrable water savings;
- Reduce water demands on Metropolitan's system; and
- Be technically sound and require Metropolitan's participation to make the project financially and economically feasible.

The Regional Supply Unit

Metropolitan staff is responsible for developing and administering Metropolitan's water conservation policies and programs. Approximately 10 people focus their efforts on water conservation issues. Staff members serve as the primary liaisons to Metropolitan's member agencies and other pertinent agencies and organizations.

Metropolitan's conservation programs focus on three main areas: residential indoor programs, landscape programs, and commercial, industrial and institutional programs.

Residential Programs

The residential conservation programs consist of ultra-low-flush toilets (ULFT), high efficiency clothes washers (HECW), and water-use efficiency surveys (Surveys). Metropolitan extended funding to include installing conserving devices that exceed standards in new development.

Ultra-Low-Flush Toilet (ULFT) Program

This program addresses BMP 14: conserving water by replacing older, high water using toilets (3.5 gallons-per-flush and greater) with 1.6 gallons per flush ULFTs. Metropolitan began co-funding member agency-managed ULFT programs in 1988, and to date, 25 of Metropolitan's 26 member agencies have conducted ULFT programs. This activity is the largest of Metropolitan's conservation programs. Metropolitan funds ULFT retrofit programs at $60 per ULFT installed. In August 2002, Metropolitan began funding dual-flush toilets at $80 per unit installed. These toilets exceed the current standard of 1.6 gallons per flush and, thus, have higher water savings than ULFTs.

ULFT programs are implemented through rebates or distributions. Rebate programs allow customers to purchase their choice of ULFT. Distribution programs provide ULFTs to customers at little or no charge. Rebates and vouchers typically range in value from $60 to $75, depending on the managing water agency's policy. In both the rebate and voucher programs, the customer is responsible for disposing of the old toilet.

Table III-4 shows the total cumulative savings from ULFT toilets, including all previous installations. In FY 2003-04, the estimated savings were 81 taf per year, translating into a lifetime savings exceeding 1.6 million af.

Table III-4
ULFT Installation and Savings History

Calendar Year	Annual Installs Number of ULFTs	Cumulative Installs Number of ULFTs	Accumulated ULFT Savings (Acre-Feet)	
			Annual Savings	Lifetime Savings
Pre-1999		1,310,354	45,556	911,116
1999	189,294	1,499,648	52,131	1,042,620
2000	197,214	1,696,862	58,968	1,179,360
2001	105,324	1,802,186	62,595	1,251,899
2002	258,403	2,060,589	71,515	1,430,298
2003	159,559	2,220,148	76,994	1,539,872
2004	130,180	2,350,328	81,491	1,629,820

High Efficiency Clothes Washer Rebate Program

The installation of high-efficiency clothes washers (HECWs) is a growing segment in water conservation. In September 1997, the California Urban Water Conservation Council adopted BMP 6 for HECWs, and it approved revisions in March 2004. The revisions contain two options for how to credit agencies. The first option is based on the washer's "water factor" (WF), which is a measure of the amount of water used to wash a standard load of laundry. Washers with lower water factors save more water. The first option awards 1 point for HECWs with water factors 9.5 through 8.6; 2 points for WF 8.5 through 6.1; and 3 points for WF 6 and less. It does not award points for HECWs with water factors greater than 9.5. The second method grants 1 point for all washers regardless of the water factor.

Metropolitan supported the passage of California legislation requiring all washers sold in the state to meet an 8.5 water factor standard by 2007 and a 6.0 water factor standard by 2010. Since these standards exceed federal standards, the California Energy Commission (CEC) is preparing a waiver request to submit to the U.S. Department of Energy (DOE) that will allow California to promulgate a standard that is more stringent than federal standards. Two or three years may elapse before DOE responds.

Regardless of the outcome of the waiver request to DOE, Metropolitan continues to promote HECWs. As of the end of FY 2004, Metropolitan has provided incentives to purchase over 93,000 washers. From 1995 through October 2004, Metropolitan offered a $35 per washer incentive. From 1999 to 2001, Metropolitan partnered with Southern California Edison, which added an additional incentive of $50-$100. In 2002, Metropolitan received a grant from CALFED for an additional $90 per HECW, which brought the total Metropolitan incentive to $125 per washer. During the span of this grant, participation in the program increased from an average of 4,000 units per year to 20,000 units per year. At the close of that grant Metropolitan provided a temporary increase in its own funding to $110 per HECW, and in 2004, it received a

Proposition 13 grant for the additional $75 per HECW, so the total incentive remained at $110 per washer. In November 2004, Metropolitan's increased its HECW base incentive to $60 for washers with minimum water savings of 9,000 gallons per year. Grant funds were exhausted by June 2005, and Metropolitan has provided bridge funding until supplemental funds from Proposition 50 are available.

New Development Program
Metropolitan recently adopted incentives for new developments to install highly efficient fixtures that exceed current water use efficiency standards. Other opportunities to promote the installation of water-efficient devices in new developments will be explored with manufacturers, the building industry, and stakeholders.

Residential outdoor audit program
Metropolitan funds a residential landscape efficiency program through outdoor audits and weather-based irrigation controller rebates. Landscape audits provide customers with a recommended irrigation schedule and suggested improvements for irrigation systems. Installation of weather-based irrigation controllers (WBICs) is supported through the coordinated rebate program described below

Residential Weather-Based Irrigation Controller (WBIC) Rebate
Weather-based irrigation controllers are a rapidly evolving conservation technology. It entails devices that adjust irrigation schedules based on rain, temperature, sunlight, soil moisture, or some combination of indicators. Metropolitan began funding WBIC incentives in homes after conducting a pilot study that evaluated potential savings and ease of use. The incentive is $65 per WBIC, plus $5.50 per station over 12 stations for residential sites

Non-Residential Landscape Water Use Efficiency Program

Metropolitan has funded large landscape audits since 1993, retrofit of landscapes with centralized irrigation controllers since 1998, and rebates for weather-based irrigation controllers (WBIC) since 2002.

In September 2004, Metropolitan began an updated large landscape program. The new program provides Metropolitan's member agencies with the flexibility to choose from three components that best fit specific landscape sites. The long-standing landscape training program – Professional Protector del Agua – supports the first two of these three components:

1. Water Use Accountability
2. Measured Water Savings
3. Commercial and Institutional WBIC rebates

1. Water Use Accountability. This program improves landscape water management practices through training and timely water use reports. Agencies provide landscape owners, managers, and maintenance personnel with reports that compare the actual site water use to water budgets. Each billing cycle, the agencies generate water use update reports. In addition, participants may receive landscape water management training either by Metropolitan or the agency. Metropolitan provides incentives to reimburse agencies for up to

50% of their program costs. Incentives are $2.50 per acre per month of irrigated landscape under management if Metropolitan provides the training, or $3.50 per acre per month if the agency provides the training.

2. Measured Water Savings: Metropolitan provides incentives to upgrade landscape irrigation equipment that can provide verified water savings. In addition, participants may receive landscape water management training. A dedicated landscape meter is required to participate in this pay-for-performance program component. Incentives are $115 per acre-foot of verified saving if Metropolitan provides the training, and $154 per acre-foot if the agency provides the training. The incentives continue to be paid for up to five years or one-half of the project cost.

3. Commercial and institutional WBIC Rebate: Metropolitan provides an incentive of $500 per acre of irrigated landscape for WBICs.

Professional Protector del Agua (PPDA)
Metropolitan provides classes on efficient landscape water management. Agencies can provide equivalent training via their own staff or program vendor to meet the program requirements. An agency needs to choose whether Metropolitan or the agency will be providing PPDA training or the equivalent at the outset of their program.

Southern California Heritage Landscape Program
In 2002, Metropolitan launched a public outreach campaign targeting outdoor water use. The campaign, coordinated with participating member agencies, included funding for the promotion of efficient residential watering through irrigation controllers, a watering index to assist in estimating efficient watering times, and a native and California-friendly plant program. Metropolitan expanded these programs in 2003 and 2004 with an extensive media and outreach campaign and launched a consumer-oriented outdoor conservation savings web site.

The landscape program is expected to reduce summer and fall outdoor water use. The actual savings rate will be measured, but will not be included in the IRP Update's resource goals. Quantifying the potential savings is complicated because of possible overlaps with other programs – some of the outdoor savings, when measured, may be confounded with price-induced savings unless the effort is preceded by a controlled evaluation study.

Commercial, Industrial and Institutional Programs

Prior to the establishment of the Commercial, Industrial, and Institutional (CII) rebate program in 1997, Metropolitan conducted approximately 900 (CII) water-use surveys. These surveys provided the initial information used to determine the menu of eligible rebates and their dollar amounts, as shown in Table III-5.

Table III-5
CII Rebates Offered

Device	Incentive Amount
ULFT (Gravity & Flush Valve)	$60
Dual-flush toilet	$80
Upgrade from ULFT to dual-flush	$20
Urinal	$60
Pre-Rinse Spray Valve	$50
HECW	$100
Water broom	$100
Cooling Tower Controller	$500
X-Ray Film Processor Recirculating System	$2,000

In 1999, Metropolitan partnered with its member agencies to pilot the feasibility of working with a regional vendor for program marketing, management, and paying of rebate checks. Based on the success of this pilot program, a vendor-administered regional program began in 2004. Member agencies wishing to manage their own commercial program remain eligible to receive the device incentives listed above.

Industrial Process Improvement Program

Metropolitan's Industrial Process Improvement (IPI) program provides incentives to industrial customers for improving the water efficiency of their processes. Metropolitan has offered incentives to industrial customers since 1997. Initially, the complexity of the program and the difficulty in sector marketing resulted in low participation rates. In 2004, Metropolitan conducted focus groups to gather ideas for improving the IPI program. The resulting improvements – that encourage water efficiency actions by individual operators within their facilities – include:

a) Partial payment of the conservation incentive up front
b) Streamlining the application process
c) Providing outside vendor services for technical advice
d) Eliminating limits on project size.

Additionally, Metropolitan has initiated partnering opportunities with local sanitation districts to help market the program.

Innovative Conservation Program

Metropolitan's Innovative Conservation Program (ICP) began in October 2001 with a request for proposals for new conservation technologies. The 2001 ICP identified two promising new technologies: X-ray film processing water recyclers and water brooms. These two technologies have been added to Metropolitan's existing programs. In 2003, Metropolitan issued a second ICP request for proposals that resulted in the following ICP grants:

- An evaluation of water savings potential of commercial connectionless food steamers;
- An evaluation of the effectiveness of water savings with instant hot water systems;
- An artificial lawn demonstration test project;
- A swimming pool cover rebate survey;
- Research on surfactants that optimize water usage in turf and ornamentals;
- A native- and drought-tolerant plant pilot incentive program;
- A study of the efficiency of closed loop irrigation controls;
- A study of water conservation opportunities in supermarkets;
- A flow control valve study; and
- Root scorch prevention of container-grown California native plants sold in the retail trade.

These projects are all in various stages of completion.

Price-Effect Conservation

Numerous demand studies have shown that retail water rates and rate structures can be effective in promoting water savings. Consumers respond to price increases by reducing discretionary water use and by installing water-conserving devices. As retail rates within the region increase, and as water agencies adopt conservation-oriented rate structures, Metropolitan expects discretionary household and commercial and industrial water use to decrease. This reduction was modeled and incorporated into the IRP Update as a source of conservation. Most of the savings are expected to come from reductions in outdoor irrigation, which is the major discretionary component of residential and commercial use.

Grant Programs

Additional funding for conservation programs has been made available through government agencies. Metropolitan has worked to obtain a share of this funding to enhance the region's water conservation investments. Table III-6 and the following summaries describe briefly the sources and uses of these funds.

Table III-6
Grant Program Funding

Funding Source	Program/Project	Funding Amount ($1,000s)	Description	Status
CALFED				
	Residential HECW	$925	Increase rebate amount	Completed
	Protector del Agua	$100	Course development	Completed
	CII	$34		
Prop 13 Grants				
	HECW	$2,500	Increase rebate amount	
	ET Controllers	$1,800	Initiate rebates	
CPUC (w/CUWCC)				
2003	Pre-Rinse Spray Valves: Phase 1	$1,600*	12,000 direct installations*	Completed
2004	Pre-Rinse Spray Valves: Phase 2	$2,200*	17,000 direct installations*	In progress
USBR				
2003	CA-Friendly Landscapes	$182	New home landscapes	
2003	Data Loggers	$50	Software error analysis	Deferred
2004	CA-Friendly Landscapes	$60	New home landscapes	
2004	Synthetic Turf pilot	$220		In progress
2004	World Forum	$50	College/university grants	In progress
2004	CII Regionwide	$250	Add $ to rebate amounts and for administration	Completed
2005	Protector del Agua	$50	Develop web classes	Pending
2005	Landscape Market Analysis	$50		Pending
2005	City Makeover	$50	Public landscapes	In progress
Water for the West				
	Protector del Agua	$25	Develop web classes	In progress
Prop 50				
	Residential HECW	$1,660	Increase rebate amount	Pending
	CA-Friendly Cities	$423	Public landscapes	Pending
	High Efficiency Toilets	$1,000		Pending
	Protector del Agua	$77.5	Develop on-line classes	Pending

* This amount is Metropolitan's share of the project.

CALFED

- Residential High Efficiency Clothes Washers funded at $925,000
- Protector del Agua funded at $100,000
- CII conservation ($34,000)

Proposition 13-Funded Grants

Proposition 13 (The Safe Drinking, Clean Water, Watershed Protection, and Flood Protection Act) provided funding for water conservation. Within Metropolitan's region, grant funds received in 2003 went toward the following programs:

- Residential High Efficiency Clothes Washer Rebate Program – $ 2.5 million – used to extend the rebate program for high-efficiency clothes washers for about a year at the rebate level of $110 per unit.
- Evapotranspiration (ET) Irrigation Controller Installation Rebate – $ 1.8 million – used to establish a new rebate program that will install 5,500 units and perform studies over a three-year period.

California Public Utilities Commission (CPUC) Grants

- In 2003, Metropolitan partnered with the California Urban Water Conservation Council to use CPUC grant funding to install 12,000 pre-rinse spray valves in restaurants within Metropolitan's service area. The effort is expected to result in savings approaching 14,000 acre-feet over the five-year life of the devices.
- In 2004, a Phase 2 project is funded at the $2.2 million level to install 17,000 valves.

U.S. Bureau of Reclamation Grants

The following projects received funding from USBR during 2003:

- California Friendly Landscape pilot for new homes using incentives to establish up to 10 acres of water- efficient landscaping – $ 182,000
- Evaluation of data loggers, devices that attach to a water meter to provide precise, unobtrusive water use information – $ 50,000
- Metropolitan facilitated grantees with funding. Funds were granted directly to applicants for four additional Innovative Conservation Programs – $ 250,000.

The following projects received funding from USBR in 2004:

- Increased California Friendly Landscape Pilot for new homes by $60,000
- Synthetic Turf Replacement Program funding to promote, install, and study artificial turf on municipal and other public lands – $220,000
- World Water Forum for an "innovative conservation and technology" grant program for college and university teams – $50,000.
- Regional administration and enhanced rebate amounts for Industrial Process Improvement Programs – $250,000.

The following projects were selected by USBR in 2005, but the funds have not yet been distributed:

- Protector del Agua. Development of web-based classes –$50,000.
- Landscape Market Analysis – $50,000.
- City Makeover. Funds for landscape conservation by public agencies – $50,000.

Water for the West

- Protector del Agua. Development of web-based classes –$50,000.

Proposition 50 Grant Funds

- Residential High Efficiency Clothes Washers. Provided funds to increase the rebate amount – $1.6 million.
- California Friendly Landscape Pilot for new homes by $423,000

- High Efficiency Toilets – $1 million.
- Protector del Agua. Development of on-line classes – $77,500.

Measurement and Evaluation

The Measurement and Evaluation effort has four primary functions:

- Providing a means to measure and evaluate the effectiveness of current and potential conservation programs.
- Developing reliable estimates of various conservation programs and assessing the relative benefits and costs of these interventions.
- Providing technical assistance and support to member agencies in the areas of research methods, statistics and program evaluation.
- Documenting the results and the effectiveness of Metropolitan-assisted conservation efforts.

Metropolitan's staff has served as technical advisors for a number of state and national studies involving the quantification and valuation of water savings.

Other Conservation-Related Activities at Metropolitan

Conservation activities are closely coordinated with Metropolitan's External Affairs Group. Table III-7 summarizes the major conservation-related activities of BMP 7 administered by External Affairs. Table III-8 shows Metropolitan's extensive commitment to BMP 8's conservation-related education programs.

Water System Operations Group

Metropolitan's Water System Operations Group works to fulfill BMP 3 (System Water Audits, Leak Detection, and Repair) and BMP 4 (Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections).

Leak Detection

Metropolitan has a variety of ongoing system-wide leak detection programs. Each week, a mathematical algorithm compares inflow with outflow for Metropolitan's entire system. Major control structures and hydroelectric plants are inspected weekly. Field crews patrol and visually inspect Metropolitan's pipelines daily for leaks. The 242-mile Colorado River Aqueduct is patrolled daily by both air and ground crews. All underground structures are checked every six months as part of a continuous preventive maintenance program.

Metering

As a wholesale water supplier, Metropolitan has no retail customers. However, the majority of inter-agency water service connections are metered. Any new water agency supplied by Metropolitan would likely be metered.

Other activities include:

- Re-evaluating the $154 value provided by the conservation credit program in light of up-to-date supply costs.
- Creating a 5-year strategy document regarding agency financing, including rates.

- Tightening annexation policies to ensure greater compliance with the initiation of water efficiency measures in newly annexed areas.
- Annual SB60 reporting
- Launching the bewaterwise.com website
- Maintaining 9 CIMIS stations
- Conducting a customer attitude survey in 2003
- Developing new incentives for HETs, waterless urinals, and differential incentives for higher Water Factor HECWs
- Completing the Orange County Saturation study in 2002.

Metropolitan charges a fixed unit price per acre-foot for water service to its member agencies. For increases in supplies, Metropolitan's rates include a second tier that is set at the cost of new supply sources, so it is higher than the first tier. The purpose of this second tier is to encourage competition at market rates among alternative water sources, such as water transfers, recycling and desalination. This commodity-based revenue structure complies with BMP 11.

Achievements to Date

Conservation is an integral part of water supply planning and operations at Metropolitan. The Regional Supply Unit works to improve the understanding of the costs and benefits of conservation so investment decisions are both efficient and effective at meeting program goals. As a cooperative member of California's water conservation community, Metropolitan has made significant contributions to the development and coordination of conservation activities throughout the state. These contributions have been recognized in the form of "Gold Star" certification from the Association of California Water Agencies and awards from the United States Bureau of Reclamation and California Municipal Utilities Association.

Table III-9 summarizes Conservation Credits Program savings and payments. Table III-11 summarizes activities Metropolitan implemented in its service area in the past decade (as of the end of FY 2004) and shows the achievements the region has made in implementing these programs. Table III-12 shows the most recent conservation projections by category without future active conservation programs—the total conservation achievement picture based on all activities to date.

Summary

Conservation continues to be an important part of Metropolitan's water supply planning. Continued investment in cost-effective conservation is a key goal in the IRP process, and its importance has increased in the IRP Update.

Table III-7
External Affairs Group
Conservation-Related Activities

Program or Activity	Description
Speaker's Bureau	Provides speakers for organizations, service clubs, churches, business and other community groups and associations. An estimated 15,000 – 20,000 people attend these presentations annually.
Community Relations	Organizes and conducts an average of 80 Board of Director-sponsored inspection trips of Metropolitan's distribution system per year for elected officials, community leaders and members of the public. Approximately 3,000 people learn about Metropolitan's conservation and water management policies and practices each year through these trips. Additionally, Metropolitan's education curriculum and program activities engage an average of 150,000 students per year.
Media and Publications	Conducts editorial briefings and media field trips; assembles press packets; prepares and disseminates news releases, speeches, videos, fact sheets, brochures, articles and editorials describing Metropolitan's water management objectives and programs.
Government Relations	Provides elected officials, public agencies, businesses and organizations with information about Metropolitan's water management objectives and programs.

Table III-8
School Education Programs

Program or Activity	Date Initiated	Date Updated	Current Status	Grades	Description
Admiral Splash	1983	2001	Ongoing	Grade 4	A two-week program focusing on Southern California history, the water cycle, supply and the distribution system, water uses and conservation.
All About Water	1991	1998	Ongoing	K-3	Activities to teach young students about droughts, conservation, water quality and physical properties of water.
Geography of Water	1993	1998	Ongoing	Grades 4-8	A curriculum module on the relationship between population, precipitation, geography, economics, and water distribution.
Water Politics	1994	2004	Ongoing	Grades 9-12	A case study-based exploration of water supply issues facing Southern California, the Colorado River Basin, and the Middle East.
Water Ways	1995	2001	Ongoing	Grade 5	A supplement integrated into fifth-grade U.S. History featuring activities regarding water use, sources, ethics, and environment issues selected from three historical periods. This includes historical attitudes towards the stewardship of water.
Water Quality	2001	-	Ongoing	Grades 7-12	Hands-on activities to investigate water quality issues, with conservation as an element of the overall picture.
Water Works	2001	-	Ongoing	Grades 7-12	A school to career, job specific program featuring activities and profiles on a variety of water-related careers, including conservation specialist.
Water Times	2005	-	Ongoing	Grade 6	An age-appropriate newspaper that provides interdisciplinary concepts, tools, and calculations related to water conservation, and that conveys an overall ethic of water stewardship.

Table III-9
Conservation Credits Program

	Residential	Landscape	Commercial	Total
Water Savings* (AF)				
FY 2004/05	95,700	2,550	14,050	112,300
FY 2003/04	90,300	2,700	9,250	102,250
FY 2002/03	84,816	2,525	4,789	92,130
Since Inception (1990)	759,894	27,065	40,185	827,145
Payments ($ millions)				
FY 2004/05	8.6	0.2	1.9	10.7
FY 2003/04	12.5	0.4	3.8	16.7
FY 2002/03	12.1	0.1	2.7	14.9
Since Inception (1990)	162.3	2.2	12.2	176.7

* Includes code-based conservation originated as active.

Note: Program expenditure decreased in FY 2004/05 primarily due to saturation of residential ultra-low flush toilets and reduction in commercial high-efficiency clothes washer incentives.

Table III-10
Conservation Achievements In Metropolitan's Service Area

BMP Number	BMP Name	Metropolitan Program Description	Device/Activity Description	Number Implemented	Metropolitan Expenditures
1	Residential Water Surveys	Financial support for surveys, retrofits,	Surveys	69,901	$1,960,538
			Toilet devices distributed	1,132,765	$1,311,740
			Residential R&D (projects)	8	$299,799
2	Residential Plumbing Retrofits	Financial support for retrofits and Distributions	Low Flow Showerheads distributed	2,968,576	$12,413,187
			Faucet aerators distributed	225,239	$224,073
6	High Efficiency Washing Machines	Financial support for rebates	Residential High Efficiency washers rebated	93,062	$6,022,786
14	Residential ULFT Replacement	Financial incentives for toilet retrofits	Some agencies are reaching saturation	2,134,839	$133,501,638
		Residential Sector Total		6,624,390	$155,733,761
5	Large Landscape	Financial support for retrofit surveys	Audits conducted	2,173	$845,035
			Central controller	7	$703,175
			Protector del Agua graduates	30,747	$1,935,205
			Landscape R&D (projects)	11	$473,868
		Large Landscape Sector Total		32,938	$3,957,283
9	Commercial, Industrial, Institutional	Financial support for retrofit surveys, workshops and research & development	ULFT	58,511	$3,777,731
			Urinals	2,146	$168,587
			Flush Valve kits	755	$18,723
			Cooling Tower retrofits	640	$311,615
			Clothes Washer rebates	19,705	$4,258,134
			Industrial Process Improvements	3	$172,157
			Pre-Rinse spray valves	12,675	$842,623
			Other device rebates	1,704	$429,576
			Workshops on commercial retrofits	7	$7,000
			CII R&D (projects)	11	$336,403

Table III-10 (contd.)
Conservation Achievements In Metropolitan's Service Area

BMP Number	BMP Name	Metropolitan Program Description	Device/Activity Description	Number Implemented	Metropolitan Expenditures
CII Sector Total				96,157	$10,322,549
3	System Water Audits, Leak Detection	Distribution system audits/leak detection	MWD surveys own pipes & aqueducts		$3,850,000
4	Metering and Commodity Rates	All connections metered	Yes		
7	Public Information	Materials & programs provided	Launched multi-media regional message	0	$15,344,641
8	School Education	Full range of school curricula		0	$8,990,293
10	Wholesale Agency Assistance	Technical and financial support for BMPs 1, 2, 5, 6, 7, 8, 9, 11, and 14	Regional water efficiency media campaign, some programs managed for MWD's service area		
11	Conservation Pricing	Commodity rate structure in place			
12	Conservation Coordination	Staff of 10 people		0	$13,282,690
13	Water Waste Prohibition	Exempt		0	$0
	Various	Programs no longer offered		1,719	$1,569,070
Miscellaneous Programs Total				1,719	$43,036,694
Cumulative Total Spent by Metropolitan Water District through FY 2004:					**$213,050,287**

Table III-11
2005 UWMP Final Forecast
Total Conservation - All Sources Plus IRP Target

	2005	2010	2015	2020	2025	2030
Existing Active (through 2004)*, Code-based, Price-Effect, and Remaining IRP Target	486,000	615,000	705,000	778,000	857,000	938,000
Pre-1990	250,000	250,000	250,000	250,000	250,000	250,000
Total	736,000	865,000	955,000	1,028,000	1,107,000	1,188,000

* Includes code-based savings originated through an active implementation program

III.3 RECYCLING, GROUNDWATER RECOVERY, AND DESALINATION

IRP Goals

With the adoption of the 1996 IRP, Metropolitan's members and Board set resource goals for Metropolitan to achieve during the next 25 years to meet its supply reliability and water quality objectives in a cost-effective manner. These goals call for strong reliance on local water management options, including conservation and increased use of local resources.

Metropolitan's projection of the regional implementation of direct-use recycling, groundwater recovery, and seawater desalination exceed the 1996 IRP goals. In 2004, Metropolitan's board adopted an IRP Update that includes a target of 150,000 acre-feet per year for seawater desalination projects to meet future demands.

The 1996 IRP set a year 2020 production target for combined water recycling and groundwater recovery elements totaling 500 taf per year. Of that amount, about 251 taf per year (FY 2002) are currently being produced: 209 taf per year from recycling and 43 taf per year from groundwater recovery. The IRP Update set a year 2025 target production for combined water recycling, groundwater recovery, and seawater desalination elements totaling 750 taf per year, including an increase of 250 taf as a supply buffer. Table III-12 shows the IRP goals for these water supplies.

Table III-12
Target Range for Water Supplies from Recycling and Groundwater Recovery

Year	Delivery Goals (taf)
2005	355
2010	410
2020	500-750
2025	500-750

Water recycling has proven to be an effective drought-proof supply, and it helps local agencies comply with environmental regulations. Currently, more than half of the water recycling in California occurs in Metropolitan's service area. In addition, local agencies have implemented several projects to recover contaminated or degraded groundwater for potable uses that help meet the region's current or future water demand. The groundwater recovery projects use a variety of treatment technologies to remove undesirable constituents such as nitrates, VOCs, perchlorate, color and salt. The increases in groundwater production in some cases require additional artificial replenishment and may not be sustainable on an annual basis. Desalination of brackish groundwater and other local supplies is also an important element in the continued supply reliability of the region.

Issues

Meetings with member agencies related to the previous Urban Water Management Plan and the IRP Update highlighted an important issue: a significant amount of future recycling has been dedicated to groundwater replenishment and seawater barriers (non-consumptive or non-direct use) rather than for direct use to offset potable demand (urban or agricultural), which was Metropolitan's expectation when it developed its 1996 IRP recycling target. Thus, supply analyses must properly identify potable and non-potable uses of water.

A. Recycling

Local water recycling projects involve collecting wastewater that is currently discharged within the service area, treating that water to a suitable standard for specific uses, and using that recycled water for non-potable uses. This section provides a description of the water sources that potentially could be used for recycled water.

Wastewater Disposal in the Service Area

As part of regional planning that encourages the collection and use of recycled water, a database has been developed to catalogue the name of each wastewater treatment facility, operating agency, location and elevation of the facility, extent of wastewater treatment, capacity and anticipated production, method of effluent disposal, and influent and effluent water qualities. As shown in Table III-13, this database identifies 89 wastewater treatment plants within Metropolitan's service area.

Wastewater treatment capacity provides an indication of the amount of wastewater being generated and disposed of within Metropolitan's service area. Most wastewater plants in the service area provide secondary treatment using activated sludge, a level of treatment that complies with the Clean Water Act. Inland wastewater plants generally provide treatment to tertiary levels so the effluent may be disposed of in a stream or other water body or for beneficial reuse. A small percentage of tertiary treated effluent undergoes reverse osmosis or electrodialysis reversal processes, producing high-quality recycled water for groundwater recharge, industrial uses, or, in some instances, municipal uses.

Within Metropolitan's service area, many local agencies collect and treat municipal wastewater. Some of the largest agencies include:

- Los Angeles County Sanitation Districts
- Orange County Sanitation District
- City of Los Angeles Bureau of Sanitation
- San Diego Metropolitan Wastewater Department
- Eastern Municipal Water District
- Inland Empire Utilities Agency

Table III-13
Existing and Projected Total Effluent Capacity
Wastewater Treatment Plants within Metropolitan's Service Area

Treatment Level	Existing Capacity (MGD)	2010 Capacity (MGD)	2040 Capacity (MGD)
Primary	2,120	2,668	3139
Secondary	1,546	2,232	2708
Tertiary	607	1,080	1464
Advanced	34	184	229

This data was compiled as part of the South California Comprehensive Water Reclamation and Reuse Study and is included in the Phase IB Summary Report – December 1998.

Many small special-purpose wastewater agencies, dual-purpose (water and wastewater) special districts, and municipal wastewater agencies also operate within Metropolitan's service area.

As a rule, wastewater is collected in a sewer collection system. From there, it flows by gravity to a centrally located treatment plant. Once treated, wastewater is disposed of through one of three mechanisms:

1. Ocean Outfalls – Treated wastewater is either disposed of directly through an ocean outfall or conveyed to the ocean outfall via a land pipeline.

2. Reuse – About 209 taf per year goes to irrigation, industrial processes, and groundwater recharge applications. A few inland treatment plants (in Riverside and San Bernardino counties) irrigate feed and fodder crops with recycled water. While this use is considered beneficial, it is not necessarily the highest and best use for recycled water. Higher value uses, however, will require more developed markets.

3. Live Stream Discharge – A number of inland plants pump treated effluent into local streams and rivers. That water is then used downstream for beneficial uses, or it flows into the ocean. Some of the affected rivers (or ephemeral streams) include:

    - Los Angeles River
    - Santa Ana River
    - Calleguas Creek
    - Rio Hondo & San Gabriel Rivers
    - Santa Margarita River

Regional Planning for Optimal Recycling

In the 1990s, the United States Bureau of Reclamation, in conjunction with Metropolitan, the California Department of Water Resources, and six other Southern California water agencies, studied the feasibility of regional water reclamation projects in Southern California.[1] This study

[1] This was the Southern California Comprehensive Wastewater Recycling and Reclamation Project (SCCWRRS).

identified 34 potential regional projects within Metropolitan's service area with an estimated yield of 450 taf per year. Metropolitan and its member agencies continue to explore these and other projects and develop updated plans on a regular basis.

Uses of Recycled Water

Currently, there are about 355 taf per year of planned and permitted uses of recycled water throughout Metropolitan's service area. These uses include landscape irrigation, commercial and industrial use, seawater intrusion barriers, and groundwater recharge applications. Approximately 480 taf per year of new recycled water could be developed in Metropolitan's service area by the year 2025, and an additional 130 taf per year could be developed by the year 2050, for a total of 610 taf per year. A number of these projects are currently being implemented and will go on-line within the next five years. Other projects are in various stages of planning, and their development will depend on cost, financing, regulatory actions, and water supply demands.

Groundwater Recharge

Metropolitan's service area overlies numerous groundwater basins, many of which are overdrafted, and some of which are threatened by seawater intrusion. Water agencies along the Los Angeles and Orange county coastline inject water into the underlying groundwater basins to create a barrier against this seawater. A limited amount of the injected water originates as captured storm water, but the major part is recycled, imported, or extracted from deep wells. Increasing the proportion of recycled water can free imported water for direct consumption. Currently, approximately 60 taf per year of recycled water is "permitted" for recharge and seawater barrier injection into the Orange County, Central and West Coast groundwater basins.

About 30 percent of the recycled water in Metropolitan's service area is used for groundwater replenishment and seawater barriers. Table III-14 presents a summary of this recycled water use.

Table III-14
Existing Groundwater Replenishment and Seawater Barrier Injection Projects Using Recycled Water
(af per year)

Project	Recycled Water Use
OCWD Water Factory 21	2,700
West Coast Barrier[1]	7,500
Central Basin Spreading	45,000
Alamitos Barrier	3,000
Total	58,200

1 An additional 5,000 af per year of recycled water is expected to be permitted in 2006.

On average, these and other seawater barriers recharge approximately 50 taf per year with imported water or water from extraction wells. Within the next decade, projections show that 90 percent of the water used for seawater barriers will be supplied by recycled water treated with microfiltration followed by reverse osmosis, freeing other water for direct consumption.

Large-scale groundwater replenishment projects require case-by-case review by the California Department of Health Services (CDHS). The greater the percentage of recycled water used for replenishment, the more stringent the CDHS requirements.

Typically, groundwater recharge projects are linked with the construction of new wells to increase basin yield and offset demand for imported water. This conjunctive use element of groundwater recharge projects adds the cost of groundwater extraction facilities and energy to the project's total cost. New wells cost between $500,000 and $1 million.

One potential concern related to the use of recycled water for groundwater recharge could be adverse impacts to groundwater quality from organic contaminants, metals, and salts. CDHS has proposed regulations for recharge with recycled water into an aquifer used as a domestic supply source. The proposed regulations limit the amount of recycled water that can be recharged to a maximum of 20 percent blend at the nearest production well without treatment, and treatment technologies are prohibitively expensive. Despite these regulations, a large market exists for the use of recycled water, but realizing a significant demand for recycled water will require modifying regulations based on future studies of the health effects of recycled water.

Industrial

Industrial users represent a large potential market for recycled water, particularly in heavily industrialized areas, such as the cities of Vernon, Commerce, Industry and the Wilmington area of Los Angeles. Additionally, refineries in El Segundo in West Basin MWD's service area and in the City of Torrance use approximately 8 taf per year of recycled water. Typical industrial uses include cooling tower makeup water, boiler feed water, paper manufacturing, carpet dying, and process water. Industrial users are high-demand, continuous-flow customers, which allows greater operational flexibility by allowing plants to base load operations rather than contend with seasonal and diurnal flow variations. Because of these operational benefits, industrial users reduce the need for storage and other peak demand facilities and management.

Irrigation

Currently, about 86 taf per year of recycled water is used to irrigate golf courses, parks, schoolyards, cemeteries and greenbelts throughout Southern California. Using recycled water for irrigation reduces the need for imported water during the critical summer months and in drought situations when water supplies are most scarce.

Technical and Economic Issues of Recycled Water

The use of recycled water is growing rapidly in Metropolitan's service area. Further expanding its use will depend on progress in research, regulatory change, public acceptance, and financing of local projects.

Metropolitan supports:

- Increasing water recycling in California and the Colorado River Basin;
- Advocating funding assistance by parties that benefit both directly and indirectly from the use of recycled water;
- Expanding recycled water uses;

- Reviewing recycled water regulations to ensure streamlined administration, public health and environmental protection;
- Planning efforts and voluntary cooperative partnerships at the local and statewide levels;
- Conducting research and studies to address public acceptance, new technologies and health effects assessments.

Funding - Capital risk is a significant constraint to increased recycled water project development. Recycled water systems are separate from the potable system, so projects require significant capital investments in treatment and distribution. Variability in demand for recycled water lengthens the time needed to develop markets fully, which can affect project economics by increasing unit costs during early years of operation. Uncertainty of market demands creates a risk to the cost recovery required for the repayment of capital debt.

Estimates show the need for $2.6 billion in capital improvements for near-term projects to develop 450 taf per year of recycled water from future projects. This funding could come from many sources, including water agencies, wastewater agencies, and federal and state funding programs. However, the large capital risk may deter agencies from undertaking these projects.

Metropolitan developed the Local Projects Program (LPP) and subsequently the Local Resources Program (LRP) to assist member agencies in overcoming this obstacle. In its role as the regional water supplier, Metropolitan provides financial assistance to participating projects that offer regional benefits to offset regional supply shortages.

In addition to the LPP and LRP, many water agencies partner with wastewater agencies to provide needed financial resources. The San Diego County Water Authority's Reclaimed Water Development Fund assists local agencies in developing recycling projects in San Diego County. Wastewater agencies understand that beneficial reuse may be a cost-effective alternative to regulatory and disposal issues. Implementing a reuse program can defer or eliminate the need for ocean outfall expansions and extensions. Also, a recent trend by the regulatory community to require zero discharge during certain periods encourages wastewater agencies to consider water reuse as a supply option. Project partnerships between water supply and wastewater treatment agencies have led to projects in which both entities contribute financial resources and share multiple benefits.

The Bureau of Reclamation's Title XVI program represents another major funding source. Title XVI was authorized by Congress in 1992, and approximately $232 million has been appropriated to projects in Metropolitan's service area.

Proposition 204 (1996 bond measure) provided $60 million for water recycling loans. Proposition 13, approved by voters in 2000, has supplemented Proposition 204 funds with $40 million in grants and low interest loans. Proposition 13 funding also provided $235 million to the Santa Ana Watershed Project Authority, a portion of which will likely be used to fund recycled water projects. Proposition 50, passed in 2002, includes funding for the development of local projects including water recycling, and it is expected to be an important source of funding for local projects.

In the recent Framework For Action, CALFED staff recommended that state and federal governments spend up to $2 billion over the next seven years on water use efficiency projects, including water conservation and recycling.

Regulatory Issues

Two state agencies are involved in regulating water recycling projects. The Regional Water Quality Control Board (RWQCB) is the permitting authority, and the California Department of Health Services (CDHS) oversees health concerns and standards. Combining water quality concerns and health effects requires meeting stringent goals and standards. Title 22 of the California Administrative Code provides specific guidelines for treatment levels and corresponding reuse opportunities. However, there are no uniform criteria for groundwater recharge applications. Currently, state regulatory agencies review and determine requirements for recharge projects on a case-by-case basis. In many instances, CDHS is required to make interpretations regarding Title 22.

Institutional Issues

Multiple local agencies are often involved in proposed water recycling projects. For example, recycled water from a single wastewater source may be used by a number of recycled water distributors, or the recycled water may be treated and delivered by an agency in one service area and used in another. Also, an agency responsible for wastewater collection and treatment may wish to deliver recycled water within a water district's service area. Projects that involve groundwater recharge require close coordination with groundwater managers. In most instances, these projects require a committed agency that is willing to negotiate with other affected agencies to develop water recycling.

Water Quality

Water quality requirements for various types of irrigation and industrial uses are critical when evaluating whether recycled water will be an acceptable supply. Possible constituents in recycled water, such as TDS, chloride, pH, or ammonia, may cause problems for specific applications.

Seasonal Storage

Production of wastewater at a water reclamation plant is relatively uniform year round since indoor residential use does not vary much from winter to summer. Flows may be somewhat higher in the winter at the wastewater reclamation plant from stormwater inflow into the sewers, but more than 60 percent of irrigation demand on recycled water (parks, golf courses, etc.) is in summer (May through September). Therefore, some recycled water projects store surplus production of recycled water in the winter for later use during the dry summer months to optimize recycling. Agencies such as Las Virgenes Municipal Water District and Irvine Ranch Water District have undertaken extensive engineering and operational studies to manage their seasonal supply variations. Operational storage is also needed because regulations only allow watering at night to reduce opportunities for direct public contact.

Brine Disposal

Brine disposal is a critical issue facing Southern California in the further development of recycled water projects. Metropolitan and the U.S. Bureau of Reclamation conducted a Salinity Management Study that identified the need for approximately $200 million in additional brine sewer lines to export salts from the watersheds to the ocean. The study recommended that these

brine lines be built to maintain the long-term salt balance of the groundwater basins and to maintain the quality of the recycled water supplies at water reclamation plants. The Southern California Salinity Coalition, a coalition of water and wastewater agencies, has advocated for state and federal financial assistance to build these regional brine lines.

Public Acceptance

Public education programs are an integral part of recycled water project implementation. Recycled water users and the general public need to be educated on recycled water benefits, and they need to be reassured of the safety of recycled water. To encourage public acceptance, Metropolitan supports a continuous review of recycled water use regulations to ensure streamlined administration, public health, environmental protection, and research efforts that address public acceptance, new technologies, and health effects assessments.

B. Groundwater Recovery

All Southern California groundwater basins experience varying degrees of water quality challenges as a result of urban and agricultural uses. The accumulation of high-salinity water and degradation from volatile organics are two common constraints to the economic use of groundwater for urban applications. In some cases, the threat of increased salt buildup can also complicate the conjunctive use of groundwater basins and imported supplies.

In limited instances, recovering degraded groundwater costs less than purchasing imported water from Metropolitan. As a result, these projects have moved forward on their own because they make economic sense. In many cases, particularly where total dissolved solids are the constituent of concern, more expensive membrane processes are required, and agencies are more reluctant to make the capital investments necessary to recover the degraded water. In those cases, agencies typically seek financial assistance to offset costs to the extent that recovering degraded water has a regional benefit.

Use of degraded groundwater normally requires high levels of treatment. Once treated, however, recovered groundwater may be delivered to potable water systems. Membrane processes used to recover the majority of severely degraded water have a high capital cost and incur a high operational cost for power.

All processes that recover degraded groundwater also produce concentrated waste flows for which disposal can be problematic. Most importantly, membrane processes produce significant volumes of brine – about 15 percent of the treated water – that require disposal to an ocean outfall or sanitary sewer. Since discharge to sewers only exacerbates the salinity problems that challenge downstream water recycling projects, brine disposal requires expensive ocean outfalls.

Lastly, most of the groundwater basins in Southern California are regulated by basin managers. Where the safe yield of a groundwater basin is at its maximum, these regulations might require that recovered groundwater projects include replenishment with supplemental water.

Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes. Under the GRP, Metropolitan provided financial assistance of up to $250 per acre-foot to local agencies for the construction and operation of project facilities used to recover degraded groundwater that will

cost the implementing agency more than purchasing that water supply from Metropolitan. The GRP was open to all technologies that recovered and used degraded groundwater. It was retired in 1998 with the initiation of the Competitive Local Resources Program, which includes both recycled water and groundwater recovery projects.

C. Seawater Desalination

Until recently, seawater desalination has been considered uneconomical to be included in the region's water supply mix. However, recent breakthroughs in membrane technology and plant siting strategies have helped reduce desalination costs, warranting consideration among alternative resource options outlined in Metropolitan's IRP Update. The IRP Update includes a target of 750 taf per year of local water production by 2025 that could include up to 150 taf per year of seawater desalination.

As a first step to implementing this plan, Metropolitan issued a competitive request for proposals targeting 50 taf per year of desalinated seawater. Metropolitan would provide financial assistance of up to $250 per acre-foot of desalinated seawater developed and used within Metropolitan's service area for up to 25 years. Five member agencies submitted proposals for about 142 taf per year of desalinated seawater, including San Diego County Water Authority, Long Beach Water Department, Los Angeles Department of Water and Power, West Basin Municipal Water District, and the Municipal Water District of Orange County, which are expected to come on line by 2010.

However, the implementation of large-scale seawater desalination plants faces considerable challenges. These challenges include high capital and operation costs for power and membrane replacement, availability of funding measures and grants, addressing of environmental issues, and addressing the requirements of permitting agencies, such as the Coastal Commission. These issues require additional research and investigation. Metropolitan is providing $250,000 to five member agencies to conduct research in various aspects of seawater desalination. They are reviewing and assessing treatment technologies, pretreatment alternatives, and brine disposal issues, and they are identifying and evaluating resource issues such as permitting, environmental review and the regulatory approvals associated with the delivery of desalinated seawater to regional and local distribution system.

Metropolitan is also assisting its member agencies in the joint development of legislative strategies to seek funding in the form of grants and/or loans, and to inform decision-makers of the role of seawater desalination in the region's future water supplies. Metropolitan is also monitoring the strategies and outcomes of other programs (such as that in Tampa Bay, Florida) to gain insights into seawater desalination implementation and cost issues.

Changed Conditions

The status of locally planned recycling and groundwater recovery projects changes from year to year. Metropolitan periodically surveys its member agencies for planned projects to coordinate local supply projections and plans. Changes in long-term strategies, regulations, funding priorities, and new opportunities contribute to changing outcomes. In fact, this dynamic nature of local supply plans accounts for much of the change between the 1996 IRP and the Update.

Other changes since the 1996 IRP include the following:

- Decreases in the estimated cost of seawater desalination;
- Faster than expected development of groundwater recovery supplies;
- Decrease in potable supply offset by recycled water due to higher than projected local recycling production dedicated to non-direct uses, such as groundwater replenishment and seawater barriers.

Implementation Approach

The IRP Preferred Resource Mix provides Metropolitan with a strategy to meet future water supply reliability needs. Developing locally owned water recycling, groundwater recovery, and seawater desalination projects allows Metropolitan to reduce its capital improvements and its O&M costs for water importation, treatment, and distribution. Metropolitan schedules its financial assistance for these types of projects to conform to expanding regional needs for imported water.

Since 1982, Metropolitan has implemented several programs to provide financial assistance to its member agencies and subagencies for developing local water supplies. Metropolitan's incentive programs are based on a pay-for-performance principle, with incentive payments provided on a contractual basis for yield developed by local agencies and applied to beneficial uses. These incentive programs have been instrumental in helping the region implement the 1996 IRP local resource targets. Since the inception of the program, Metropolitan has invested more than $165 million and partnered with member agencies on 54 recycling projects and 20 groundwater recovery projects. Member and retail agencies have also funded a significant number of local projects without Metropolitan funding, many of which pre-date Metropolitan's incentive programs.

Metropolitan's Incentive Programs

Local Projects Program

Metropolitan implemented the LPP in 1982 to assist with the development of recycled water supply projects. At that time, the Board recognized that water recycling generally costs more than buying imported water from Metropolitan. Since then, the LPP was modified to continue the development of water recycling projects in Southern California. The basic purpose of the LPP was to provide financial support to local agencies developing recycled water projects that cost more than Metropolitan's imported supplies, thus reducing the demand for imported water and improving regional water supply reliability.

Between 1986 and 1990, the LPP contribution for a project was a minimum of $75 per af of production, which roughly equaled Metropolitan's avoided energy cost for pumping an equivalent amount of water through the State Water Project. In April 1990, Metropolitan's Board modified the LPP contribution to $154 per af. In August of 1995, Metropolitan's Board adopted the Local Resources Program (LRP) Conversion and revised the contribution scheme for existing LPP projects. The contribution for a project ranged from $0 to a maximum of $250 per af, based on the difference between the project's unit cost and Metropolitan's treated water rate. Existing participants in the LPP had a choice of remaining at the flat rate of $154 per af or converting to the revised contribution methodology. LPP and Local Resources Program Conversion were retired in 1998 with the initiation of the Competitive Local Resources Program.

Groundwater Recovery Program

Following on the success of its LPP, which included two projects to recover degraded groundwater, Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes.

The GRP supported member agency efforts to improve regional water supply reliability through conjunctive use and the development of additional local sources of supply. Similar to the LPP, Metropolitan provided financial assistance to local agencies for the construction and operation of project facilities used to recover degraded groundwater that will cost the implementing agency more than purchasing that water supply from Metropolitan. Unlike LPP, Metropolitan provided financial assistance based on the difference between the project unit cost and Metropolitan's treated water rate, up to a maximum of $250 per af. The GRP was open to all technologies that recovered and used degraded groundwater. The GRP was retired in 1998 with the initiation of the Competitive Local Resources Program, which includes both recycled water and groundwater recovery projects.

Competitive Local Resources Program

In June 1998, following extensive joint development and endorsement from Metropolitan's member agencies, Metropolitan's Board retired the LPP, GRP, and LRP Conversion programs and established the Competitive LRP in their places. The primary objective of the Competitive LRP is to support the development of cost-effective water recycling and groundwater recovery projects that reduce demands for imported supplies. The Competitive LRP uses a competitive Request for Proposals (RFP) process to encourage the development of cost-effective recycled and groundwater recovery projects.

To qualify for inclusion in the LRP, a project must be selected through a competitive RFP process. A review committee provides an objective evaluation of project proposals and identifies the mix of project proposals that best meets the region's needs consistent with the objectives of the IRP. Qualifying and scoring criteria guide the review committee in its ranking of LRP project proposals. These criteria set basic standards to ensure that the proposed project provides an increased level of recycled water and is capable of being implemented. Projects that pass the qualifying criteria received a numerical score based on the following categories:

- Readiness to proceed
- Diversity of input discharges
- Regional water supply benefits

- Water quality benefits
- Metropolitan facility benefits (will the project postpone or delay new facilities?)
- Operational reliability and probability of success
- Increased beneficial uses
- Cost to Metropolitan

In 1998, Metropolitan issued an RFP to meet the short-term goal of obtaining an additional 53 taf per year of local resource production by 2010, offering incentives of up to $250 per af for terms of up to 25 years. The RFP specified that Metropolitan would select project proposals based on selection criteria up to these levels. In response to the RFP issued in 1998, Metropolitan received a total of 28 proposals with an ultimate yield of more than 140 taf per year. Fourteen projects with a combined total yield of 51.5 taf per year were selected for inclusion in the LRP, and contracts for Metropolitan to provide financial assistance have been executed. In April 2003 Metropolitan issued an additional RFP, offering financial incentives of up to $250 per acre-foot for terms of up to 25 years. In response, member agencies submitted 27 proposals for projects that would produce 113 taf per year. A review committee of Metropolitan staff and water resource consultants evaluated the proposals using selection criteria previously adopted by the Board. This process resulted in the selection of thirteen projects to be eligible for incentive payments, as shown in Table 15. Future targets for recycling production identified in the IRP Update will likely use a similar competitive process. Metropolitan will continue to assist in the development of recycled water projects in Southern California as its ongoing planning process identifies water recycling needs.

Seawater Desalination Program

Metropolitan and its member agencies view seawater desalination as a future component of a diversified water supply portfolio. Recent and continuous breakthroughs in membrane technology have helped reduce desalination costs, warranting consideration among alternative resource options outlined in Metropolitan's IRP. The IRP Update includes a target of 750 taf per year of local water production by 2025 that includes up to 150 taf per year of seawater desalination.

Table III-15
Thirteen Local Resource Program Projects Selected in 2004

Project / Member Agency	Yield (AFY)	Contribution ($/AF)
City of Industry Regional WRP / Three Valleys MWD	8,867	50 – 200
Direct Reuse Phase IIA / Upper San Gabriel Valley MWD	2,258	65-200
Groundwater Replenishment System / MWDOC	31,000	100-137
Hansen Area WRP / LADWP	3,665	12-250
IRWD Recycled Water System Upgrade / MWDOC	8,500	117
Pomona Well No. 37 / Three Valleys MWD	1,100	100
RW Distribution Extension / Las Virgenes MWD	225	155
RW Distribution Ext. Malibu Golf Course /Las Virgenes	300	175
RW Pipeline Reach 16 / Eastern MWD	820	82
Sepulveda Basin WRP Phase IV / LADWP	546	125
South Valley Water Recycling Project / LADWP	1,000	175
Tapo Canyon WTP / Calleguas MWD	1,445	100
Wells No. 7 & 8 / Torrance	5,189	160

Source: Metropolitan's SB 60 Report

Metropolitan initiated the Seawater Desalination Program (SDP) in 2001. This program provides financial assistance of up to $250 per af per year for 25 years for desalinated seawater that is developed and used within Metropolitan's service area. Five member agencies have submitted proposals for about 142 taf per year of desalinated seawater: San Diego County Water Authority, Long Beach Water Department, Los Angeles Department of Water and Power, West Basin Municipal Water District, and the Municipal Water District of Orange County. The Board has directed Metropolitan staff to develop contracts to pursue projects proposed under this program.

Metropolitan continues to work with its member agencies to develop a research agenda for specific projects. Metropolitan is also involved in efforts to assess current desalination projects and to compare project features and applicability to Southern California, such as an evaluation of permitting and regulatory approvals associated with delivery of desalinated seawater to regional and local distribution systems.

Innovative Supply Program

This program was designed to encourage investigations into alternative approaches to increasing the region's water supply. In April 2003 Metropolitan issued a solicitation for competitive proposals to investigate these innovative ideas. The competitive program provides a systematic

approach for objectively considering proposals from organizations and individuals on new supply ideas rather than on a case-by case basis.

Metropolitan received 17 proposals including harvesting storm runoff, on-site water recycling, desalination and waterbag technology for brine disposal. The proposals requested total funding of $1.2 million, almost 5 times the project budget of $250,000. The proposals were scored according to innovation, the likelihood of success, and the potential benefits to Metropolitan and its member agencies.

In May 2004, Metropolitan selected 10 projects for grant funding. Currently, seven projects have completed investigations and submitted final reports documenting findings. The remaining projects require more time to complete. Staff will report findings to the board upon completion and will hold a workshop with member agencies to review and consider the results.

Achievements to Date

Since 1982 Metropolitan has committed to providing financial assistance to the development of water recycling projects throughout its service area. Since adopting the IRP in 1996, Metropolitan, along with its 26 member agencies, has made significant progress in achieving regional targets for recycling and groundwater recovery. Metropolitan currently provides funding to 54 recycled water projects, of which 39 were in operation in 2004. Local projects not receiving funding from Metropolitan provide an additional 134 taf of recycled water to the region.

Since 1991, Metropolitan executed GRP and LRP contracts for 20 recovered groundwater projects that produced about 43 taf per year in 2004. In addition to the projects under Metropolitan's programs, about 21 taf per year of degraded groundwater is recovered by agencies in Metropolitan's service area without Metropolitan's financial assistance.

Table III-16 summarizes the current level of regional production from these local projects. To date, Metropolitan has invested $124 million in recycling programs and $41 million for groundwater recovery. In March 2004, Metropolitan selected 13 additional projects for funding through the Local Resources Program. Metropolitan plans to provide about $158 million toward developing these projects over the next 25 years. These new groundwater recovery and recycled water projects are expected to collectively produce about 65,000 acre-feet per year of additional local supplies. Table III-17 summarizes groundwater and recycled water production and incentive payment to date.

In 2003, Metropolitan conducted an audit of the performance of projects under the LRP. As a result, it terminated LRP incentive agreements for non-performing projects and reduced its financial obligations for projects with poor performance. These actions ensured that the funded programs continued to provide cost-effective water supplies to the region.

Summary

Metropolitan has continued to develop and refine its programs to encourage the involvement of its member agencies in water recycling, groundwater recovery and desalination. The adopted IRP Update relies heavily on these sources for future water supply. Changing conditions over the last five years have reduced the costs of these options. Developing and managing these programs requires considerable coordination and refinement to allow Metropolitan to adjust to changing conditions and to achieve its IRP goals.

Table III-16
2004 Water Production From Recycling and Groundwater Recovery
(taf)

Type of Project	With Metropolitan Funding	Without Metropolitan Funding	Total
Recycled Water	75	134	209
Groundwater Recovery	43	21	64
Total	118	155	273

Table III-17
Local Resources Programs

	Recovered Groundwater	Recycled Water	Total
Projects[1]			
Planned	24	57	81
In Operation	18	41	59
Ultimate Yield (AFY)	84,110	270,986	355,096
Deliveries (af)[2]			
FY 2004/2005	34,374	65,394	99,768
FY 2003/2004	43,181	75,619	118,800
Since Inception	278,055	732,358	1,010,412
Payments ($ millions)			
FY 2004/2005	$6.34	$13.34	$23
FY 2003/2004	$8.28	$14.95	$22
Since Inception	$47.8	$137.5	$165

[1] 12 project agreements are no longer in effect.
[2] 2004/2005 values are lower than the previous year because high local precipitation led to reduced demand for irrigation water.

III.4 STORAGE AND GROUNDWATER MANAGEMENT PROGRAMS: WITHIN THE REGION

IRP Goals

The region's water supply relies on a number of sources affected by variations in precipitation. In addition, the imported water supplies are transported to the region in aqueducts that cross a number of seismic faults, which could put the region's imported water supply at risk at any particular time.

Since the 1950s, local water management in Metropolitan's service area has included the conjunctive use of surface water and groundwater sources. Conjunctive use of water refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of abundance. This stored water is available for use during periods of low surface water supplies as a way of dealing with seasonal and multiyear imbalances of supply and demand.

To prepare for supply disruptions, Metropolitan and its member agencies have adopted goals for water storage within the region. Metropolitan has identified 400 taf of storage that should be set aside for use in emergencies, such as a disruption to the California Aqueduct. In addition to that storage, Metropolitan's planning process calls for dry-year storage that can be called on at times of supply shortage due to drought. The 1996 IRP identified a 2020 in-region surface water target of 620 taf of dry year storage - 400 taf of dry year storage in Diamond Valley Lake (DVL), and about 220 taf in the SWP terminal reservoirs (Castaic and Perris) made available through the Monterey Amendment to the SWP contract. This target has been achieved and remains unchanged in the IRP Update.

Storage capacity in the region's groundwater basins allows for conjunctive use programs. These basins are recharged with imported surface water supplies using spreading basins and injection wells. Numerous recharge facilities in Southern California are currently being used to replenish groundwater basins. The 1996 IRP identified the need for about 200 taf per year of dry-year yield from in-region groundwater storage by 2000, 275 taf by 2010, and 300 taf by 2020. The IRP Update retained these targets.

Issues

Metropolitan established general long-term storage guidelines in the 1999 Water Surplus and Drought Management (WSDM) plan. The WSDM plan provides for flexibility during dry years, allowing Metropolitan to use storage for managing water quality, hydrology, and SWP issues. Dry-year surface storage yields have been characterized in several ways, including delivery capabilities over two and three-year dry periods. The approach used in the IRP Update assumes that dry-year surface storage can be used as needed and as available within the WSDM planning framework.

In analyzing its groundwater storage programs, Metropolitan has found that a three-to-one ratio of groundwater storage capacity to delivery capability generally allows for maximizing storage use under historic hydrologic variation while minimizing capital cost. In other words, for every 3,000 acre-feet of groundwater storage capacity, there should be 1,000 acre-feet of delivery

capability. A ratio of less than three-to-one poses a risk of being unable to withdraw sufficient water during times of drought. Most of Metropolitan's groundwater programs have this ratio as a planning goal. With that ratio, the annual dry-year yield reported here may be maintained for three consecutive dry years.

As regional demands grow, the estimated need for emergency storage also increases. As a result, the proportion of DVL set aside for emergency storage will increase, and the dry year storage in DVL is expected to gradually decline to the 1996 IRP target of 400 taf by 2030.

Changed Conditions

Metropolitan has also refined its characterization of the flexible storage available in the SWP terminal reservoirs. Previous planning studies assumed that up to 50 percent of the available SWP flexible storage could be used in a repeat of a single dry year event, such as the 1977 hydrology. In the IRP Update, dry-year surface production, including Monterey storage, is not limited in this way. Instead, Metropolitan's reliability modeling determines the availability of stored surface water supplies in each forecast year based on historical hydrology.

For the groundwater storage programs, changed conditions since the 1996 IRP include a broadening of Metropolitan's groundwater programs from rate discount-based storage programs to include contract-based programs and bond funding for local groundwater storage projects. Previous discount-based programs provided water to those member agencies that stored the water. The region as a whole benefited from this program because those member agencies could reduce their demands in times of shortage. With contractual storage programs, however, Metropolitan retains the ability to call upon the stored water when needed, which increases the regional benefit of the stored water.

Since the 2000 UWMP, additional groundwater funding mechanisms have become available.

- In 2000, Proposition 13 appropriated $45 million for groundwater conjunctive use projects in Metropolitan's service area.
- The same Proposition made another $200 million available for additional local groundwater storage and recharge projects throughout California based on a competitive bid process.
- In 2002, Chapter 7 of Proposition 50 made $76 million available for state water supply reliability, and Chapter 8 of Proposition 50 made $500 million available for water management programs. Proposition 50 grants are allocated through a competitive-bid process similar to that of Proposition 13.

Implementation Approach

A. Surface Storage

Since the beginning of the IRP process, two significant changes have occurred to regional surface storage.

Diamond Valley Lake
Construction of Southern California's newest and largest reservoir nearly doubled the area's surface water storage capacity. Transport of imported water to the lake began in November 1999, and the lake reached capacity in early 2003. Diamond Valley Lake holds 800 taf, some of which is for dry-year and seasonal storage, and the remainder for emergency storage.

SWP Terminal Reservoirs
Under the 1994 Monterey Agreement, Metropolitan received operational control of 218,940 af in the reservoirs at the southern terminals of the California Aqueduct. Control of this storage capacity in Castaic Lake and Lake Perris gives Metropolitan greater flexibility in handling supply shortages. Seismic concerns have arisen at the Lake Perris dam. In response, DWR plans to reduce the storage amount at Lake Perris by half until those concerns can be studied and addressed. In the long-term, the reduction in storage may potentially impact the amount of flexible storage available to Metropolitan from Lake Perris, and also impact the total amount of emergency storage available.

B. Groundwater Storage

Many local groundwater storage programs have been implemented over the years to maximize the use of local water supplies. These programs have included the diversion of water flows into percolation ponds for artificially recharging groundwater basins and the recovery of degraded groundwater, and they have increased production in all types of years.

- For many years, flood control agencies within Metropolitan's service area have captured and spread storm water for groundwater replenishment. Local runoff and reclaimed water have been conserved in spreading grounds, injection wells, reservoirs, and unlined river channels. In addition, flood control agencies have operated seawater barrier projects in Los Angeles and Orange Counties to prevent seawater intrusion into the coastal groundwater basins.

- In the past, growing water quality problems raised serious concerns about the ability to sustain average annual production levels. The federal Superfund program, although slow to implement clean-up projects, has helped maintain or increase the usable groundwater. These increased levels have been augmented by water recovery projects discussed in Chapter III.3.

Conjunctive use of the aquifers offers an even more important source of dry year supplies. Unused capacity in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects will allow effective management and regulation of the region's major imported supplies from the Colorado River and Bay/Delta region. To meet the adopted targets for dry year storage, Metropolitan and its member agencies have encouraged the recharge of the groundwater basins. Over the years,

Metropolitan has implemented conjunctive water use through various incentive programs. Typically this storage takes place in one of two ways:

Direct deliveries to storage — Metropolitan delivers replenishment or banked water directly to water storage facilities, including spreading sites and injection wells.

In-lieu deliveries to storage — Metropolitan delivers replenishment water directly to the member agency's distribution system. The member agency then delivers this water rather than producing water from local sources. The deferred local production results in water being left in local storage (surface or groundwater) for future use.

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 taf per year of dry-year supply from cyclic storage accounts with several member agencies. These agreements allow Metropolitan to deliver replenishment water into a groundwater basin in advance of agency demands. Agencies can then transfer water from storage accounts when they incur a replenishment obligation to the basin. These types of agreements have been in place since the early 1970s but may be closed by 2020. Today Metropolitan is concentrating on long-term replenishment storage programs and contractual conjunctive use programs.

The following sections describe these programs in more detail.

Long term Replenishment Storage
To encourage member agencies to participate in this program, Metropolitan offers replenishment water at reduced rates. Table III-18 displays the Tier 1 charges for full service and compares them to the replenishment charges.

Table III-18
Selected Metropolitan Water Rates,
Effective 1/1/2005

Rate category	Charge per AF
Tier 1 Full Service	
Untreated full service	$331
Treated full service	$443
Replenishment Service	
Untreated replenishment service	$238
Treated replenishment service	$325

North Las Posas
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 af of water in the North Las

Posas Groundwater Basin. Phase 1 and 2 wellfields (18 ASR wells) have been completed and are online. These wellfields are expected to be fully operational in 2007 after the completion of the Moorpark pipeline pumpstation by the Calleguas MWD. At that stage, the project will be able to pump 47 TAF per year from the basin. As of June 30, 2005, 48 taf are in storage. With temporary pumps in place, approximately 20 taf could be extracted in 2005 if needed.

Proposition 13 Projects

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. To select which projects to invest in, Metropolitan used a competitive Request for Proposals (RFP) process designed to fund projects with the most potential for success under Metropolitan's conjunctive use principles. Since 2001, Metropolitan's staff worked to coordinate the eight conjunctive use programs selected through this process. Table III-19 describes these projects.

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 MWD 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 program is expected to yield 22 taf per year by 2010.

Other Identified 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
- City of San Diego Storage Program

Table III-19
Conjunctive Groundwater Projects Selected Through The RFP Process

Project and Project Proponents	Storage Capacity (TAF)	Dry-Year Yield (TAF/Year)	Balance as of 12/31/2004 (TAF)	Design/ Construction Status
LOS ANGELES COUNTY				
Long Beach Conjunctive Use Project (CUP) CBMWD and Long Beach	13.0	4.3	13.0	Completed
Foothill Area GW Storage Project Foothill MWD	9.0	3.0	2.0	Started
Long Beach CUP: Expansion in Lakewood CBMWD and Long Beach	3.6	1.2	0	Executed Agreement
City of Compton Conjunctive Use Program City of Compton	2.3	0.8	0	Design
Upper Claremont Heights Conjunctive Use Three Valleys MWD	3.0	1.0	0	In Approval Process
ORANGE COUNTY				
Orange County GW Conjunctive Use Program OCWD, MWDOC	60.0	20.0	18.8	Under construction
SAN BERNARDINO COUNTY				
Chino Basin Programs IEUA, Chino Basin Watermaster	100.0	33.0	37.8	Design and Construction
Live Oak Basin Conjunctive Use Project Three Valleys MWD	3.0	1.0	0.3	Under Construction
Total	193.9	64.3		

Achievements to Date

Table III-20 summarizes the local groundwater storage identified and contracted under the local storage programs. It shows that Metropolitan has identified almost all of the 300 taf dry year supplies set as a goal for groundwater storage within the region. It also shows that additional potential programs could be pursued if required. With the completion of Diamond Valley Lake, Metropolitan has achieved its surface storage goals for the 2025 time frame. Thus, Metropolitan has identified projects that will enable it to achieve its goals for local storage, and it has implemented programs that provide the majority of that storage. For 2030 projections, Metropolitan has assumed that all programs projected to be in place in 2025 will remain in place.

Table III-20
In-Region Groundwater Storage Status
2020 & 2025 (TAF)

Project	Annual Supply	Project Status
Long-term Replenishment and Cyclic	86	Current
North Las Posas	47	Current
Proposition 13 Programs City of Long Beach Inland Empire Orange County Foothill Three Valleys Compton Long Beach – Lakewood	64	Current
Proposition 13 Programs (in progress) San Diego County Upper Claremont	~3	Under Development
Raymond Basin	22	Under Development
Additional Programs *Expansion of existing programs* Chino Basin Storage Program Expansion Orange Co Basin Storage Program Expansion North Las Posas Phase 3 *New programs* Central Basin Storage Program West Basin Storage Program San Fernando Basin Storage Program San Jacinto Basin Storage Program City of San Diego Storage Program Other new programs	80 or more	Under Development
Total	**300**	

Note: "Current" signifies that contracts are in place, not necessarily that facilities are constructed or water in storage. "Under Development" signifies that programs have been identified and negotiations commenced, but that feasibility, environmental analysis or contractual agreements are not yet finalized.

III.5 STATE WATER PROJECT

IRP Goals

In 1999, Metropolitan's Board of Directors set new goals for the State Water Project (SWP) with the adoption its CALFED Policy Principles. These goals committed Metropolitan to water quality objectives, the development of a 650 taf minimum dry-year supply from the SWP by 2020, and average annual deliveries of 1.5 maf (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.

System Description

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by California's Department of Water Resources (DWR). Figure III-2 shows SWP facilities. This statewide water supply infrastructure provides water to 29 urban and agricultural agencies throughout California. The original State Water Contract called for an ultimate delivery capacity of 4.2 maf, with Metropolitan holding a contract for 2,011 taf.

Much of the SWP water supply passes through the San Francisco-San Joaquin Bay-Delta (Bay-Delta). More than two-thirds of California's residents obtain some of their drinking water from the Bay-Delta system. For decades, the Bay-Delta has experienced water quality and supply reliability challenges and conflicts due to variable hydrology and environmental standards that limit pumping operations.

Issues

Prior to the 1994 Bay-Delta Accord, the reliability of SWP deliveries was deteriorating rapidly. Based on an analysis of the State Water Resources Control Board's (SWRCB) draft water rights decision 1630, Metropolitan estimated that by 2005 its SWP delivery would be reduced to 171 taf – about 8.5 percent of its SWP contract entitlement -- under hydrologic conditions comparable to 1977, the driest year on record for the SWP. The SWRCB subsequently withdrew draft water rights decision 1630, and the Bay-Delta Accord, through SWRCB water rights decision 1641, established new operating criteria for the SWP. Under these new criteria, DWR projects that in critically dry years, SWP delivery would be 418 taf – about 21 percent of Metropolitan's SWP contract entitlement.

To achieve Metropolitan's overall supply reliability objectives, the yield from the SWP during critically dry years would need to increase to 650 taf by 2020, and annual deliveries (excluding transfer and storage programs along the SWP) need to average 1.5 million acre-feet per year.

Moreover, Metropolitan would meet its supply reliability goals only if it has access to SWP supplies up to its full contracted amount during wet years to replenish surface and groundwater storage.

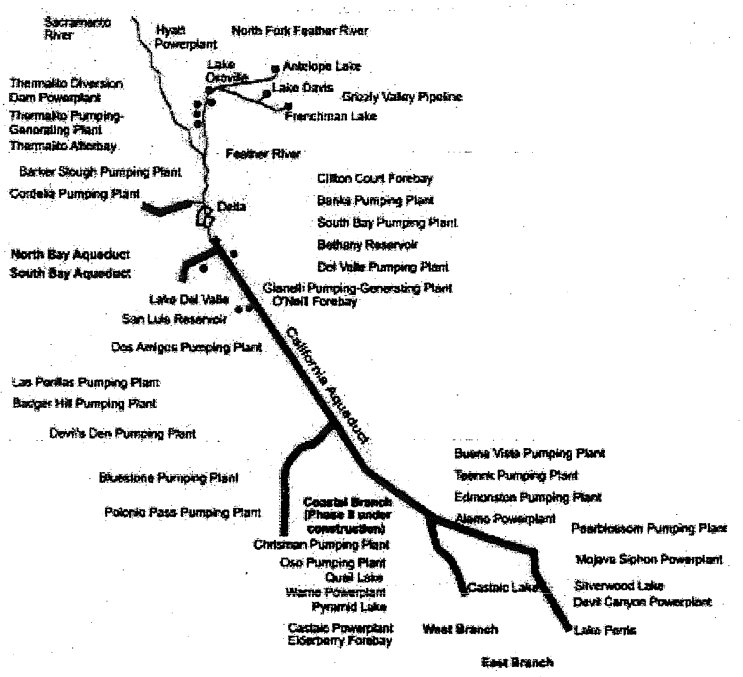


Figure III-2
Current and Projected Facilities of the State Water Project

Sustained improvement in SWP water quality also represents an important concern for Metropolitan. Metropolitan must be able to meet the increasingly stringent drinking water regulations that are expected for disinfection by-products and pathogens in order to protect public health. Meeting these regulations will require improving the Delta water supply by cost effectively combining alternative source waters, source improvement, and treatment facilities. Additionally, Metropolitan requires water quality improvements of Delta water supplies to meet its 500 mg/L salinity blending objective in a cost-effective manner, while minimizing resource losses and helping to ensure the viability of regional recycling and groundwater management programs.

Changed Conditions

Since the 2000 RUWMP, conditions affecting the future operations of the SWP have changed. In August 2000, state and federal resources and environmental protection agencies approved the CALFED Record of Decision (ROD) for the Programmatic Environmental Impact Report/Impact Statement. The ROD identifies implementation plans for the first seven years of what is expected to be a 30-year improvement program in the Bay-Delta. A number of projects identified in the ROD relate to the conveyance capacity, water quality, and operation of the SWP. Approval of the ROD was challenges on grounds that the environmental review process did not meet legal requirements. In October 2005 a state appellate court upheld the challenge and remanded the case to the lower court for remediation. As a result, additional environmental documentation and public review may be required.

In 2003, the California Bay-Delta Act established the Bay Delta Authority as the new governance structure for the CALFED Program. Its responsibilities include providing accountability, ensuring balanced implementation, and tracking and assessing Program progress.

It also helps to coordinate actions taken by CALFED Implementing Agencies, including the California Department of Water Resources, which operates the SWP.

Also in 2003, the DWR, the United States Bureau of Reclamation (USBR), and State and Federal water contractors addressed joint operational issues. These planning and operational activities set the stage for the development of the Delta Improvement Package of 2004, which outlines actions related to water project operations in the Delta. These actions would result in increased water supply reliability, improved water quality, environmental protection and ecosystem restoration, protection of the Delta levee system, and improved real-time and long-term management. The Delta Improvements Package (DIP) also outlines conditions under which the SWP would be allowed to increase its permitted export pumping capacity from 6,680 to 8,500 cubic feet per second (cfs) at the Banks Pumping Plant in the Delta, a key requirement to achieving Metropolitan's supply reliability objectives.

Under the DIP, the CALFED Implementing Agencies would be required to report annually on the status of actions and linkages in the Delta Improvements Package to assure balanced implementation and success.

In May 2005, DWR issued to SWP contractors excerpts from its Draft SWP Delivery Reliability Report due to be released later in the year. These excerpts contained results from seven studies of SWP reliability. The first three studies replicated modeling done by DWR for its 2003 SWP Delivery Reliability Report. Studies 4 and 5 reflected changes in CVP/SWP operations consistent with the CVP/SWP Operations Criteria and Plan (OCAP). The last two studies, 6 and 7, were similar to studies 4 and 5 but also included updated SWP demand projections developed in consultation with SWP contractors. DWR recommended SWP contractors use results from studies 6 and 7 for their UWMPs.

In studies 6 and 7, SWP delivery capability under single-dry year conditions similar to 1977 shows a dramatic decrease compared to DWR's previous reliability estimates. DWR's 2003 SWP Delivery Reliability Report estimated a minimum delivery capability of 830 taf. Under the new OCAP and SWP demand assumptions, minimum delivery capability ranged between 159 taf (Study 6) and 187 taf (Study 7), a nearly 80 percent drop in delivery capability. DWR listed several attenuating circumstances that would likely result in their models overstating the drop in single dry-year SWP delivery capability. These circumstances included conservative assumptions about San Luis Reservoir minimum pool and carryover storage. According to DWR, relaxing these assumptions to better reflect how the SWP would actually be operated during a single dry year could, under some circumstances, increase delivery capability by as much as 650 taf, Thus, DWR's Draft SWP Delivery Reliability Report findings appear to place SWP single dry year delivery capability somewhere between 159 taf and 837 taf.

Metropolitan incorporated DWR's draft results into its planning models for SWP operations and concluded that delivery capability for SWP water delivered to Metropolitan for a single dry year like 1977 would be about 175 taf of Table A delivery plus about 280 taf of carryover storage delivery. For multiple dry years, similar to the period 1990-1992, annual SWP deliveries to Metropolitan would average about 509 taf of Table A water and about 93 taf of carryover storage. Previous DWR assessments of SWP delivery reliability had led Metropolitan to plan for SWP Table A deliveries of about 415 taf under a single dry year scenario like 1977 and about 830 taf under a multiple dry year scenario like 1990-1992. DWR's updated assessment of SWP

delivery capability has caused Metropolitan to make a significant downward revision to previous estimates of Table A delivery for single and multiple dry year hydrologies.

Implementation Approach

Metropolitan's implementation approach for the SWP depends on the full use of the current State Water Contract provisions, including its basic Table A supply contract amount, Article 21 interruptible supplies, and Turnback Pool supply provisions. In addition, it requires successful negotiation and implementation of a number of agreements, including CALFED, the Sacramento Valley Water Management (Phase 8 Settlement) Agreement, and the Delta Improvement Package. Each of these stakeholder processes or agreements involves substantial Metropolitan and member agency staff involvement to represent regional interests. Metropolitan is committed to working collaboratively with DWR, SWP contractors, and other stakeholders to ensure the success of these extended negotiations and programs.

SWP Reliability

This section provides details of the major actions Metropolitan is undertaking to improve SWP reliability:

Delta Improvements Package and Phase 8 Settlement
Ensuring the successful implementation of the 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.

The key benefits of the proposed Delta Improvement Program for urban Southern California water supply reliability include:

- Increased water supply for regional groundwater and surface water storage initiatives (130 taf per year);
- Enhanced access to voluntary water transfers upstream of the Delta as foreseen in the Record of Decision;
- Continued Endangered Species Act assurances and supply reliability through implementation of a long-term Environmental Water Account;
- Achievement of SWP supply goals for 2020 adopted by the Metropolitan Water District Board in the Southern California IRP; and
- Enhanced operation of the diversified portfolio of supplies developed over the past decade in the IRP.

The Delta Improvements Package also contains actions related to improving water quality in the Delta. Separate discussions of water quality issues appear in a later section.

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 taf per year in the Sacramento Valley, and approximately 55 taf of this water would come to Metropolitan through its SWP allocation. The Agreement specifies a supply breakdown of 110 taf (60 percent) to the SWP and 75 taf (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 taf in 2010, 55 taf in 2015, and 110 taf beyond 2015.

Monterey Amendment

The Monterey Amendment, executed by DWR and most of the State Water Contractors in 1995 and 1996, primarily addressed the allocation of SWP water in times of shortage, and it dealt with a number of other issues that facilitated more flexibility for SWP contractors. Though challenged in court, a settlement has been reached and a revised Environmental Impact Report is being prepared. The Monterey Amendment enables Metropolitan to use a portion of the San Luis Reservoir's capacity for carryover storage into the subsequent calendar year, which increases SWP annual delivery by 93 taf to 285 taf, depending on supply conditions.[1]

SWP Terminal Storage

Metropolitan has contractual rights to 65,000 af of flexible storage at Lake Perris (East Branch terminal reservoir) and 153,940 af 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 taf of additional supply. In a single dry year like 1977 it can provide up to 219 taf of additional supply to Southern California.

Desert Water Agency/Coachella Valley WD SWP Table A Transfer

Under the transfer agreement, Metropolitan transferred 100 taf of its SWP Table A amount to Desert Water Agency/Coachella Valley WD (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 taf 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

[1] This includes DWCV carryover that would flow to Metropolitan through exchange agreements with Desert Water Agency and Coachella Valley Water District.

management credits associated with the 100 taf. 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 entitlement transfer can provide Metropolitan about 5 taf of SWP supply. In multiple dry years like 1990-1992 it can provide Metropolitan about 26 taf of SWP supply.

Desert Water Agency/Coachella Valley WD Advance Delivery Program

Under this program, Metropolitan delivers Colorado River water to the Desert Water Agency and Coachella Valley WD 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 taf in a single dry-year like 1977 and by about 18 taf 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 III-21.[2]

Table III-21 summarizes Metropolitan's SWP supply range for 2025 based on these changes. When interpreting the SWP dry year supply projections shown in this table, it is important to note that the estimates of zero dry year supply from Delta Improvements can be misleading. The primary supply benefit of Delta Improvements will be the ability to increase SWP pumping during average and wet years and storing this water for subsequent use in dry years. The projections of dry year supply for local and Central Valley storage programs discussed in Chapters III-4 and III-6 reflect this increase in stored water available for dry year delivery.

SWP Water Quality

Metropolitan requires a safe drinking water supply from the Bay-Delta to meet current and future regulatory requirements for public health protection. Finding cost-effective ways to reduce total organic carbon (TOC), bromide concentrations, pathogenic microbes, and other unknown contaminants from Bay-Delta water supply is one of Metropolitan's top priorities. Metropolitan also requires a SWP supply that is consistently low in salinity — Total Dissolved Solids (TDS) — so it can blend SWP water with higher-salinity Colorado River water to achieve salinity goals for its member agencies. In addition, Metropolitan needs consistently low-salinity SWP water to increase in-basin water recycling and groundwater management programs. These programs, essential to the successful implementation of the IRP, require that blended water supplied to the member agencies do not fall below the TDS standards adopted in Metropolitan's Salinity Action Plan.[3]

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[2] 18 taf out of a total of 509 taf SWP annual delivery for a multiple dry-year event similar to the period 1990-1992 are due to the DWCV advance delivery provision. For a single-dry year similar to 1977, 6 taf out of a total of 175 taf are due to the advance delivery provision.

[3] The Action Plan is discussed in the Water Quality chapter of this report.

Table III-21
SWP Supply Projection: 2025
(TAF)

Hydrology	Multiple Dry Years* (1990-1992)	Single Dry Year (1977)	Average Year* (1922-2004)
Current Programs			
SWP Deliveries[1]	509	175	1,472
San Luis Carryover[2]	93	280	280
SWP Call-back of DWCV Table A Transfer	26	5	0
SWP Terminal Storage[4]	73	219	0
Subtotal of Current Programs	***701***	***679***	***1,752***
Programs Under Development			
Delta Improvements[3]	0	0	130
Phase 8 Agreement	110	110	110
Subtotal of Proposed Programs	***110***	***110***	***240***
Maximum Supply Capability	**811**	**789**	**1,992**

Notes:
1. Includes 76 taf of additional SWP supplies in 1977 per DWR and DWCV Table A supplies in multiple and single dry years.
2. Includes DWCV carryover.
3. Includes increasing Banks pumping capacity to 8,500 cfs.
4. SWP terminal storage is shown in the In-Basin Storage Activities tables in Appendix A.3.
* Appendix A.3 includes SWP supply projections for 2010, 2015, and 2020.

The Delta Improvement Package offers important water quality benefits to Metropolitan. In particular, levee modifications at Franks Tract and other source control actions may significantly reduce ocean salinity concentrations in Delta water, which would benefit Delta water users and export interests alike.

Franks Tract is an island located in the central Delta that was actively farmed until levee breaches in 1936 and 1938. Since 1938, the tract has remained a flooded island and its levees remain in disrepair. Tidal flows in the Delta entrap saline ocean water in the flooded tract, resulting in degraded water quality for both in-delta and export users. Recent computer modeling analyses by Metropolitan, DWR, and the US Geological Survey indicate that reducing this salinity intrusion by partially closing existing levee breach openings and/or building radial gate flow control structures will significantly reduce TDS and bromide[4] concentrations in water from the Delta during the summer and fall months and in drought years. Based on Metropolitan's analysis, improvements to Franks Tract alone could reduce peak bromide concentrations in the summer and fall months by about 33 percent at Contra Costa Water District's (CCWD) Rock Slough intake, by 27 percent at CCWD's Old River intake, and by 24 percent at the SWP intake in the South Delta. At the same time, increasing Banks Pumping Plant capacity to 8,500 cfs would allow the diversion of a larger proportion of water supplies during periods of good water quality.

[4] The importance of bromides is discussed in the Water Quality chapter.

In addition to the Delta Improvement Package, CALFED has adopted an "equivalent level of public health protection" (ELPH) program that targets water quality actions outside the Delta. CALFED Program is coordinating several SWP water quality feasibility studies and projects. These include a) a feasibility study on water quality improvement in the California Aqueduct and b) the conclusion of feasibility studies and demonstration projects under the currently funded Southern California-San Joaquin Regional Water Quality Exchange Project. With respect to the latter project, the Friant Water Users Authority (FWUA) and Metropolitan have entered into a partnership, based on an approved set of principles, to investigate the potential of enhancing the quantity and affordability of the eastern San Joaquin Valley's water supply while improving Southern California's water quality. The FWUA and Metropolitan are studying possible projects that would benefit each region while creating no adverse impacts. A pre-feasibility study of existing conditions and potential constraints was completed in 2003. Similar studies are underway with the Kings River Water Association.

SWP System Outage and Capacity Constraints

As its infrastructure ages, the SWP becomes increasingly vulnerable to natural disasters, particularly the Delta levee system and the California Aqueduct, which are both susceptible to floods and earthquakes. In June 2004, a levee in the Jones Tract of the Delta failed, resulting in total inundation of the island and disrupting SWP operations. Catastrophic loss of either the Delta levee system or the aqueduct would shut down the project, affecting the welfare of millions. While Metropolitan has made substantial investments in local resources and in-basin storage to insulate Southern California against loss of its imported water supplies, additional investment is needed in the at-risk infrastructure.

The CALFED Levees Program coordinates Delta levee maintenance and improvement activities. Its goal is to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Over the next two to three years, CALFED Implementing Agencies will carry out a Comprehensive Program Evaluation (CPE). It will incorporate the risk study that has been commissioned by DWR, including the currently-proposed expanded scope of that study. The CPE will: a) supplement the DWR risk study to ensure that it considers all relevant levee risks, b) include the development of a formal strategic plan that contains a description of any proposed future program changes, and c) recommend priorities and estimate funding needs for the Levees Program. For example, the P.L. 84-99 ROD target will be reevaluated as part of the CPE using information from the Risk Study.

The California Aqueduct remains susceptible to floods at several points as it travels from the Delta along the west side of the San Joaquin Valley. Key among these is where the Aqueduct crosses the Arroyo Pasajero, an alluvial fan located near Coalinga, California. At that spot, the Aqueduct effectively forms a barrier to Arroyo flood flows. Although flood control facilities were built to protect the Aqueduct, the volumes of runoff and sediment deposition are much greater than originally estimated, so a significant flood risk remains. The Aqueduct was severely damaged during March of 1995 when a flood overwhelmed control facilities and overtopped the Aqueduct with 10 taf of floodwater and an estimated 800,000 cubic yards of sediment. Impacts to downstream water users lasted through the summer of 1995. In December of 2004, DWR began construction of "Phase I" improvements to the Aqueduct where it crosses the arroyo.

These improvements will increase the size of the detention basins west of the aqueduct to protect it against a 50-year storm event.

DWR is also investing in the replacement of aging SWP infrastructure critical to SWP operations. It is midway into its Turbine Rehabilitation Program at Oroville Reservoir's Hyatt-Thermalito complex. In 2004 DWR awarded a contract to replace four pumps at the Edmonston Pumping Plant in the Delta. Moreover, improved maintenance procedures have decreased the amount of time pumps at Edmonston come off-line for maintenance to less than 10 percent of the time they would otherwise be available for operation.

Because of the risk of a prolonged shutdown of the SWP caused by seismic or hydrologic events either within the Delta or along the Aqueduct, Metropolitan has acted decisively to ensure that Southern California has adequate emergency storage. Diamond Valley Lake and SWP terminal reservoir storage, combined with member-agency emergency storage, are jointly capable of providing the region with a six-month supply of water if combined with a temporary 25 percent reduction in demand. Metropolitan engineering studies indicate this would provide sufficient time to repair the SWP and resume delivery.

Achievements to Date

SWP Reliability

The discussions initiated in July 2003 at Napa between SWP and CVP contractors to resolve inter-project operational conflicts set the stage for the development of the proposed Delta Improvement Package of 2004. The primary focuses of the Napa discussions were better integration of the operations of the SWP and CVP and the development of joint planning assumptions and support for the advancement of CALFED. Key features of the proposal that resulted from the discussions include:

- Consistent Planning Assumptions. Previously, DWR and USBR made inconsistent planning assumptions in their various Delta-related activities. These assumptions created a significant problem for CALFED, which seeks to coordinate activities among agencies. A proposal drafted at Napa aligns the planning activities of the two project operators and provides for timely permitting of CALFED through-Delta improvements.

- Project Integration Plan. The project operators and their contractors agreed to better integrate project operations, allowing both projects to get more out of the existing water supply system, consistent with environmental restoration and water quality improvement goals. In essence, the Napa proposition provides for operation of SWP conveyance to benefit CVP contractors and operation of CVP storage to benefit SWP contractors. Through innovative integration of CVP-SWP operations, both groups of contractors would be able to improve supply reliability in a manner consistent with the CALFED ROD.

- Better Risk Management. The Napa proposition provides for better management of risk in project operations. For example, provisions allowing the SWP to "borrow" storage capacity in CVP facilities under specified conditions would allow the SWP to allocate

higher amounts of water earlier in the year, a valuable improvement even if ultimate deliveries are generally unaffected. Similarly, an agreement to shift responsibility for protecting the "low-point" in San Luis Reservoir from the CVP to the SWP would provide for significant increases in CVP allocations earlier in the water year, increasing certainty for the annual business plans of CVP agricultural water users.

- Through-Delta Facility Improvements. The Napa discussions solidified support for CALFED plans to improve through-Delta facilities, including: a) implementation of the South Delta Improvement Program that would increase pumping capacity at the SWP Banks Pumping Plant to 8,500 cfs; and b) construction and operation of an intertie between the Delta Mendota Canal and the California Aqueduct.

Collectively, the actions proposed in the Napa discussions can significantly improve water supply reliability in a manner consistent with other CALFED objectives. In particular, the through-Delta physical improvements included in the CALFED ROD provide considerable flexibility for meeting water management challenges in the driest years. Expanding the capacity of the SWP Banks pumping plant increases the ability to store water south-of-the-Delta during wet periods. Withdrawing that water during dry periods relieves dry-year pressure on the environment and other Delta water users. In addition, this increased conveyance capacity adds to the ability to transport conserved water from voluntary sellers upstream of the Delta to buyers seeking additional supplies south of the Delta.

As an outcome of the Napa discussions, representatives of DWR, USBR, the California Department of Fish and Game (DFG), the United States Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) developed a proposal for a long-term Environmental Water Account (EWA). The proposal provides for improvements in EWA "fixed assets" that include purchases of water from willing sellers. It also proposes a long-term commitment to allow EWA to borrow storage in San Luis Reservoir, an approach successfully employed on an ad-hoc basis for the past three years. In addition, the long-term EWA would provide EWA managers with control over groundwater storage and other assets to better manage their resources and protect and restore fisheries in a more cost-effective manner.

Additional meetings, held in Stockton, addressed the concerns of Delta interests regarding project operations. While discussions are still underway, these meetings suggest that a common package of actions can be implemented that provides water supply and water quality benefits to export interests, protects the interests of Delta water users, and continues the process of environmental restoration.

SWP Water Quality

The most significant achievement for SWP water quality has been continued definition and advancement of the Delta Improvement Package. Most notably, the Franks Tract studies identified cost-effective ways to achieve significant improvements in the quality of Delta export water. The Franks Tract project will be implemented in phases, with the first phase scheduled to begin in 2006.

Progress also is being made on the Southern California-San Joaquin Regional Water Quality Exchange Project. In May 2003, SAIC Engineering, Inc. completed its pre-feasibility assessment establishing baseline conditions and water management needs for the project.

Thanks in part to financial grants from CALFED, regional planning efforts are underway to explore options for water quality exchanges and technological approaches to water quality improvement as a part of the ELPH program.

SWP System Reliability

The completion and filling of Diamond Valley Lake marked the most important achievement with respect to protecting Southern California against an SWP system outage. Water began pouring into the reservoir in November 1999 and the lake was filled by early 2003. The lake can hold up to 800 taf that provides Southern California with a six-month emergency water supply as well as carryover and regulatory storage.

East Branch Enlargement

In 1986, Metropolitan and other State Water Project (SWP) contractors entered into an agreement with the DWR to enlarge the capacity of the SWP East Branch Aqueduct from the Alamo Powerplant to the Devil Canyon Powerplant. The agreement specified a staged enlargement of approximately 1500 cfs, with Metropolitan receiving an increase of 1200 cfs. Phase I of the enlargement, which provides approximately 750 cfs, began immediately and was completed in 1992. Phase II was deferred until the build-up in water demands warranted it. Metropolitan and the other East Branch Enlargement contractors are currently in discussions with DWR regarding Phase II planning and timing. Phase II would provide additional supplies and reliability for Metropolitan's eastern service area, including the Inland Empire and San Diego. Current Metropolitan demand projections indicate that Phase II will not be needed until 2015 or later.

III.6 Central Valley Storage and Transfer Programs

IRP Goals

The 1996 IRP established a major goal of increasing the reliability of supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Since adopting the 1996 IRP, Metropolitan has developed numerous voluntary Central Valley storage and transfer programs, aiming for a dry-year water resource development target of 300 taf by 2010. The IRP Update maintains the same target. By 2003, Metropolitan had enough Central Valley storage and transfer programs in place to meet the 300 taf target.

Description

To date, Metropolitan's Central Valley storage programs consist of partnerships with Central Valley agricultural districts. These partnerships allow Metropolitan to store its State Water Project (SWP) supplies during wetter years for return in future drier years. Metropolitan's Central Valley transfer programs consist of partnerships with Sacramento Valley Central Valley Project (CVP) and SWP settlement contractors, and they allow Metropolitan to purchase water in drier years for delivery via the California Aqueduct to Metropolitan's service area.

Issues

Before the 1994 Bay-Delta Accord, SWP delivery reliability was deteriorating rapidly. To gain a clearer picture of the extent of the deterioration, Metropolitan carried out an analysis based on the State Water Resources Control Board's (SWRCB) draft water rights decision 1630. This analysis showed that by 2005, if the hydrologic conditions were comparable to those of the driest year on record, 1977, Metropolitan's SWP delivery would be reduced to 171 taf, which is only about 8.5 percent of its SWP contract entitlement.

The SWRCB later withdrew draft water rights decision 1630 and the Bay-Delta Accord established new operating criteria for the SWP. Metropolitan again analyzed these new criteria to estimate the potential water deliveries in critically dry years. Under these criteria, SWP deliveries to Metropolitan, not counting carryover storage, increased to 418 taf, which is about 21 percent of its SWP contract entitlement. Metropolitan's Board determined that while the new criteria established by the Bay-Delta Accord represented an improvement in SWP reliability, they were not, of themselves, sufficient to meet Metropolitan's overall supply reliability objectives. Moreover, DWR's most recent estimates of SWP delivery capability, which they released to SWP contractors in May 2005, show that SWP reliability under conditions similar to 1977 could be far worse than earlier modeling indicated. Based on these new DWR reliability projections, Metropolitan estimates that in a single-dry year similar to 1977, SWP deliveries to its service area would be about 175 taf rather than 418 taf of Table A water. Metropolitan estimates another 280 taf of carryover storage could be delivered, for a total delivery of 455 taf.

To achieve its overall supply reliability objectives, by 2010 Metropolitan would need to supplement its deliveries from the SWP with 300 taf of water from Central Valley storage and transfer programs during critically dry years.

Metropolitan believes that it now has in place Central Valley storage and transfer programs capable of reaching this target, and it has several other programs under development. Because yields from individual programs can vary widely depending on hydrologic conditions and CVP/SWP operations, the dry-year yields for the various programs reported in this section are expected values only. In any given year, actual yields could depart from the expected values. Despite that uncertainty, Metropolitan's models of these programs indicate that in the aggregate, they can meet the 2010 resource target under a wide range of hydrologic conditions and CVP/SWP operations.

Changed Conditions

Since the 2000 RUWMP, conditions affecting the development of Metropolitan's Central Valley storage and transfer programs have improved significantly. Metropolitan has dedicated more staff to identifying, developing, and implementing Central Valley storage and transfer programs. Such programs have served to demonstrate the value of partnering, and increasingly, Central Valley agricultural interests see partnering with Metropolitan as a sensible business practice beneficial to their local district and regional economy. In addition, Metropolitan staff has demonstrated the ability to work with California Department of Water Resources and US Bureau of Reclamation staff to facilitate Central Valley storage and transfer programs. Taken together, these positive changes enabled Metropolitan to reach the 2010 resource target by 2003.

Implementation Approach

Metropolitan currently has four Central Valley storage programs in operation that serve to increase the reliability of supplies received from the California Aqueduct. Metropolitan is also pursuing a new storage program with Mojave Water Agency, and it is currently under development. In addition, Metropolitan pursues Central Valley water transfers on an as needed basis. Table III-22 lists the expected yields from these programs. Figure III-5 shows the location within the Central Valley of each program listed in Table III-22.

Semitropic and Arvin-Edison Storage Programs

Metropolitan has entered into groundwater storage programs with Semitropic and Arvin-Edison Water Storage Districts, both of which are located in the southern part of the San Joaquin Valley. The combined storage of the two programs is approximately 600 taf. The specific amount of water Metropolitan can expect to receive from these programs depends upon hydrologic conditions and the demands placed on the Semitropic Program by other program participants. At full development, the storage programs can deliver 197 taf over 10 months. During wet years, Metropolitan has the discretion to use these programs to store portions of its SWP entitlement water that are in excess of the amounts needed to meet Metropolitan's service area demand. This water is either put in spreading basins or delivered to district farmers who use the water in-lieu of

pumping groundwater. During dry years, the districts return Metropolitan's previously stored water to Metropolitan.

Table III-22
CVP/SWP Storage and Transfer Programs: 2025
(TAF)

Hydrology*	Multiple Dry Years (1990-1992)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs[1]			
Semitropic Program	107	107	0
Arvin Edison Program	90	90	0
San Bernardino Valley MWD Program	37	70	20
Kern Delta Program	50	50	0
Subtotal of Current Programs	***284***	***317***	***20***
Programs Under Development[1]			
Mojave Program[2]	35	35	0
Central Valley Transfer Programs	125	125	0
Subtotal of Proposed Programs	***160***	***160***	***0***
Maximum Supply Capability	**444**	**470**	**20**

Notes:
1. Central Valley Storage and Transfer Programs are shown in the California Aqueduct tables in Appendix A.3.
2. The Mojave Program is listed under development even though it already exists as a demonstration project because Metropolitan is investigating extending and expanding the program.
* Appendix A.3 includes Central Valley Storage and Transfer Programs supply projections for 2010, 2015, and 2020.

San Bernardino Valley MWD Storage Program

This program can deliver between 20 taf and 80 taf in dry years, depending on hydrologic conditions. The expected delivery for a single dry year similar to 1977 is 70 taf. The agreement with San Bernardino Valley MWD also allows Metropolitan to store up to 50 taf of transfer water for use in dry years. In wet years the program can produce up to 130 taf of water supply.

Kern-Delta Water District Storage Program

This groundwater storage program has 250 taf of storage capacity. When fully developed, it will be capable of providing 50 taf of dry-year supply.

Mojave Storage Program

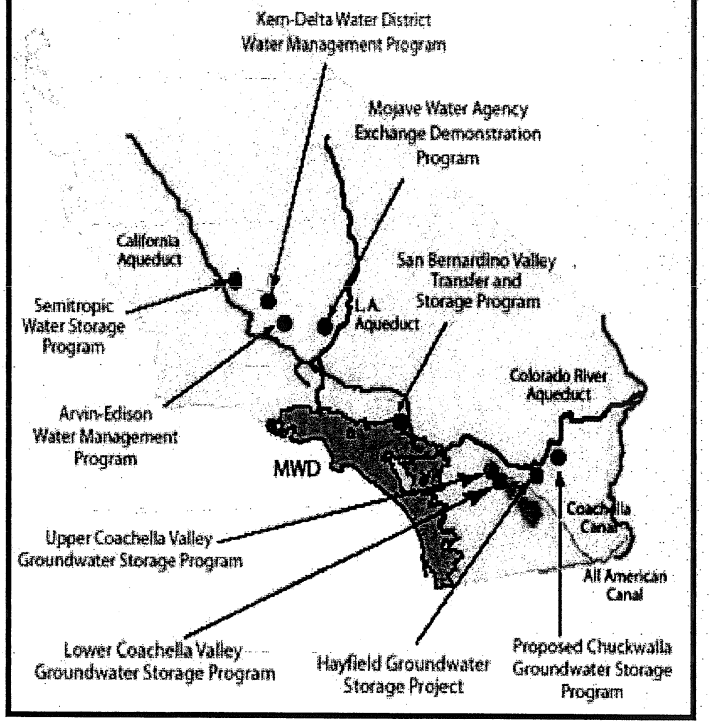
Currently operated as a demonstration program, Metropolitan plans to extend and expand this groundwater storage program. The program will store SWP supply delivered in wet years for

subsequent withdrawal during dry years. When fully developed, the program is expected to have a dry-year yield of 35 taf.

Central Valley Transfer Programs

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.

Figure III-3
Metropolitan Statewide Groundwater Banking Programs



In 2003, Metropolitan secured options to purchase approximately 145 taf of water from willing sellers in the Sacramento Valley during the irrigation season. These options protected against potential shortages of up to 650 taf 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 taf of water for delivery to the California Aqueduct.

In 2005, Metropolitan, in partnership with seven other State Water Contractors, secured options to purchase approximately 130 taf of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was 113 taf. 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, 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 taf 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 taf for single and multiple dry-year scenarios.

Achievements to Date

Metropolitan has made rapid progress to date developing Central Valley storage and transfer programs. Most notably, by 2003, it was able to put in place sufficient storage and transfer programs to meet its 2010 dry-year resource target of 300 taf. This rapid progress may be attributed to several factors, including Metropolitan dedicating additional staff to identify, develop, and implement Central Valley storage and transfer programs; increased willingness of Central Valley agricultural interests to enter into storage and transfer programs with Metropolitan; and Metropolitan staff's ability to work with California Department of Water Resources and US Bureau of Reclamation staff to facilitate Central Valley storage and transfer programs.

III.7 COLORADO RIVER AQUEDUCT

IRP Goals

In the 1996 IRP, Metropolitan adopted a target for supplies from the Colorado River Aqueduct (CRA) of 1.2 million af per year. Since that time, a number of constraints have developed that restrict Metropolitan's access to Colorado River supplies. As a result, Metropolitan's goals for Colorado River deliveries and programs to attain the goals have been changed from the previous IRP. The IRP Update adopted a revised policy of utilizing the fill capacity of the CRA when needed through the basic apportionment and various water banking and water transfer programs. This water will help Metropolitan manage regional storage conditions and water quality.

System Description

Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. Under its contract with the federal government, Metropolitan has a basic entitlement of 550 taf per year of Colorado River water. Over time, however, this amount will be reduced slightly. Metropolitan also holds a priority for an additional 662 taf per year. Metropolitan can obtain water under this priority from:

- water unused by the California holders of priorities 1 through 3
- water conserved by the water conservation program with Imperial Irrigation District.
- water saved by the Palo Verde fallowing and forbearance program, or
- when the U.S. Secretary of the Interior determines that either one or both of the following exists:
  - surplus water;
  - water is apportioned to, but unused by, Arizona and/or Nevada.

Issues

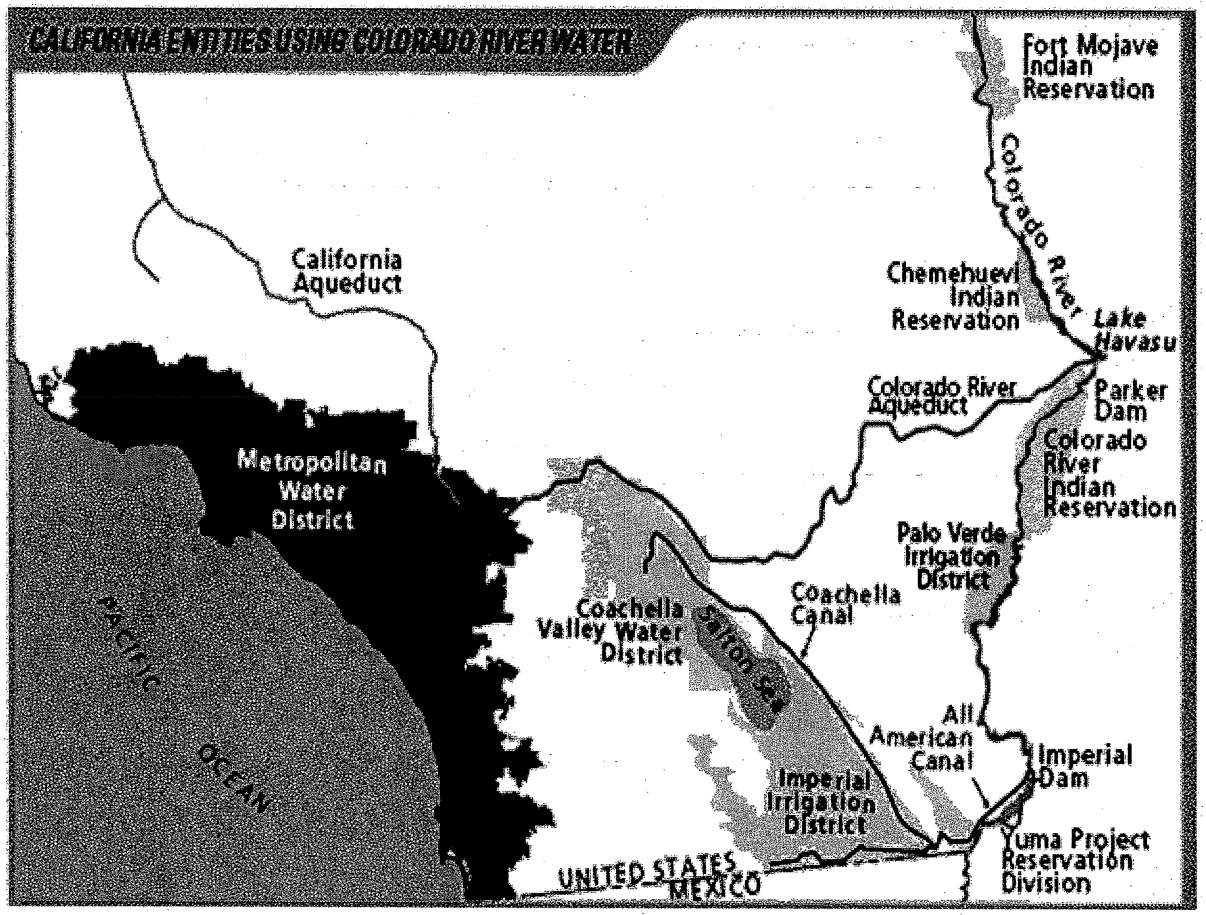
Over the years, a number of factors have affected the levels of Colorado River water available to Metropolitan.

- The 1964 U.S. Supreme Court decree in *Arizona v. California* reduced Metropolitan's dependable supply of Colorado River water to 550 taf per year. The reduction in dependability occurred with the commencement of Colorado River water deliveries to the Central Arizona Project in 1985.
- In 1979, the U.S. Supreme Court quantified present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations and other users. Since 1985, these PPR holders have used less than 20 taf annually. Because over 5.362 maf of Colorado River water were already allocated, it was not clear which rights would be affected by the use of these PPRs.

At that time, no formal guidelines existed to determine whether surplus water would be available. Decisions regarding surplus water availability were to be made at the discretion of the Secretary of Interior. As a result, the issues surrounding Colorado River water rights remained the subject of disagreement and litigation for many years.

The following figure shows the major aqueducts within southern California including those from the Colorado River, and the entities within the state having rights to the use of more than 5.362 maf of water from the Colorado River.

Figure III-4



Changed Conditions

Over time, Metropolitan and the State of California acknowledged that they would obtain less water from the Colorado River in the future than they had in the past, but the lack of clearly quantified water rights hindered efforts to promote water management projects. The U.S. Secretary of Interior asserted that California's users of Colorado River water had to limit their use to a total of 4.4 maf per year, plus any available surplus water. Under the auspices of the state's Colorado River Board, these users developed a draft approach to the problem, which was known as "California's Colorado River Water Use Plan" or the "California Plan." It characterized how California would develop a combination of programs to allow the state to limit its annual use of Colorado River water to 4.4 million af per year plus any available surplus water. The 2003 Quantification Settlement Agreement (QSA) among Imperial Irrigation District, Coachella Valley Water District and Metropolitan is the critical component of the

California Plan. It establishes the baseline water use for each of the agencies and facilitates the transfer of water from agricultural agencies to urban uses.

The recent extended drought in the Colorado River basin has stressed the water supply in this region more severely than had been foreseen. As a result of this experience, agencies from the Colorado River states are embarking on a negotiating process to develop guidelines to managing shortage on the Colorado River system. Until this process is completed (expected by December, 2007) the only guideline to allocations of this water is the existing priority system. Under this system, Metropolitan's base supply has higher priority than Arizona's or Nevada's supply, so Metropolitan has assumed (and current modeling demonstrates) that this supply is unlikely to be interrupted.

The San Diego County Water Authority has begun two projects that will provide Colorado River water to that agency.[1] These projects will result in increased Colorado River water being diverted into the Colorado River Aqueduct in Lake Havasu for delivery by Metropolitan to San Diego. Although these are not Metropolitan projects, they will increase water supplies to the region and decrease San Diego's demands on Metropolitan water supplies.

Implementation Approach

The 1996 IRP recognized explicitly that program development would play an important part in reaching the target level of deliveries from the CRA and other Colorado River user service areas. The implementation approach explored a number of water conservation programs with water agencies that took water from the Colorado or were located in close proximity to the CRA. Implementing the QSA was a necessary first step for all of these programs. On October 10, 2003, after lengthy negotiations, representatives from Metropolitan, the Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD) executed the QSA and other related agreements. Parties involved also included the San Diego County Water Authority (SDCWA), the California Department of Water Resources (DWR), the California Department of Fish and Game, the U.S. Department of the Interior, and the San Luis Rey Indian Water Rights Settlement Parties.

Metropolitan has identified a number of programs that could be used to achieve the regional long-term development targets for the CRA, and it has entered into or is exploring agreements with a number of agencies. Table III-23 summarizes these programs and describes whether the programs are being implemented, are deferred, or under investigation.

[1] These projects, the San Diego County Water Authority/Imperial Irrigation District transfers and the lining of the Coachella and All-American canals will be discussed in that Authority's Urban Water Management Plan.

Table III-23
Colorado River Aqueduct Deliveries: 2025
(TAF)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Existing Projects			
Base Apportionment[1]	503	503	503
IID/MWD Conservation Program	85	85	85
PVID Land Management Program	110	110	110
Future Projects			
Hayfield Storage Program[2,3]	100	100	0
Lower Coachella Storage Program[3]	150	150	0
Chuckwalla Storage Program[3]	150	150	0
Storage in Lake Mead[4]			

1. Basic apportionment less Present Perfected Rights.
2. Program has been implemented with approximately 73 taf in storage, and construction of extraction facilities was started but then deferred for two years because of drought in the Colorado River basin.
3. Storage programs have been deferred pending greater availability of surplus on the Colorado River.
4. Under investigation

Colorado River Water Management Programs

IID/MWD Conservation Program

Under a 1988 agreement, Metropolitan has 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 non-structural measures, including the lining of existing earthen canals with concrete, constructing local reservoirs and spill-interceptor canals, installing non-leak gates, and automating the distribution system. Other implemented programs include the delivery of water to farmers on a 12-hour rather than a 24-hour basis and improvements in on-farm water management through the installation of tailwater pumpback systems, drip irrigation systems, and linear-move irrigation systems. Through this program, Metropolitan initially obtained an additional 109 taf per year. Execution of the 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 taf per year. The remainder of the conserved water is available to CVWD.

Palo Verde Land Management and Crop Rotation Program

In May 2004, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with the Palo Verde Irrigation District. 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 taf. When fully implemented, the program is estimated to provide up to 111 taf per year. The agreement also states that when fully implemented the program will supply a minimum of 26 taf per year.

Hayfield Groundwater Storage Program

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 (about 50 miles east of Palm Springs) for future withdrawal and delivery to the CRA. As of 2003, there were 73 taf in storage. At that time, construction of facilities for extracting the stored water began, but it was then deferred for two years because drought conditions in the Colorado River watershed resulted in a lack of surplus supplies for storage. When the drought ends, Metropolitan will pursue this program and develop storage capacity of about 500 taf.

Chuckwalla Groundwater Storage Program

Under this proposed program, Colorado River water would be stored in the Upper Chuckwalla Groundwater Basin for future delivery to the CRA. The basin is located in Riverside County about 70 miles east of Palm Springs. Metropolitan has also decided to defer this program until water becomes more plentiful in the Colorado River Basin.

Lower Coachella Valley Groundwater Storage Program

Metropolitan, the Coachella Valley Water District, and the Desert Water Agency 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 taf 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.

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 maf are available for California use; when other California agencies use less than their allotted CRA water supplies; or if Metropolitan were to obtain water transfers from agencies in other Colorado River states. However, the recent drought 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.

Salton Sea Restoration Transfer

State legislation passed in 2003 requires the development of a plan to restore the Salton Sea. The Resources Secretary is required to submit to the Legislature a plan that identifies a preferred alternative no later than December 31, 2006. Implementation of the plan would be 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 af 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 taf new water to be conserved by IID; and (2) 800 taf of water presently

scheduled to be conserved by IID under the QSA to provide salinity management water for the Salton Sea. Conserved water could be available as soon as 2007 through 2017.

DWR is in the initial stages of preparing a Program Environmental Impact Report (PEIR) for the plan. A Draft PEIR is scheduled for release to the public in December 2005. The Final PEIR is scheduled for release in November 2006 with a Notice of Determination to be filed in December 2006. Metropolitan expects to call on this water in the medium term (around 2010), but does not expect to rely on it in the long term.

Lake Mead Storage

Metropolitan is also exploring other options for water storage including the potential to store water in Lake Mead. While this project appears promising, the likely benefits are too speculative to include in the reliability analysis.

Achievements to Date

Metropolitan recognizes that in the short-term, programs are not yet in place to provide the full target, even with the adoption of the QSA. The QSA provides a solid foundation for developing future programs that will help accomplish the long-term CRA target.

The execution of the QSA also reinstated the Interim Surplus Guidelines (ISG), which were suspended when the original agreement deadline passed. Under these guidelines, California can receive any surplus water available from the river through 2016. The amount of water available under this program would vary from year to year depending on the amount of water in storage in Lake Mead. Because of a five-year drought in the Colorado River watershed, the amount of surplus water available to Metropolitan has been substantially reduced from earlier projections. Additionally, if Metropolitan chooses to divert any special surplus water, a shortage-sharing program with the State of Arizona may be necessary. Because of the risks associated with this shortage-sharing, Metropolitan did not divert the special surplus water that was available through the ISG in 2003 or 2004. No surplus water is available in 2005.

Because of the uncertainties associated with this supply source, Metropolitan's current plans for resource development do not rely on them and the program is not included in this regional plan. However, this source may become more useful in future.

IV. Water Quality

IRP Goal

Metropolitan's planning efforts have recognized the importance of the quality of its water supplies. To the extent possible, Metropolitan responds to water quality concerns by concentrating on maintaining the quality of the source water and developing water management programs that protect and enhance water quality. Contaminants that cannot be sufficiently controlled through protection of source waters must be handled through changed water treatment protocols or blending. These practices can increase costs and/or reduce operating flexibility. In addition, Metropolitan has developed enhanced security practices and policies in response to national security concerns.

Implementing the major components of Metropolitan's planning efforts – groundwater storage, recycled water, and minimized impacts on the Delta – requires meeting specific water quality targets for imported water. Metropolitan has two sources of water: the Colorado River and the State Water Project. Each source has specific quality issues, which are summarized below. To date, Metropolitan has not identified any water quality risks that cannot be mitigated. As described below, the only potential effect of water quality on the level of water supplies could result from increases in the salinity of water resources. If diminished water quality caused a need for membrane treatment, Metropolitan could experience losses of up to 15 percent of the water processed. However, Metropolitan would only process a small proportion of the affected water and would reduce total salinity by blending the processed water with the remaining unprocessed water. Thus Metropolitan anticipates no significant reductions in water supply availability from these sources due to water quality concerns over the study period.

Colorado River

High salinity levels represent the most serious current problem associated with Colorado River supplies. In addition, Metropolitan is working to protect threats from uranium, perchlorate and hexavalent chromium, which are discussed later in this chapter. As noted above, high salinity levels on the Colorado could require membrane treatment, which could slightly reduce supply levels. Metropolitan fully expects its source protection efforts to be successful, so the only foreseeable water quality constraint to the use of Colorado River water will be the need to blend (mix) it with State Water Project supplies to meet the adopted salinity standards.

State Water Project

The key water quality issues on the State Water Project are total organic carbon, bromides and salinity. Metropolitan is working to protect the water quality of this source, but it has needed to upgrade its water treatment plants to deal adequately with disinfection byproducts. These byproducts result from total organic carbon and bromide levels in the source water, and they may place some near term restrictions on Metropolitan's ability to use State Water Project water. Metropolitan expects this treatment restriction to be overcome in the next few years, and other than this, Metropolitan does not expect any water quality restrictions on available water supplies from this source over the study period.

Local Agency Supplies and Groundwater Storage

Emerging standards for contaminants such as arsenic may add costs to the use of groundwater storage and may affect the availability of local agency groundwater sources. These contaminants are not expected to affect the availability of Metropolitan supplies, but they may affect the availability of local agency supplies, which could in turn affect the level of demands on Metropolitan supplies if local agencies abandon supplies in lieu of treatment options. Metropolitan has not analyzed the effect these water quality issues could have on local agency supply availability.

The major regional concerns are:

- perchlorate
- methyl tertiary butyl ether (MTBE) and tertiary butanol (TBA) in groundwater and local surface reservoirs[1]
- arsenic
- radon
- uranium
- N-nitrosodimethylamine (NDMA) in groundwater and treated surface waters
- hexavalent chromium in groundwater
- pharmaceuticals and personal care products.

Metropolitan has adopted programs to address the potential for contaminants that might influence water supply. These programs are discussed below, by contaminant.

Salinity

Imported water from the Colorado River has high salinity levels, so it must be blended (mixed) with lower-salinity water from the SWP. Higher salinity levels in either Colorado River water or groundwater would increase the proportion of SWP supplies required to meet the adopted imported water salinity objectives. Metropolitan adopted the imported water salinity standards because higher salinity could increase costs and reduce operating flexibility.

1. If diminished water quality causes a need for membrane treatment, the process typically results in losses of up to 15 percent of the water processed. These losses result both in an increased requirement for additional water supplies and environmental constraints related to brine disposal. In addition, the process is costly. However, only a portion of the imported water would need to be processed, so the possible loss in supplies is small.
2. High total dissolved solids (TDS) in water supplies leads to high TDS in wastewater, which lowers the usefulness and increases the cost of recycled water.
3. Degradation of imported water supply quality could limit the use of local groundwater basins for storage because of standards controlling the quality of water added to the basins.

In addition to the link between water supply and water quality, Metropolitan has identified economic benefits from reducing the TDS concentrations of water supplies. Estimates show that

[1] To date, no MTBE problems have been identified in Metropolitan's source water.

a simultaneous reduction in salinity concentrations of 100 milligrams per liter (mg/L) in both the Colorado River and SWP supplies will yield economic benefits of $95 million per year within Metropolitan's service territory. This estimate has added to Metropolitan's incentives to reduce salinity concentrations within the region's water supplies.

For all of these reasons, Metropolitan's Board approved a Salinity Management Policy on April 13, 1999. The policy set a goal of achieving salinity concentrations in delivered water of less than 500 mg/L TDS. At the same time, the Board adopted an Action Plan consisting of the following four components:

1. Imported water source control and salinity reduction actions;
2. Distribution system salinity management actions;
3. Collaborative actions with other agencies;
4. Local salinity management actions to protect groundwater and recycled water supplies.

Within Metropolitan's service area, local water sources account for approximately half of the salt loading, and imported water accounts for the remainder. All of these sources must be managed appropriately to sustain water quality and supply reliability goals. The following sections discuss the current salinity situation for each of Metropolitan's major supply sources.

Colorado River

Water imported via the Colorado River Aqueduct (CRA) has the highest level of salinity of all of Metropolitan's sources of supply, averaging around 630 mg/L since 1976. Concern over salinity levels in the Colorado River has existed for many years. To deal with the concern, the International Boundary and Water Commission approved Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River in 1973, and the President approved the Colorado River Basin Salinity Control Act in 1974. High TDS in the Colorado River as it entered Mexico and the concerns of the seven basin states regarding the quality of Colorado River water in the United States drove these initial actions. To foster interstate cooperation on this issue, the seven basin states formed the Colorado River Basin Salinity Control Forum (Forum).

The salts in the Colorado River System are indigenous and pervasive, mostly resulting from saline sediments in the Basin that were deposited in prehistoric marine environments. They are easily eroded, dissolved, and transported into the river system. The Colorado River Basin Salinity Control Program is designed to prevent a portion of this abundant salt supply from moving into the river system. The program targets the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs.

The Forum proposed, the states adopted, and the Environmental Protection Agency approved water quality standards in 1975, including numeric criteria and a plan for controlling salinity increases. The standards require that the plan ensure that the flow-weighted average annual salinity remain at or below the 1972 levels, while the Basin states continue to develop their 1922 Colorado River Compact-apportioned water supply. The Forum selected three stations on the main stream of the lower Colorado River as appropriate points to measure the river's salinity. These stations and numeric criteria are (1) below Hoover Dam, 723 mg/l; (2) below Parker Dam,

747 mg/l; and (3) at Imperial Dam, 879 mg/l. The numeric criteria are flow-weighted average annual salinity values.

During the high water flows of 1983-1986, salinity levels in the CRA dropped to a historic low of 525 mg/L. However, during the 1987-1992 drought, higher salinity levels of 600 to 650 mg/L returned. Once again, the current drought has seen a return to higher levels, with TDS in Lake Havasu measured at 674 mg/L in June 2005.

State Water Project

Water supplies from the SWP have significantly lower TDS concentrations than the Colorado River, averaging 250 mg/L in water supplied through the East Branch and 325 mg/L on the West Branch.[2] Because of this lower salinity, Metropolitan blends SWP water with high salinity CRA water to reduce the salinity concentrations of delivered water. However, both the supply and the TDS concentrations of SWP water can vary significantly in response to hydrologic conditions in the Sacramento-San Joaquin watersheds.

The TDS concentrations of SWP water can also vary widely over short periods of time. These variations reflect seasonal and tidal flow patterns, and they pose an additional problem for use of blending as a management tool to lower the higher TDS from the CRA supply. For example, in the 1977 drought, the salinity of SWP water reaching Metropolitan increased to 430 mg/L, and supplies became limited. During this same event, salinity at the SWP's Banks pumping plant exceeded 700 mg/L. Under similar circumstances, Metropolitan's 500 mg/L salinity objective could only be achieved by reducing imported water from the CRA. Thus, it may not always be possible to maintain both the salinity objective and water supply reliability unless salinity concentrations of source supplies can be reduced.

TDS objectives in Article 19 of the SWP Water Service Contract specify a ten-year average of 220 mg/L and a maximum monthly average of 440 mg/L. These objectives have not been met, and Metropolitan is working with DWR and other agencies on programs aimed at reducing salinity in Delta supplies. These programs aim to improve salinity on the San Joaquin River through modifying agricultural drainage and developing comprehensive basin plans. In addition, studies are underway to evaluate the benefits in reduced salinity of modifying levees in Franks Tract and other flooded islands in the Delta.

Recycled Water

Wastewater flows always experience significantly higher salinity concentrations than the potable water supply. Typically, each cycle of urban water use adds 250 to 400 mg/L of TDS to the wastewater. Salinity increases tend to be higher where specific commercial or industrial processes add brines to the discharge stream or where brackish groundwater infiltrates into the sewer system.

Where wastewater flows have high salinity concentrations, the use of recycled water may be limited or require more expensive treatment. Landscape irrigation and industrial reuse become

[2] The higher salinity in the West Branch deliveries is due to salt loadings from local streams, operational conditions, and evaporation at Pyramid and Castaic Lakes.

problematic at TDS concentrations of over 1,000 mg/L. Some crops are particularly sensitive to high TDS concentrations, and the use of high-salinity recycled water may reduce yields of these crops. In addition, concern for the water quality in groundwater basins may lead to restrictions on the use of recycled water on lands overlying those basins.

These issues are exacerbated during times of drought, when the salinity of imported water supplies increases because of increased salinity in wastewater flows and recycled water. Basin management plans and recycled water customers may restrict the use of recycled water at a time when its use would be most valuable. To maintain the cost-effectiveness of recycled water, therefore, the salinity level of the region's potable water sources and wastewater flows must be controlled.

Groundwater Basins

Increased TDS in groundwater basins occurs either when basins near the ocean are overdrafted, leading to seawater intrusion, or when agricultural and urban return flows add salts to the basins. Much of the water used for agricultural or urban irrigation infiltrates into the aquifer, so where irrigation water is high in TDS or where the water transports salts from overlying soil, the infiltrating water will increase the salinity of the aquifer. In addition, wastewater discharges in inland regions may lead to salt buildup from fertilizer and dairy waste. In the 1950s and 1960s, Colorado River water was used to recharge severely overdrafted aquifers and prevent saltwater intrusion. As a result, the region's groundwater basins received more than three million acre-feet of this high-TDS imported water, significantly impacting salt loadings.

In the past, these high salt concentrations have caused some basins within Metropolitan's service area to be unsuitable for municipal uses if left untreated. The Arlington Basin in Riverside and the Mission Basin in San Diego required demineralization before they could be returned to municipal service. The capacity of the larger groundwater basins makes them better able to dilute the impact of increasing salinity. While most groundwater basins within the region still produce water of acceptable quality, this resource must be managed carefully to minimize further degradation. Even with today's more heightened concern regarding salinity, approximately 600,000 tons of salts per year accumulate within the region, leading to ever-increasing salinity concentrations in many groundwater basins. Table IV-1 shows the salinity from existing productive groundwater wells within the region, and Figure IV-1 shows the distribution of those salinity concentrations.

To protect the quality of these basins, regional water quality control boards often place restrictions on the salinity concentrations of water used for basin recharge or for irrigation of lands overlying the aquifers. Those situations may restrict water reuse and aquifer recharge, or they may require expensive mitigation measures.

Table IV-1
Salinity Levels at Productive Groundwater Wells

TDS Concentration (mg/L)	Annual Production (Million Acre-Feet)	Percent of Production
Less than 500	1.06	78
500 to 1,000	0.15	11
Greater than 1,000	0.15	11
Total	1.36	100

Source: Metropolitan Water District of Southern California, Salinity Management Study, Final Report, June 1999.

The Salinity Action Plan

The Salinity Management Policy adopted by Metropolitan's Board specified a salinity objective of 500 mg/L for blended imported water. It also identified the need for both local and imported water sources to be managed comprehensively to maintain the ability to use recycled water and groundwater. To achieve these targets, the Board adopted an Action Plan that relies in part on blending SWP water with supplies from the Colorado River. Using this approach, the salinity target could be met in seven out of ten years. In the other three years, hydrologic conditions would result in increased salinity and reduced volume of SWP supplies. Metropolitan has alerted its local agencies that such conditions are inevitable, and that despite its best efforts, high salinity could be a concern at such times. Metropolitan has also urged its member agencies to structure the operation of their local projects and groundwater so they are prepared to mitigate the effect of higher salinity levels in imported waters. In addition, Metropolitan will concentrate on obtaining better quality water in the spring/summer months (April through September) to maximize the use of recycled water in agriculture.

In the near term, Proposition 13 and the CALFED Bay-Delta Program call for actions and provide funding to improve the quality of water originating in the Bay-Delta. Proposition 13 (Water Bond 2000), which was approved by 65 percent of California voters in March 2000, authorizes the State of California to sell $1.97 billion in general obligation bonds to support safe drinking water, water quality, flood protection, and water reliability projects throughout the state. Of these funds, $355 million are earmarked for statewide clean water and water recycling programs, and $155 million will go to water conservation programs.

Metropolitan has obtained Proposition 13 funding for two water quality programs:

The Water Quality Exchange Partnership. The $20 million that has been awarded is being used to develop new water infrastructure that will enhance and optimize the water supply, water quality, and water management capabilities of agricultural and urban interests in the eastern San Joaquin Valley and urban Southern California. These projects are designed for agencies that have access to high quality water from Sierra watersheds. Metropolitan is working with these agencies to institute programs to exchange their higher quality water for SWP water.

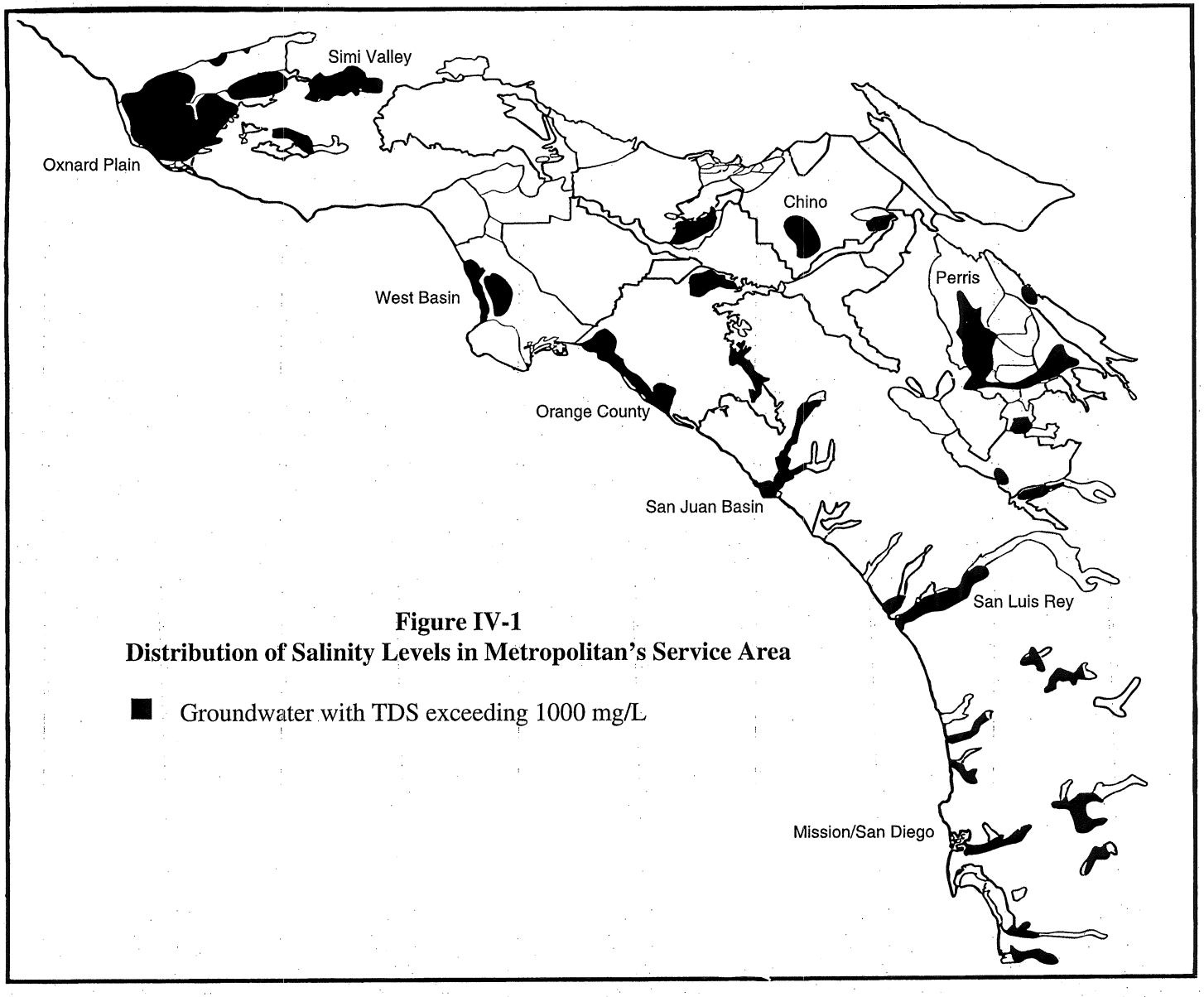


Figure IV-1
Distribution of Salinity Levels in Metropolitan's Service Area

■ Groundwater with TDS exceeding 1000 mg/L

- The Desalination Research and Innovation Partnership (DRIP). This $4 million award will help develop cost-effective advanced water treatment technologies for the desalination of Colorado River water, brackish groundwater, municipal wastewater, and agricultural drainage water.

Actions during the first seven years of the CALFED Bay-Delta Program include: improved salt management in the San Joaquin Valley, upstream source control, other desalination demonstration projects, and measures to control storm runoff into the California Aqueduct.

In the longer term, implementation of the CALFED Bay-Delta Program over the next thirty years is expected to reduce both the long-term average and short-term salinity variations in SWP water supplies. Even if these reductions are not achieved, Metropolitan could consider desalination of Colorado River water to maintain salinity objectives, but given current technologies, this option is very expensive. It also would cause a 10 to 15 percent reduction in the amount of water that could be delivered from the Colorado River because part of the treated water supply would be lost in the concentrated waste brine. In addition, there would be significant cost and environmental issues related to the disposal of this brine. For these reasons, large-scale Colorado River water desalination may not be viable at this time, but it could be in the future. To overcome the uncertainties, the Salinity Management Action Plan calls for an aggressive research and development program for a more efficient and cost-effective desalination technology. Near-term research is nearly completed through DRIP, a consortium of California water agencies and other interested parties.

Developing the Plan

The release of Metropolitan's Salinity Management Action Plan marked the culmination of a three-year process that began in August of 1996. At that time, Metropolitan and the U.S. Bureau of Reclamation (USBR) agreed to cooperate on and jointly fund a study of the sources of salinity in the water supply, problems associated with that salinity, and management options to overcome these problems. To ensure a broad level of input for the analysis, Metropolitan formed a task force of interested water, groundwater and wastewater agencies, state and local government agencies, and interested associations.

The Salinity Summit

As the Salinity Management Study neared completion, Metropolitan convened a Salinity Summit in January 1999. At this conference, 100 senior managers and technical experts representing 60 agencies discussed regional salinity issues. They considered implementation issues surrounding a regional salinity management plan, and they discussed how the region's agencies could work together to attain salinity management goals.

Perchlorate

Ammonium perchlorate is used as a main component in solid rocket propellant, and it can also be found in some types of munitions and fireworks. Ammonium perchlorate and other perchlorate salts are readily soluble in water, dissociating into the perchlorate ion (ClO_4^-), which is highly mobile in the groundwater. The perchlorate ion does not readily interact with the soil matrix or degrade in the environment.

The primary human health concern related to perchlorate is its effects on the thyroid. Perchlorate interferes with the thyroid gland's ability to produce hormones required for normal growth and development. Currently, the California Department of Health Services (CDHS) has adopted a notification level of 6 µg/L for perchlorate and is in the process of developing a drinking water regulation. If the current notification level is exceeded, CDHS requires that utilities inform their governing bodies. It also recommends they notify consumers of perchlorate's presence in the drinking water supply and its potential adverse health effects, and it strongly recommends that untreated source supplies be removed if perchlorate levels exceed 60 µg/L.

Perchlorate has been detected at low levels in Metropolitan's CRA water supply and in a number of the regional groundwater basins. No perchlorate has been detected in Metropolitan's SWP supply.

The Perchlorate Action Plan

Because of growing concerns over perchlorate levels in drinking water, Metropolitan adopted a Perchlorate Action Plan in 2002.[3] The Plan's objectives are to: (1) expand monitoring and reporting programs, (2) assess the impact of perchlorate on local groundwater supplies, (3) continue tracking health effects studies, (4) continue tracking remediation efforts in the Las Vegas Wash, the source of perchlorate contamination of the Colorado River, (5) initiate modeling of perchlorate levels in the Colorado River, (6) investigate the need for additional resource management strategies, (7) pursue legislative and regulatory options for cleanup activities and regulatory standards, (8) include information on perchlorate into outreach activities, and (9) provide periodic updates to Metropolitan's board and member agencies.

Metropolitan began monitoring for perchlorate in June 1997 when it was detected in the Colorado River Aqueduct and the Lake Mead outlet at Hoover Dam. Extensive sampling within the Colorado River watershed in July and August of the same year indicated that the perchlorate originated in the Las Vegas Wash, and the most likely source was the Kerr-McGee chemical manufacturing site located in Henderson, Nevada. In August 1997, a quarterly monitoring program began for water in Lake Mead, and Metropolitan began monthly monitoring the water in its system in October 1997. The Nevada Division of Environmental Protection manages a comprehensive groundwater remediation program in the Henderson area. The amount of perchlorate entering the Colorado River system from Henderson has been reduced from approximately 900 lb/day in 1997 to 103 lb/day as of May, 2005.[4] This number has fluctuated

[3] This was presented to the Board at the June 11, 2002 Board meeting.

[4] As reported at http://ndep.nv.gov/bca/perchlorate05.htm. This site reports real-time monitoring results for perchlorate just above the confluence of the Las Vegas Wash and Lake Mead.

during 2005, probably as a result of higher runoff caused by unusual amounts of local precipitation. The concentrations of perchlorate in Colorado River Water are now less than California's detection limit for reporting purposes of 4 parts per billion (ppb).[5]

Perchlorate has also been found in groundwater basins within Metropolitan's service area. As of May 2002, the following Metropolitan agencies reported closures of wells due to perchlorate: Anaheim, Central Basin MWD, Foothill MWD, Pasadena, San Marino, Three Valleys MWD, Western MWD, and Upper San Gabriel Valley MWD. Total lost production due to well closures is estimated at 57 taf annually. Member and sub-agencies are considering various options for removing or reducing perchlorate concentrations, including blending and treatment, to recover some or all of lost production.[6]

Perchlorate in local groundwater basins is thought to be largely from local sources that tested and manufactured solid rocket engines. The closed wells are typically located near rocket testing and manufacturing facilities (such as Aerojet in Azusa in the Main San Gabriel Basin and the Jet Propulsion Laboratory/NASA in the Raymond Basin). In the Raymond Basin, one City of Pasadena well was shut down because of perchlorate concentrations of approximately 100 to 125 µg/L. In the Main San Gabriel Basin, several wells have been shut down, and the La Puente County Water District has the highest concentrations of perchlorate, at approximately 200 µg/L.

Metropolitan also conducted applied research to investigate technologies to mitigate perchlorate contamination. Perchlorate cannot be removed using conventional water treatment. Nanofiltration and reverse osmosis do work effectively but at a very high cost. Aerojet has implemented fluidized bed biological treatment in Rancho Cordova and is re-injecting the treated water into the ground. Local companies have also conducted work on this topic. A number of companies have developed an ion exchange process that removes perchlorate but creates a hazardous waste brine. Nevertheless, a number of sites in Southern California have successfully installed ion exchange systems. The City of Pasadena is using ion exchange treatment at one well site and is considering biological treatment for another. The City of Santa Clarita is studying the use of fixed-bed biological treatment.

Thus, research is showing that treatment options are available to recover groundwater supplies contaminated with perchlorate. However, it is impossible to predict whether treatment will be pursued to recover all lost production since local agencies will make those decisions based largely on cost considerations, ability to identify potentially responsible parties for cleanup, and the availability of alternative supplies.

Total Organic Carbon and Bromide

When source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone, disinfection byproducts (DBPs) form. Studies have shown a link between certain cancers and DBP exposure. In addition, some studies have shown an association between reproductive and developmental effects and chlorinated water. In December 1998, the U.S. Environmental Protection Agency (EPA) adopted more stringent

[5] See the measurements from Willow Beach, reported at the NDEP website provided in the previous footnote.
[6] As reported in the Perchlorate Action Plan, June, 2002.

regulations for DBPs. Water agencies began complying with those new regulations in January 2002, and the EPA is expected to promulgate even more stringent regulations in the near future.

Existing levels of total organic carbon (TOC) and bromide in Delta water supplies present significant concern for Metropolitan's ability to maintain safe drinking water supplies. Levels of these constituents in SWP water increase several fold due to agricultural drainage and seawater intrusion as water moves through the Delta. One of Metropolitan's primary objectives for the CALFED Bay-Delta process is protection and improvement of the water quality of its SWP supplies to ensure compliance with current and future drinking water regulations. Although exact future drinking water standards are unknown, significant source water protection of SWP water supplies will almost certainly be a necessary component of meeting these requirements cost effectively.

On August 17, 1999, Metropolitan's Board of Directors adopted a Statement of Needs for the CALFED Bay Delta Program. The drinking water quality and salinity targets component states that Metropolitan requires a safe drinking water supply from the Bay-Delta to meet current and future regulatory requirements for public health protection. This objective is to be achieved through reduced levels of TOC, bromide, pathogens, and other as yet unknown constituents in SWP water supplies. Implementation of the CALFED program should:

- Ensure the ability to meet anticipated more stringent regulations on disinfection byproducts and pathogens to protect public health, either through water quality improvements for Delta water supplies or through a cost-effective combination of alternative source waters, source improvement, and treatment facilities. Water quality improvements need to be implemented in a timely manner to allow compliance with the effective date of the regulations.

- Identify and commit to projects tied to the establishment of water quality performance milestones as an element of Stage 1 of CALFED's implementation plan to ensure compliance with anticipated and future more stringent regulations.

The CALFED Record of Decision released in August 2000 adopted the following water quality goals for TOC and bromide:

- average concentrations at Clifton Court Forebay and other southern and central Delta drinking water intakes of 50 µg/L bromide and 3.0 mg/L total organic carbon, or
- an equivalent level of public health protection using a cost-effective combination of alternative source waters, source control, and treatment technologies.

CALFED's Bay-Delta Program calls for a wide array of actions to improve Bay/Delta water quality, ranging from improvements in treatment technology to safeguarding water quality at the source. These actions include conveyance improvements, alternative sources of supply, changes in storage and operations, and advanced treatment by water supply agencies. These conceptual actions do not completely conform to the specific requirements as outlined by Metropolitan's Board. Metropolitan would like to see CALFED adopt water quality improvement milestones that would assure Southern California's ability to comply with pending more stringent regulations.

Source water quality improvements must be combined with cost-effective water treatment technologies to ensure safe drinking water at a reasonable cost. Metropolitan has five treatment plants: two that receive SWP water exclusively, and three that receive a blend of State Project and Colorado River water. In December 2001, Metropolitan's board committed to installing ozone treatment systems at the two plants that treat SWP water only. This ozonation process avoids the production of regulated disinfection byproducts that would otherwise form in the chlorine treatment of SWP water. The plants producing blended water meet federal guidelines for these byproducts through managing the blend of State Project and Colorado River water. To maintain the byproducts at a level consistent with federal law, Metropolitan currently limits the percentage of water from the State Water Project used in each plant. Metropolitan's Board has also adopted plans to install ozonation at the blending plants by 2011 at a cost of approximately $850 million.[7] This improvement will lift the restrictions on the mix of water used at the plants.

For short periods, Metropolitan can manage TOC levels in SWP supplies by blending with water withdrawn from water banks. For example, during a 2003 outage at Lake Mathews, Metropolitan extracted water from the Arvin-Edison and Kern Water Bank groundwater storage programs to reduce organic carbon levels in the California Aqueduct. The low-TOC groundwater reduced the TOC load in the California Aqueduct deliveries by more than 20% during the extraction period.

Other Issues of Concern

Four other chemicals have been identified as being of concern in Metropolitan's water supplies. These are MTBE, arsenic, radon and uranium. The following sections detail the reasons for Metropolitan's concerns and the plans for addressing them. Other emerging contaminants, such as NDMA and hexavalent chromium, could impact the region's water supplies; they have been identified, but the full extent of problems associated with them remains uncertain.

Methyl Tertiary Butyl Ether and Tertiary Butanol

Until recently, MTBE was the primary oxygenate in virtually all the gasoline used in California. In January 2004, the Governor's executive order to remove MTBE from gasoline became effective, and now ethanol is the primary oxygenate in use. The use of MTBE (and other oxygenates) in gasoline was mandated to achieve reductions in air pollution, including emissions of benzene, a known human carcinogen. However, this reduction in air pollution has been achieved at the expense of creating a serious groundwater and surface water contamination problem. MTBE is very soluble in water and has low affinity for soil particles, so it moves quickly into the groundwater. It is introduced into surface water bodies from the motor exhausts of recreational watercraft. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components.

CDHS has adopted a primary maximum contaminant level (MCL) of 13 µg/L for MTBE based on carcinogenicity studies in animals. MTBE also has a California Secondary Drinking Water Standard of 5 µg/L, which was established based on taste and odor concerns. In addition,

[7] This plan was authorized by Metropolitan's Board on July 8, 2003.

tertiary butanol (TBA) is often found in water where MTBE is present, so the CDHS has adopted a provisional action goal for TBA of 12 µg/L.

Metropolitan regularly monitors its water supply for contamination from MTBE and other oxygenates. In the past years, MTBE testing results have ranged from of non-detection to as high as 3.9 µg/L in the treatment plant effluents, and as high as 6.4 µg/L in the source water.

At Diamond Valley Lake and Lake Skinner, Metropolitan has taken steps to reduce the potential for MTBE contamination from recreational watercraft. The Board authorized a non-polluting boating program for these reservoirs that calls for specific boat requirements (MTBE-free fuel and clean burning engines) and a monitoring program that will show if MTBE or other gasoline contaminants appear at the lake.

Metropolitan has supported federal and state legislation aimed at reducing the impacts of MTBE in its drinking water supply, and it is investigating treatment options. In 1999, then-Governor Gray Davis issued Executive Order D-5-99, which phased out MTBE as a gasoline additive by December 31, 2003. California has requested a waiver to the oxygenate requirement from USEPA. The request was originally denied, but it is currently being reconsidered. Since other oxygenates are being used and many of these compounds have properties similar to those of MTBE, Metropolitan will continue to monitor for fuel oxygenates in reservoirs that are exposed to motorized watercraft.

MTBE presents a significant problem to local groundwater basins. Leaking underground storage tanks and poor fuel-handling practices at local gas stations may provide a large source of MTBE. Only one gallon of gasoline (11% MTBE by volume) is enough to contaminate about 16.5 million gallons of water at 5 µg/L. Within Metropolitan's service area, local groundwater producers have been forced to close some of their wells due to MTBE contamination. For example, the city of Santa Monica lost about fifty percent of its production wells as a result of MTBE.

Improved underground storage tank requirements and monitoring, and the phase-out of MTBE as a fuel additive, will probably decrease the likelihood of MTBE groundwater problems in the future. However, it is difficult to estimate the magnitude of the problem when a small amount of MTBE can contaminate such a large volume of water.

A combination of an advanced oxidation process (typically ozone and hydrogen peroxide) followed by granular activated carbon has been found to be effective in reducing the levels of these contaminants by 80 to 90 percent.[8] Member agencies may therefore be able to treat their groundwater sources to comply with water quality standards. However, if the cost increases are sufficient, some member agencies may choose to increase their use of imported water to avoid this treatment cost.

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[8] See Liang, S., L. S. Palencia and R. L. Wolfe (1999). "Oxidation of MTBE by ozone and peroxone processes." *Journal of the American Water Works Association* 91(6): 104, and Liang, S., R. S. Yates, D. V. Davis, S. J. Pastor, L. S. Palencia and J. M. Bruno (2001). "Treatability of MTBE-contaminated groundwater by ozone and peroxone." *Journal of the American Water Works Association* 93(6): 110-120.

Arsenic

The new federal MCL for arsenic in domestic water supplies is 10 µg/L, with an effective date of 2006. The standard will impact both groundwater and surface water supplies. Metropolitan's water supplies have low levels of this contaminant and will not require treatment changes or capital investment to comply with this new standard. However, some investment will be needed to manage arsenic in the solids resulting from treatment.

The California Legislature required the Department of Health Services to adopt a new drinking water standard for arsenic by June 30, 2004. In advance of this requirement, the Office of Environmental Health Hazard Assessment set a public health goal for arsenic of 0.004 µg/L, based on lung and urinary bladder cancer risk. Monitoring results submitted to CDHS in 2001-2003 show that arsenic is ubiquitous in drinking water sources, reflecting its natural occurrence. They also show that considerably more sources have arsenic detections above the federal 10 µg/L MCL compared to the current MCL of 50 µg/L. Southern California drinking water sources that contain concentrations of arsenic over 10 µg/L include San Bernardino (61 sources), Los Angeles (50 sources), Riverside (24 sources), Orange (4 sources), and San Diego (4 sources).[9]

Some member agencies may face greater problems with arsenic compliance. A 1992 study for Central Basin Municipal Water District, for example, indicated that some of the Central Basin wells could have difficulty in complying with a lowered standard.[10] Water supplies imported via the Los Angeles Aqueduct also contain some arsenic. The cost of arsenic removal from these supplies could vary significantly.

At this time, it appears likely that the new treatment standards will increase costs but not necessarily decrease local water supplies. However, if the cost increases are sufficient, some member agencies may choose to increase their use of imported water to avoid this treatment cost.

Radon

U.S. EPA has proposed a radon MCL of 300 pCi/L, with an alternative standard of 4,000 pCi/L if the state has an approved Multimedia Mitigation program to reduce the indoor radon risk from soil and rocks underneath homes and buildings. Radon levels in Metropolitan's water supplies have been well below the proposed MCL of 300 pCi/L.[11] Where radon is a problem, air-stripping through aeration is the cost-effective treatment option. However, stripping results in outgassing of radon to the air. Currently the U.S. EPA has determined that the risk posed by this outgassing is less than that posed by radon in the water.

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[9] From the CDHS web site: http://www.dhs.ca.gov/ps/ddwem/chemicals/arsenic/monitoringresults.html. Note that the numbers reported there may change because the website is frequently updated.

[10] *Summary Review on the Occurrence of Arsenic in the Central Groundwater Basin, Los Angeles County, California*, prepared by Richard C. Slade & Associates, Sept. 7, 1993.

[11] Metropolitan's annual water quality report (Consumer Confidence Report, CCR). is a public document which reports the presence of regulated contaminants in Metropolitan's water supply. Radon is a regulated contaminant, so it would be included it in the Consumer Confidence Report if it were to be detected. Radon is not reported in the CCR, so it is not detected in the source water.

Uranium

A ten-and-a-half-million-ton pile of uranium mine tailings at Moab, Utah lies 600 feet from the Colorado River. Rainwater has been seeping through the pile and contaminating the local groundwater, causing a flow of contaminants into the river. It also has the potential to wash millions of tons of material containing uranium into the Colorado River as a result of a flood or other natural disaster. Public perception of drinking water safety is a particular concern with uranium.

Operations and maintenance activities at the site include intercepting some of the contaminated groundwater before it discharges into the river. The interim action system became fully operational in September 2003 and is currently being evaluated. Uranium in the concentration range of 950 to 1,190 picoCuries per liter (pCi/L) has been measured at the seepage site in the river. Uranium levels in the Colorado River at Metropolitan's intake range from 1 to 5 pCi/L. The California drinking water standard is 20 pCi/L.

At the recommendation of the National Research Council, the Department of Energy conducted a study to evaluate remediation actions and released an environmental impact statement (EIS) in July 2005.[12] The Department of Energy has agreed to move the tailings, but remediating the site will require Congressional appropriations, and maintaining congressional support for a cleanup will require close coordination and cooperation with other Colorado River users.

Other Emerging Contaminants

A number of other emerging contaminants, most notably N-nitrosodimethylamine, chromium VI, and pharmaceutical products, may also impact groundwater supplies.

N-nitrosodimethylamine (NDMA) contamination of groundwater was initially believed to be the result of chemical contamination from liquid rocket fuels when it was detected in some California groundwaters at concentrations exceeding California's notification level of 0.010 µg/L. Further investigations have shown NDMA to be a disinfection by-product of water and wastewater treatment. Recent studies indicate that chlorine and monochloramine can react with organic nitrogen precursors to form NDMA. Some NDMA control measures or removal technologies may be required to avoid impacts on Southern California drinking water supplies. Current test results for the presence of NDMA in Metropolitan's system range from non-detect (reporting limit of 0.002 µg/L) to 0.012 µg/L. The presence of NDMA is not limited to Metropolitan waters but is believed to be widespread.

Chromium VI is a possible contaminant in groundwater and surface water. Chromium is an inorganic chemical used in electroplating, leather tanning, wood treatment, pigments manufacture, and cooling tower treatment for corrosion control. Chromium can enter drinking water sources through discharges from industries, leaching from hazardous waste sites, and erosion of natural deposits. The California Legislature required that the California Department of Health Services set a maximum contaminant level for chromium VI by January 1, 2004. This level has not yet been achieved because the California Office of Health Hazard Assessment must

[12] This can be found at http://gj.em.doe.gov/moab. This site also provides updated information on the status of this project.

first establish a chromium VI-specific public health goal, which is the first step in the regulatory process. The current California MCL for total chromium is 0.05 mg/L (which includes chromium VI), but the CDHS is currently reviewing that MCL. Metropolitan is participating in a Consultative Technical Work Group that reviews monitoring results and remediation plans for groundwater contaminated with chromium VI at a site adjacent to the Colorado River near Topock, California.

Local agencies are concerned that Chromium VI may be found to be a health hazard, yet there are no proven technologies for reducing Chromium VI in water supplies to low levels. Although concentrations in local water supplies are below federal and state water quality standards, a number of cities[13] teamed with the American Water Works Association Research Foundation to initiate a research program into chromium removal. The program consists of three phases: bench scale, pilot scale and demonstration scale testing. Bench and pilot scale testing have been completed, and they have identified promising technologies. The City of Glendale is currently conducting a Phase 3 bridge project to fine-tune the treatment technologies identified in the earlier phases and develop cost estimates. The most cost-effective treatment technology will be chosen for the demonstration-scale project, and the city will submit an application for an EPA grant for that phase of the project. Metropolitan is a member of the Project Advisory Committee for this project, as are staff from Glendale, Los Angeles, U.S. EPA and the California Department of Health Services.

Pharmaceuticals and personal care products in source water and recycled water have led to growing expressions of concern. The extent that these contaminants are found to require mitigation may increase the cost of recycled water and wastewater treatment, and they may require broad controls on runoff into source water. However, the effect of this concern is difficult to predict with the current state of knowledge.

Other Water Quality Actions

In addition to monitoring for and controlling specific identified chemicals in the water supply, Metropolitan has undertaken a number of programs to protect the quality of its water supplies. These programs are summarized below.

Source Water Protection

Source water protection is important for all of California. The California Department of Health Services requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to examine possible sources of drinking water contamination. These surveys include suggestions for how to protect water quality at the source. The most recent sanitary surveys for Metropolitan's water sources were completed in 2000 and 2001.[14]

[13] Los Angeles, Burbank, Glendale and San Fernando.

[14] Metropolitan Water District of Southern California, *Colorado River Watershed Sanitary Survey, 2000 Update*. For the State Water Project, the sanitary survey report was undertaken by the California Department of Water Resources, Division of Planning and Local Assistance, in 2001, and was titled *Sanitary Survey Update Report, 2001*.

A similar requirement from EPA calls for utilities to complete a Source Water Assessment. Information collected in the sanitary surveys is used to evaluate the vulnerability of water sources to contamination and to help determine the need for additional protective measures. Metropolitan completed its source water assessment in December 2002.[15] Water from the Colorado River is considered to be the most vulnerable to contamination by recreation, urban/storm-water runoff, increasing urbanization in the watershed, wastewater, and past industrial practices. Water supplies from Northern California are most vulnerable to contamination by urban/storm-water runoff, wildlife, agriculture, recreation, and wastewater.

Support SWP Water Quality Programs

Metropolitan supports DWR policies and programs aimed at maintaining or improving the quality of SWP water delivered to Metropolitan. In particular, Metropolitan supported the DWR policy to govern the quality of non-project water conveyed by the California Aqueduct, and it continued funding DWR's Municipal Water Quality Investigations Program that monitors and studies conditions affecting the quality of water in the Bay-Delta system.

Metropolitan also supports the Sacramento River Watershed Program, which was founded in 1996 to encourage interest groups to work together to address water quality problems in the watershed. Metropolitan provides funds to the program to help finance public service announcements to educate the public about the need to protect water quality in the watershed. Metropolitan also provides input to the development and implementation of water quality monitoring in the watershed.

Water Quality Exchanges

Metropolitan has developed and fostered water quality exchange partnerships with the Friant Water Users Authority and the Kings River Water Association. Under these partnerships, Metropolitan will invest in local infrastructure in the partners' service areas, which will provide the physical capability for the partners to exchange high-quality water from the Sierra Nevada mountains for a portion of Metropolitan's SWP supplies.

In addition, Metropolitan has implemented selective withdrawals from the Arvin-Edison storage program and the Kern Water Bank to improve water quality. Although these programs were initially designed to provide dry-year supply reliability, they can also be used to store SWP water at periods of better water quality so the stored water may be withdrawn at times of lower water quality, thus diluting SWP water deliveries.

[15] Metropolitan Water District of Southern California, Water Quality Section. *Drinking Water Source Assessments for the Colorado River and State Water Project: System 1910087.* 2002

Water Supply Security

The change in the national and international security situation has led to increased concerns about protecting the nation's water supply. In coordination with its member agencies, Metropolitan added new security measures in 2001 and continues to upgrade and refine procedures. Changes have included an increase in the number of water quality tests conducted each year (more than 300,000), as well as contingency plans that coordinate with the Homeland Security Office's multicolored tiered risk alert system.

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
REGIONAL URBAN WATER MANAGEMENT PLAN 2005
APPENDICES AND ATTACHED DOCUMENTS

APPENDIX A.1
DEMAND FORECAST

A.1 DEMAND FORECAST

Forecast Overview

Retail M&I demands represent the full spectrum of urban water use within a region, including residential, commercial, industrial, institutional and un-metered uses. Within the water industry, numerous approaches exist for projecting future retail M&I water demands. These approaches include per capita projections, trend extrapolation, land use build-out estimates, and econometric models.

To forecast urban water demands, Metropolitan uses the MWD-MAIN Water Use Forecasting System. MWD-MAIN features statistical models that have been adapted to conditions in Southern California. The model incorporates projections of demographic and economic variables from regional planning agencies (the Southern California Association of Governments, or SCAG, and the San Diego Association of Governments, or SANDAG) into statistically estimated water demand models to produce forecasts of water demand. The retail demand projections from MWD-MAIN are reduced by projected conservation savings developed in a separate conservation model.

The MWD-MAIN system features a separate model for each sector. Similarly, in the nonresidential sector, water use per employee is combined with forecasts of employment to yield an estimate of total nonresidential water demand. Table A.1-1 depicts these key relationships in the MWD-MAIN model. In the residential sector, the forecasts of water demand per dwelling unit are combined with the forecasts of dwelling units from the regional planning agencies to yield an estimate of total sector water demand.

In addition to accounting for future demographic trends, Metropolitan's water demand forecasts also incorporate current and future water demand management (conservation) efforts. In 1991, Metropolitan signed a *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU.) The MOU has been amended over time, and it commits Metropolitan to implementing a number of long-term water conservation measures referred to as Best Management Practices (BMPs). Section III.1 contains a more detailed discussion of Metropolitan's efforts at implementing the BMPs. A copy of the amended memorandum can be found at http://www.cuwcc.org/memorandum.lasso .

The forecasting approach embeds a detailed accounting of water conservation, distinguishing between:

- *Code-Based Conservation* – Water saved as a result of changes in water efficiency requirements for plumbing fixtures in plumbing codes. Thus, this form of conservation would occur without any water agency action.
- *Active Conservation* – Water saved directly as a result of conservation programs by water agencies (includes implementation of Best Management Practices.) This form of conservation is unlikely to occur without agency action.
- *Price-effect Conservation* – Water saved by retail customers attributable to the effect of changes in the real (inflation-adjusted) price of water. There may be some overlap between this form of conservation and the previous two. For example, increased water prices might

induce a consumer to take part in one of the active conservation programs run by the providing agency.

Because Metropolitan is fully committed to the implementation of the BMPs, the retail M&I demand projections account for the effects of the conservation BMPs, including projected changes in the price of water.

Table A.1-1
MWD-MAIN Demand Model
Variables

Demand Sector	Projected Demographic	Dependent Variable	Explanatory Variables
Single Family Residential	Number of Single Family Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Multifamily Residential	Number of Multifamily Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Commercial, Industrial, Institutional (CII)	Total Urban Employment	Water use per employee	Climate Price and Conservation Industrial / Service employment Share
Unmetered Use			Percentage of total use

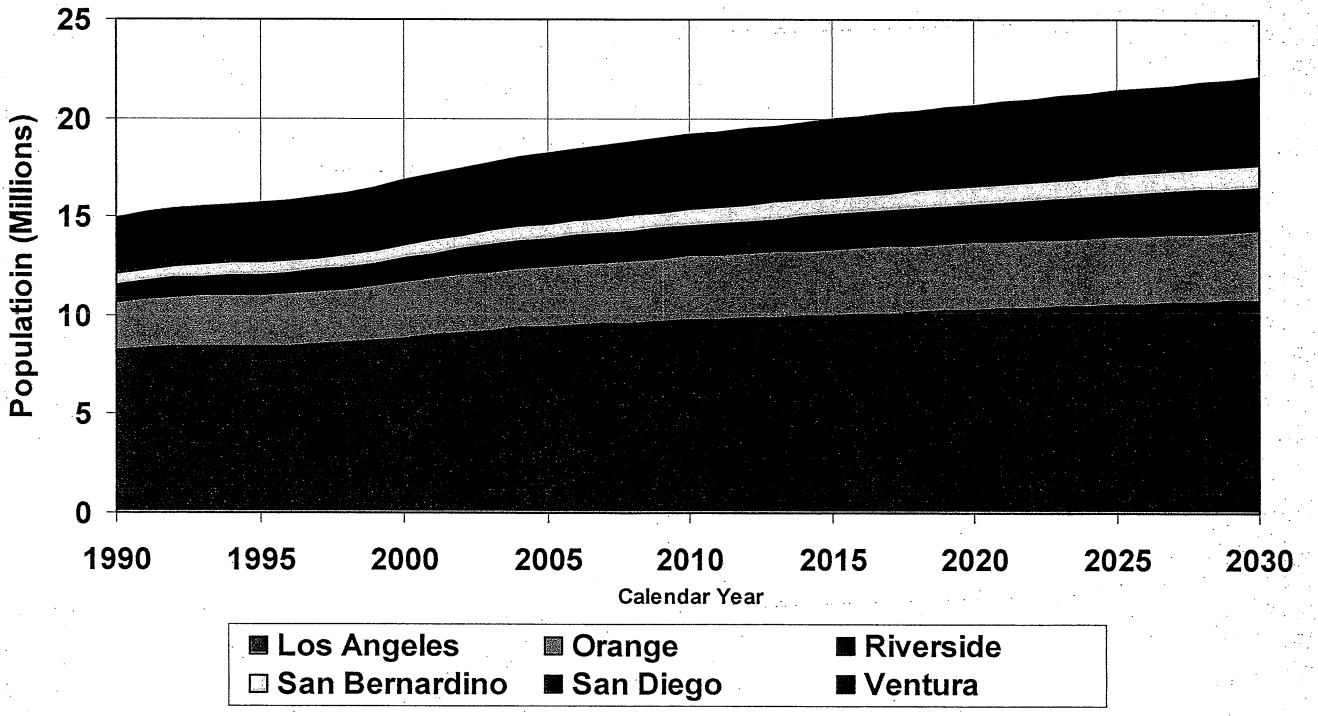
Trends in Southern California

Population

Population is a key indicator of regional growth. In the mid-1990s, population growth in Metropolitan's service area slowed during the recession, which disproportionately affected Southern California. An estimated 400,000 jobs were lost between 1990 and 1995, reducing Metropolitan's average population growth to less than 150,000 people per year. During the economic recovery from 1995 to 2000, average population growth rebounded to 230,000 people annually. Since 2000, population within Metropolitan's service area has grown to over 275,000 per year on average, approaching the boom levels of the 1980s. According to recent growth forecasts, population in Metropolitan's service area will average just over 150,000 people per year, from an estimated 18.2 million in 2005 to 22.0 million in 2030.

These new population projections are lower than prior estimates. The 1996 IRP projection reached nearly 22 million by 2020, and the IRP Update projection reaches about 21.4 million by that time. More conservative projections of employment growth and lowered estimates of future birth rates are partly responsible for the lower growth projections. Another factor is the 2000 Census, which provided population counts 0.48 million lower than the best estimates from the DOF for the six counties containing Metropolitan's service area. Figure A.1-1 compares the population projections for this study to the 1996 IRP and the IRP Update. Table A.1-2 on pageA.1-10 shows the populations by county.

Figure A.1-1
Actual and Projected Population



Employment

Economic trends are important drivers of water demand in Metropolitan's service area. Metropolitan captures economic trends by tracking regional employment growth and the changing mix of industries.

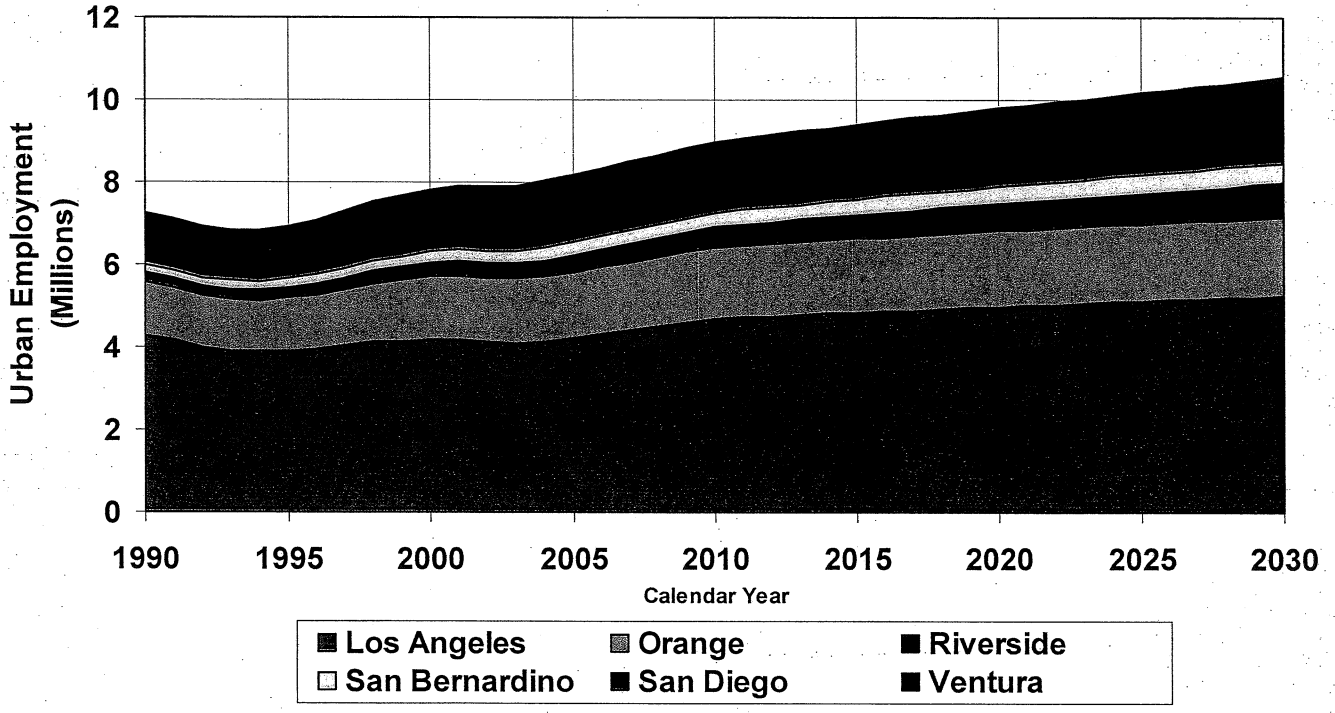
The recession in the 1990s cost Southern California 400,000 jobs and caused a major shift in the region's industry base. Almost 300,000 manufacturing jobs were lost by 1995, many of them in the aerospace and defense industries. Los Angeles and Orange Counties were especially hard hit by this trend. While manufacturing and other sectors of the economy suffered, service employment held steady and experienced modest growth in Riverside and San Bernardino Counties.

The economic recovery of the late 1990s included growth in high-tech and computer-related industries and a rapid expansion of the service-related economy. Job growth in the late 1990s approached levels of the late 1980s. Since 2000, job growth in the region has slowed as a result of the currently mild economic downturn. Southern California weathered the recession better than Northern California, which was adversely affected by the decline in the Bay Area's high-technology economy.

Within Metropolitan's service area, employment growth will not occur at the same rate across the six counties. Over the 25-year period between 2005 and 2030, the greatest employment increases are expected to occur in Los Angeles County, with over one million additional jobs expected. Relative to existing employment, Riverside and San Bernardino counties are expected to have the highest percent increases at 96 and 55 percent respectively, followed by Ventura County at 44 percent.

Figure A.1-2 and Table A.1-3 summarize the projections of commercial, industrial and institutional employment in Metropolitan's service area. The number of people employed in commerce and industry is expected to increase from 8.2 million in 2005 to about 10.5 million in 2030. This increase of about 29 percent is greater than the projected population (21 percent) and housing growth (27 percent), suggesting that a somewhat greater proportion of the population will be employed over time.

Figure A.1-2
Actual and Projected Employment



Residential Consumers

Regional planning agencies — SCAG and SANDAG — have forecast growth in residential housing in all geographic areas of the Metropolitan service area. These forecasts are shown in Figure A.1-3 and Table A.1-4. The total occupied housing stock is expected to increase more than 27 percent from 2005 to 2030, growing from 5.8 to 7.4 million housing units. Much of this growth is forecasted to occur in inland areas. Although small changes in geographic service area are expected to occur from annexations, no major increase in the total geographic service area is expected at this time. Within the service territory, the household occupancy size (household population divided by total occupied dwelling units) is projected to decline from about 3.08 persons per unit currently to 2.94 persons per unit by 2030.

Permits for the construction of residential housing constitute another indicator for water demand growth. Figure A.1-4 provides an historical picture of residential housing permits in the six-county region from 1970 to 2004. The effect of economic cycles can clearly be seen over time.

Figure A.1-3
Actual and Projected Households

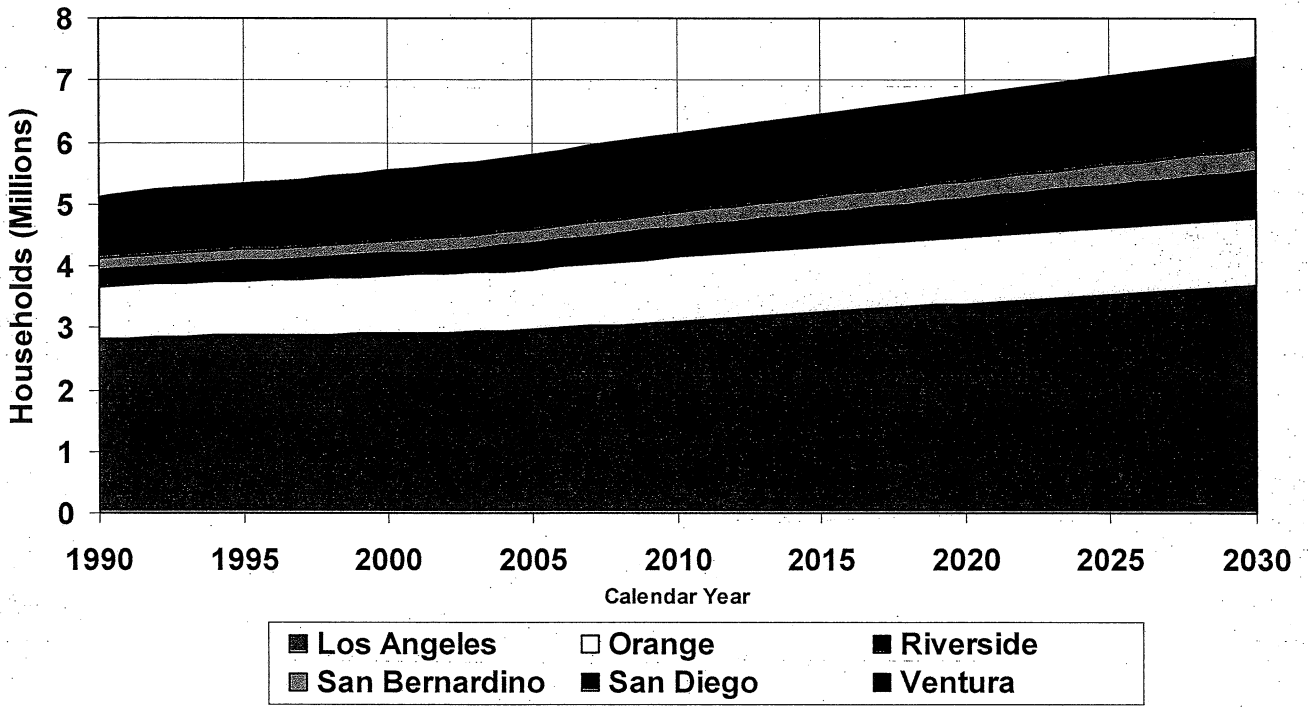
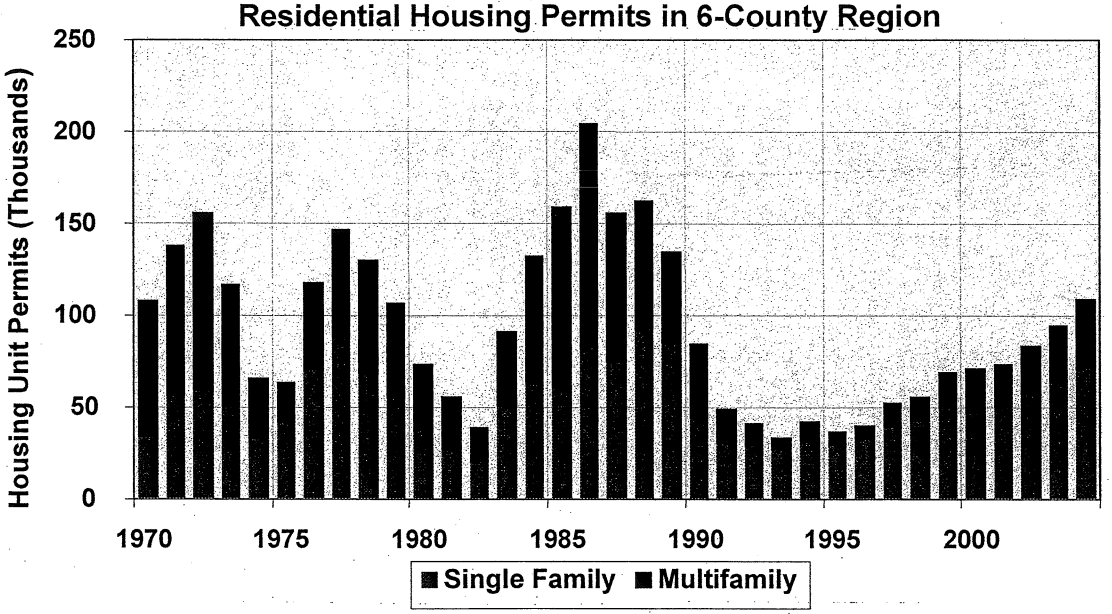


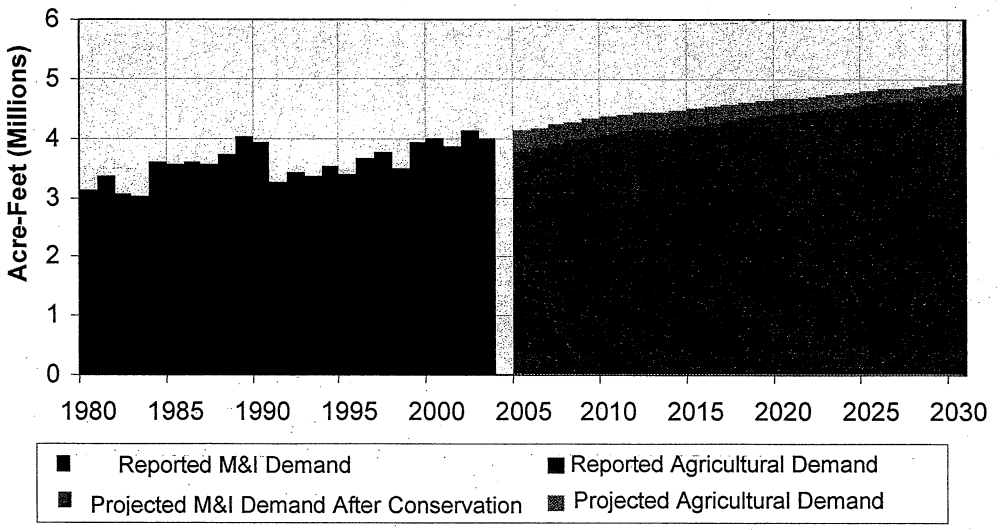
Figure A.1-4
Residential Housing Permits in 6-County Region



Water Demands

As shown in Figure A.1-4 and Table A.1-5, historical retail water demands in Metropolitan's service area have increased from 2.7 million acre-feet (af) in 1980 to 3.4 million af in 1995. Due to the recession, wet weather, conservation efforts, and lingering drought impacts, water use was lower for several years in the mid-1990s. Of the 3.2 million af used in 1998, 3.0 million af (91 percent) were used for municipal and industrial purposes (M&I), and 0.2 million af (9 percent) were used for agricultural purposes. The relative share of M&I water use to total water use has been increasing over time as agricultural water use has declined due to urbanization and market factors. Agricultural water use accounted for 14 percent in 1980, 11 percent in 1990, 9 percent in 1995, and 8.3 percent in 1997.

Figure A.1-5
Actual and Projected Retail Water Demand



*** Actual includes estimated demands for some agencies from 2000 to 2003**
**** Projections includes future IRP Active Conservation Target.**

Total M&I water use is forecast to grow from an average-year estimate of 3.8 million af in 2005 to 4.7 million af in 2030. All water demand projections begin in the year 2010 and reflect demands under normal weather conditions. The water demand forecasts account for water savings resulting from plumbing codes, price effects, and actual implementation of Best Management Practices. The reported sector-level projections do not account for the impacts of future active conservation to reach the IRP target, which are reflected in the total Metropolitan demands used in the analysis underlying this report The Metropolitan total M&I water demand projections show 11 percent savings (measured from 1990 usage levels) resulting from conservation and pricing policies in 2000, 14.4 percent savings in 2010, 16.5 percent savings in 2020, and 19.3 percent savings in 2030, compared to demands without conservation.

By County – M&I water demand is not expected to grow uniformly across counties. Following the pattern of the demographic projections, the largest absolute increases in urban water demands are expected to occur in Los Angeles and Riverside counties, with increases of 272,600 and 220,200 af per year respectively between 2005 and 2030. However, relative to current water demands, demands in Riverside County are expected to increase at the fastest rate (38 percent between 2005 and 2030). The counties with the smallest percent increases in population are also projected to experience the smallest percent increase in water demand (Los Angeles and Orange).

By Sector - Water use can also be broken down by sector. Between 2000 and 2020, single-family residential water use is expected to increase by 27 percent (Table A.1-8), while multifamily water use is expected to increase by 43 percent (Table A.1-9). This trend generally follows the projection of housing units shown in Table A.1-4. Similarly, as shown in Table A.1-10, nonresidential water use between 2000 and 2020 is expected to increase by 27 percent. Water use projections for the nonresidential sector generally follow the employment projections shown in Table A.1-3. An additional sector accounts for unmetered demand, presented in Table A.1-11.

Residential Water Use

Although single-family homes account for about 55 percent of the total occupied housing stock, they account for about 70 percent of total residential water demands. This variation occurs because single-family households tend to use more water than households living in multifamily structures (such as duplexes, triplexes, apartment buildings) on a per housing-unit basis. Single-family households tend to have more persons living in the household; they are likely to have more water-using appliances and fixtures; and they tend to have more landscaping per home.

Nonresidential Water Use

Nonresidential water use represents about 25 percent of the total M&I demands in Metropolitan's service area. This nonresidential sector represents water that is used by businesses, services, government, institutions (such as hospitals and schools), and industrial (or manufacturing) establishments. Within the commercial/institutional category, the top water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In Southern California, the major industrial users include electronics, aircraft, petroleum refining, beverages, food processing, and other industries that use water as a major component of the manufacturing process.

Conservation Savings

Table A.1-12 presents the estimated conservation savings that result from active conservation programs ("Active"), ongoing conservation from natural replacement of plumbing fixtures, and conservation induced by a projected increase in the real price of water ("Price'). The combined conservation savings resulting from these three sources are compared to the targets derived from the IRP processes.

Per Capita Demand

Table A.1-13 provides the water demand forecasts expressed in per capita form, or water demand per person. The projected per capita demands show less variation than the historical per capita estimates that incorporate the effects of weather in specific years.

Projected M&I Demand by Sector

Table A.1-14 provides the summary of municipal and industrial demands broken down by sector, as well as the percentage share of each sector

Table A.1-2
Population Growth in Metropolitan's Service Area (July)

County	Actual				Projected					% Change
	1990	1995	2000	2005*	2010	2015	2020	2025	2030	2005-30
Los Angeles	8,268,200	8,457,700	8,862,400	9,425,000	9,752,000	10,018,700	10,279,900	10,524,900	10,760,000	14.2%
Orange	2,412,000	2,604,500	2,863,600	3,078,200	3,291,500	3,369,800	3,433,600	3,494,500	3,552,900	15.4%
Riverside	851,400	993,600	1,129,600	1,371,600	1,506,500	1,693,600	1,872,300	2,039,100	2,197,200	60.2%
San Bernardino	564,800	636,800	708,200	800,900	839,700	910,900	981,200	1,048,500	1,113,100	39.0%
San Diego	2,407,100	2,518,800	2,737,800	2,966,000	3,113,500	3,261,700	3,414,100	3,554,800	3,703,200	24.9%
Ventura	451,000	477,600	541,600	592,100	634,800	659,900	683,500	705,700	726,800	22.7%
Metropolitan Total	14,954,500	15,689,000	16,843,200	18,233,800	19,138,000	19,914,600	20,664,600	21,367,500	22,053,200	20.9%

Source: US Census, CA Department of Finance, SCAG RTP-04, SANDAG 2030 Forecast
* Interpolated

Table A.1-3
Urban Employment Growth in Metropolitan's Service Area
(Calendar Year Average)

County	Actual				Projected					% Change
	1990	1995	2000	2005*	2010	2015	2020	2025	2030	2005-30
Los Angeles	4,294,600	3,925,500	4,203,700	4,216,800	4,690,500	4,846,000	4,991,200	5,123,300	5,245,300	24.4%
Orange	1,282,000	1,268,000	1,504,000	1,603,600	1,733,400	1,785,900	1,831,900	1,870,900	1,904,800	18.8%
Riverside	232,600	257,900	333,500	423,400	498,600	579,900	661,500	744,200	830,300	96.1%
San Bernardino	188,400	211,600	265,100	309,900	344,500	378,600	412,300	446,200	481,000	55.2%
San Diego	1,118,600	1,117,600	1,317,500	1,403,200	1,458,000	1,528,700	1,598,600	1,663,300	1,744,900	24.4%
Ventura	152,100	157,700	211,100	229,300	266,400	283,500	299,600	315,100	331,300	44.5%
Metropolitan Total	7,268,300	6,938,300	7,834,900	8,186,200	8,991,400	9,402,600	9,795,100	10,163,000	10,537,600	28.7%

Source: US Census, CA Employment Development Department, CCSCE, SCAG RTP-04, SANDAG 2030 Forecast
* Interpolated

Table A.1-4
Occupied Housing Growth in Metropolitan's Service Area
in Metropolitan's Service Area (July)

County	Actual				Projected					% Change
	1990	1995	2000	2005*	2010	2015	2020	2025	2030	2005-30
Los Angeles	2,824,700	2,875,500	2,911,200	2,966,000	3,112,300	3,252,500	3,394,800	3,535,400	3,675,200	23.9%
Orange	831,700	880,800	938,500	981,700	1,033,800	1,046,300	1,064,000	1,081,300	1,098,400	11.9%
Riverside	283,200	322,400	357,400	424,800	481,500	554,200	627,700	700,500	772,900	81.9%
San Bernardino	175,000	190,400	202,800	219,600	237,200	263,500	290,800	318,200	346,000	57.6%
San Diego	862,800	912,600	965,800	1,028,200	1,083,200	1,120,100	1,155,100	1,211,000	1,244,300	21.0%
Ventura	142,600	151,400	170,300	183,500	197,100	208,000	218,700	229,200	239,600	30.6%
Metropolitan Total	5,120,000	5,333,100	5,546,000	5,803,800	6,145,100	6,444,600	6,751,100	7,075,600	7,376,400	27.1%

Source: US Census, CA Employment Development Department, CCSCE, SCAG RTP-04, SANDAG 2030 Forecast
* Interpolated

Table A.1-5
Total Retail Demand in Metropolitan's Service Area with Conservation
(Acre-Feet)

County	Reported					Projected					
	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
Los Angeles	1,526,000	1,703,700	1,743,500	1,593,200	1,733,400	1,776,800	1,885,900	1,917,400	1,977,200	2,023,400	2,049,400
Orange	520,100	593,900	651,500	587,900	694,500	672,700	713,900	721,900	735,400	748,600	761,000
Riverside	348,000	375,600	480,200	403,700	515,300	573,400	618,100	656,900	704,600	751,900	793,600
San Bernardino*	166,200	188,000	209,700	184,300	242,000	257,000	276,000	287,200	300,000	322,900	345,100
San Diego	476,400	579,600	678,400	522,000	658,800	673,800	699,100	711,700	730,500	734,900	754,600
Ventura	96,500	115,800	141,900	110,300	133,700	162,000	179,300	186,700	195,100	202,900	210,300
Total	3,133,200	3,556,600	3,905,200	3,401,400	3,977,700	4,115,700	4,372,300	4,481,800	4,642,800	4,784,600	4,914,000

NOTE: Projected Data from Sales Model, not MWD-MAIN, County totals do not include future active conservation (post 2004).
* Year 2000 retail M&I demand for San Bernardino county estimated from fiscal year data.

Table A.1-6
Total Retail M&I Demand in Metropolitan's Service Area with Conservation
(Acre-Feet)

County	Reported					Projected					
	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
Los Angeles	1,519,700	1,698,400	1,739,800	1,583,800	1,728,400	1,775,300	1,884,600	1,916,200	1,976,200	2,022,500	2,048,700
Orange	481,100	549,400	625,200	571,400	671,100	656,600	704,200	715,400	731,800	745,900	758,300
Riverside	141,000	173,600	279,400	243,500	324,800	384,300	442,200	493,200	552,200	610,200	662,000
San Bernardino	120,100	150,300	172,500	152,100	212,000	226,600	246,700	267,200	289,900	312,800	335,000
San Diego	364,600	469,200	549,000	463,300	566,600	582,300	615,100	636,400	664,900	692,800	722,200
Ventura	77,100	93,800	114,500	96,000	119,600	142,900	160,700	168,300	177,300	185,400	193,200
Total	2,703,600	3,134,700	3,480,400	3,110,100	3,622,500	3,768,000	4,053,500	4,196,700	4,392,300	4,569,600	4,719,400

NOTE: Projected Data from Sales Model.

Table A.1-7
Total Retail Agriculture Demand in Metropolitan's Service Area
(Acre-Feet)

County	Reported					Projected					
	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
Los Angeles	6,300	5,300	3,700	9,400	5,000	1,500	1,300	1,200	1,000	900	700
Orange	39,000	44,500	26,300	16,500	23,400	16,100	9,700	6,500	3,600	2,700	2,700
Riverside	207,000	202,000	200,800	160,200	190,500	189,100	175,900	163,700	152,400	141,700	131,600
San Bernardino	46,100	37,700	37,200	32,200	30,000	30,400	29,300	20,000	10,100	10,100	10,100
San Diego	111,800	110,400	129,400	58,700	92,200	91,500	84,000	75,300	65,600	42,100	32,400
Ventura	19,400	22,000	27,400	14,300	14,100	19,100	18,600	18,400	17,800	17,500	17,100
Metropolitan Total	429,600	421,900	424,800	291,300	355,200	347,700	318,800	285,100	250,500	215,000	194,600

Table A.1-8
Single Family Retail Demands in Metropolitan's Service Area
(Acre-Feet)

County	Model Estimate	Projected Average Year					
	2000	2005	2010	2015	2020	2025	2030
Los Angeles	753,600	780,400	808,900	820,000	850,000	868,400	874,200
Orange	321,900	331,600	349,200	353,400	362,500	368,500	374,800
Riverside	213,500	257,500	293,300	326,500	366,200	403,200	434,500
San Bernardino	127,000	139,800	148,600	160,600	173,800	186,500	198,800
San Diego	232,600	244,900	267,000	276,800	290,500	300,900	311,200
Ventura	79,700	85,600	94,100	98,000	103,000	107,100	110,500
Metropolitan Total	1,728,300	1,839,800	1,961,100	2,035,300	2,146,000	2,234,600	2,304,000

Note: Projected demands do not include savings from future active conservation programs.

Table A.1-9
Multifamily Retail Demands in Metropolitan's Service Area
(Acre-Feet)

County	Model Estimate	Projected Average Year					
	2000	2005	2010	2015	2020	2025	2030
Los Angeles	385,300	401,200	426,000	450,500	465,400	475,100	495,800
Orange	107,600	112,400	124,300	129,400	132,400	134,700	137,000
Riverside	32,200	38,700	45,300	53,800	60,100	66,500	75,500
San Bernardino	28,200	31,600	35,300	39,300	43,300	47,200	51,600
San Diego	121,000	128,500	136,200	145,500	157,100	169,100	182,800
Ventura	14,000	15,100	16,700	18,300	19,400	20,300	21,700
Metropolitan Total	688,300	727,500	783,800	836,800	877,700	912,900	964,400

Note: Projected demands do not include savings from future active conservation programs.

Table A.1-10
Commercial, Industrial and Institutional Retail Demands in Metropolitan's Service Area
(Acre-Feet)

County	Model Estimate 2000	Projected Average Year 2005	2010	2015	2020	2025	2030
Los Angeles	511,700	450,800	507,500	506,100	519,500	526,700	521,200
Orange	169,000	161,500	179,200	181,800	185,900	188,100	189,900
Riverside	45,600	52,800	64,400	70,200	78,500	86,700	93,000
San Bernardino	36,300	37,500	44,300	47,800	51,700	55,500	59,100
San Diego	175,400	163,700	167,200	169,400	171,400	172,600	174,500
Ventura	32,000	31,000	37,800	39,700	42,100	44,100	46,300
Metropolitan Total	970,000	897,300	1,000,400	1,015,000	1,049,100	1,073,700	1,084,000

Note: Projected demands do not include savings from future active conservation programs.

Table A.1-11
Unmetered Use in Metropolitan's Service Area
(Acre-Feet)

County	Model Estimate 2000	Projected Average Year 2005	2010	2015	2020	2025	2030
Los Angeles	141,400	139,700	149,100	152,000	156,900	159,900	161,700
Orange	50,600	51,200	55,200	56,200	57,600	58,500	59,400
Riverside	28,200	33,800	39,000	43,500	48,700	53,600	58,000
San Bernardino	16,200	17,700	19,300	20,900	22,700	24,500	26,200
San Diego	44,000	44,700	47,500	49,300	51,600	53,600	55,800
Ventura	10,600	11,100	12,600	13,200	13,900	14,500	15,100
Metropolitan Total	291,000	298,200	322,700	335,100	351,400	364,600	376,200

Table A.1-12
Conservation Savings in Metropolitan's Service Area - 1980 Base Year
(Acre-Feet)

County*	Estimate			Projected					
	1990	1995	2000	2005	2010	2015	2020	2025	2030*
Los Angeles	0	108,900	223,900	268,400	329,900	369,200	399,900	436,500	474,000
Orange	0	30,500	68,600	89,900	109,700	119,600	126,400	135,000	144,300
Riverside	0	11,100	24,700	34,000	48,900	63,400	76,100	89,800	104,000
San Bernardino	0	1,600	4,100	10,500	17,600	24,500	30,600	35,900	41,600
San Diego	0	28,800	69,200	71,400	92,300	108,100	121,100	133,400	145,200
Ventura	0	3,300	7,400	11,700	16,800	20,600	23,500	26,200	29,100
Active, Code and Price	**0**	**184,200**	**397,900**	**485,900**	**615,200**	**705,400**	**777,600**	**856,800**	**938,200**
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total Conservation Target	**250,000**	**434,200**	**647,900**	**735,900**	**865,200**	**955,400**	**1,027,600**	**1,106,800**	**1,188,200**

Note: County totals do not include savings from future active conservation programs.

*The 2030 IRP Conservation Target is derived from the 2003 IRP Update forecast projections for 2030; it is not an official target for 2030.

Table A.1-13
Per Capita M&I Retail Demands in Metropolitan Service Area

County	(Dry)	(Wet)	(Average)	Projected					
	1990	1995	2000*	2005	2010	2015	2020	2025	2030
Los Angeles	188	167	174	168	173	171	172	172	170
Orange	231	196	209	190	191	190	190	191	191
Riverside	293	219	257	250	262	260	263	267	269
San Bernardino	273	213	267	253	262	262	264	266	269
San Diego	204	164	185	175	176	174	174	174	174
Ventura	227	179	197	215	226	228	232	235	237
Metropolitan Total	208	177	192	184	189	188	190	191	191

* Estimated

Table A.1-14
Projected Municipal and Industrial Demands by Sector

County	Model Estimate 2000	Projected 2005	2010	2015	2020	2025	2030
Single-Family	1,728,300	1,839,800	1,961,100	2,035,300	2,146,000	2,234,600	2,304,000
Multifamily	688,300	727,500	783,800	836,800	877,700	912,900	964,400
Non-Residential	970,000	897,300	1,000,400	1,015,000	1,049,100	1,073,700	1,084,000
System Losses/Unmetered	291,000	298,200	322,700	335,100	351,400	364,600	376,200
Metropolitan Total	3,677,600	3,762,800	4,068,000	4,222,200	4,424,200	4,585,800	4,728,600
Single-Family	47.0%	48.9%	48.2%	48.2%	48.5%	48.7%	48.7%
Multifamily	18.7%	19.3%	19.3%	19.8%	19.8%	19.9%	20.4%
Non-Residential	26.4%	23.8%	24.6%	24.0%	23.7%	23.4%	22.9%
System Losses/Unmetered	7.9%	7.9%	7.9%	7.9%	7.9%	8.0%	8.0%
Metropolitan Total	100%	100%	100%	100%	100%	100%	100%

Note: Projected demands do not include savings from future active conservation programs.

Appendix A.2
Existing Regional Water Supplies

A.2 EXISTING REGIONAL WATER SUPPLIES

Water used in Metropolitan's service area comes from both local and imported sources. Local sources include groundwater, surface water, and recycled water. Sources of imported water include the Colorado River, the State Water Project (SWP), and the Owens Valley/Mono Basin. Local sources meet about 42 percent of the water needs in Metropolitan's service area, while imported sources supply the remaining 58 percent.

The city of Los Angeles imports water from the eastern Owens Valley/Mono Basin in the Sierra Nevada through the Los Angeles Aqueducts (LAA). This water currently meets about 10 percent of the region's water needs, but is dedicated for use by the City of Los Angeles. Contractually and for planning purposes, Metropolitan treats the LAA as a local supply, although physically its water is imported from outside the region. Other supplies come from local sources, and Metropolitan provides imported water supplies to meet the remaining 45 percent of the region's water needs. These imported supplies are received from Metropolitan's Colorado River Aqueduct (CRA) and the SWP's California Aqueduct. Table A.2-1 and Figure A.2-1 show the historical use of local and imported supplies within Metropolitan's service area.

Table A.2-2 shows the quantities of Metropolitan water used by member agencies during the last 20 years. Metropolitan's largest water customers are the San Diego County Water Authority (27 percent of Metropolitan's supplies in 2004), City of Los Angeles (16 percent) and Municipal Water District of Orange County (12 percent). The reliance on Metropolitan's water supplies varies by agency. For example, in recent years, Upper San Gabriel received as little as 15 percent of its total water supply from Metropolitan, while Beverly Hills received over 90 percent. However, this relative share of local and imported supplies varies from year to year based on supply and demand conditions.

The following sections describe the current supply sources in more detail. The main body of the Urban Water Management plan contains descriptions of planned future supplies.

Local Water Supplies

Local sources of water available to the region include surface water, groundwater, and recycled water. Some of the major river systems in Southern California have been developed into systems of dams, flood control channels, and percolation ponds for supplying local water and recharging groundwater basins. For example, the San Gabriel and Santa Ana rivers capture over 80 percent of the runoff in their watersheds. The Los Angeles River system, however, is not as efficient in capturing runoff. In its upper reaches, which make up 25 percent of the watershed, most runoff is captured with recharge facilities. In its lower reaches, which comprise the remaining 75 percent of the watershed, the river and its tributaries are lined with concrete, so there are no recharge facilities. The Santa Clara River in Ventura County is outside of Metropolitan's service area, but it replenishes groundwater basins used by water agencies within Metropolitan's service area. Other rivers in Metropolitan's service area, such as the Santa Margarita and San Luis Rey, are essentially natural replenishment systems.

Table A.2-1
Sources of Water Supply in the Metropolitan Service Area
(Acre-Feet)

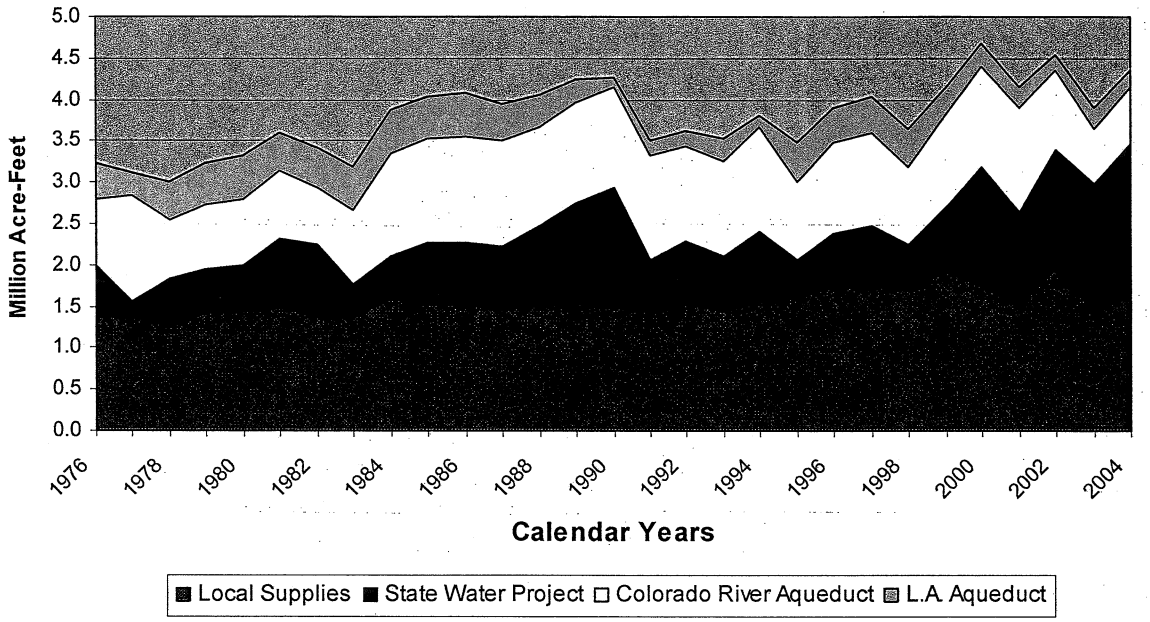
Calendar Year	Local Supplies	L. A. Aqueduct	Colorado River Aqueduct[1]	State Water Project[2]	Totals
1976	1,365,639	430,305	794,620	638,051	3,228,615
1977	1,369,735	275,363	1,280,598	189,755	3,115,451
1978	1,251,051	472,330	713,816	575,545	3,012,742
1979	1,415,949	492,671	787,415	532,137	3,228,172
1980	1,446,520	514,636	794,824	559,611	3,315,591
1981	1,492,595	465,069	824,101	826,951	3,608,716
1982	1,384,712	482,953	689,516	856,996	3,414,177
1983	1,379,543	518,503	895,515	385,308	3,178,869
1984	1,616,253	516,258	1,237,230	501,682	3,871,423
1985	1,528,685	495,800	1,273,236	740,410	4,038,131
1986	1,505,120	520,565	1,303,276	756,142	4,085,103
1987	1,461,380	428,018	1,282,277	769,603	3,941,278
1988	1,519,197	369,439	1,203,571	957,276	4,049,483
1989	1,539,455	288,224	1,203,934	1,215,139	4,246,752
1990	1,481,724	106,188	1,218,321	1,457,676	4,263,909
1991	1,443,831	186,445	1,255,720	624,861	3,510,857
1992	1,539,424	176,918	1,156,687	746,991	3,620,020
1993	1,437,745	289,279	1,144,956	663,390	3,535,370
1994	1,561,649	132,541	1,266,439	845,305	3,805,934
1995	1,623,271	464,102	936,097	451,305	3,474,775
1996	1,749,198	424,994	1,092,089	642,871	3,909,152
1997	1,745,964	435,786	1,128,145	724,393	4,034,288
1998	1,725,420	466,836	943,841	521,255	3,657,352
1999	1,924,759	309,038	1,124,624	790,538	4,148,959
2000	1,740,274	255,183	1,230,700	1,442,615	4,668,772
2001	1,521,231	266,923	1,252,870	1,119,408	4,160,433
2002	1,983,920	179,338	959,248	1,413,745	4,536,251
2003	1,428,371	251,942	649,491	1,560,569	3,890,374
2004	1,667,660	202,547	697,478	1,792,246	4,359,931

[1] Colorado River Aqueduct supplies are total Colorado River Aqueduct deliveries less deliveries to Desert Water Agency and Coachella Valley Water District (DWCV).
[2] Entitlement, exchanges, wheeling, carryover, drought bank, etc. Excludes wheeling to Castaic Lake Water Agency and deliveries to storage outside of Metropolitan's service area.
[3] 1999 Local Supplies value is estimated.

Table A.2-2
Historic Metropolitan Water Deliveries to Member Agencies

Agency	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Anaheim	14,075	19,835	18,440	15,534	19,184	24,503	16,063	22,576	21,327	26,357
Beverly Hills	12,473	13,253	14,102	13,124	13,737	13,940	13,166	13,787	12,286	12,355
Burbank	17,384	12,049	9,956	18,180	8,527	11,503	12,206	12,236	13,628	13,103
Calleguas	93,466	115,491	109,175	95,659	114,879	120,214	109,894	127,240	118,258	128,231
Central Basin	72,605	98,191	101,481	64,424	77,621	128,496	108,831	96,817	61,529	117,094
Coastal	38,599	42,404	38,736	25,288	28,204	18,924				
Compton	2,918	3,536	3,688	4,747	3,808	3,760	3,964	2,842	3,160	3,011
Eastern	53,043	54,151	57,745	51,503	72,755	86,264	79,663	101,405	90,476	114,487
Foothill	8,014	10,122	11,276	7,543	10,490	12,417	11,351	13,408	12,725	14,329
Fullerton	7,033	7,797	7,870	5,649	6,931	7,262	8,066	12,706	9,759	17,272
Glendale	26,345	27,561	28,397	25,379	27,531	29,237	28,459	22,830	22,838	24,180
Inland Empire	37,959	49,841	54,817	51,577	51,924	69,785	66,515	76,218	81,294	83,848
Las Virgenes	17,185	18,805	22,016	17,418	21,553	22,661	21,018	23,205	21,657	26,102
Long Beach	50,323	53,238	46,838	43,888	45,530	44,491	43,764	43,161	49,205	47,944
Los Angeles	71,163	81,288	92,206	53,018	160,591	330,021	304,345	403,293	318,237	392,196
MWDOC	159,611	222,967	276,297	186,265	228,850	302,055	263,686	340,031	276,851	297,944
Pasadena	12,076	17,427	18,417	14,146	20,194	24,212	18,779	29,053	22,763	24,251
San Diego	387,555	450,517	511,505	407,316	536,485	592,641	588,405	662,442	650,730	676,572
San Fernando	210	729	0		0		0	372	519	500
San Marino	1,461	1,306	1,873	1,004	577	760	474	511	941	1,851
Santa Ana	10,207	10,922	12,784	12,066	13,150	10,970	12,631	19,336	13,349	20,459
Santa Monica	4,507	9,276	11,783	11,418	11,799	12,122	11,535	12,828	13,835	14,401
Three Valleys	56,961	64,016	66,460	53,959	71,235	81,800	70,710	93,165	82,498	85,848
Torrance	22,216	22,232	22,372	20,696	21,308	20,628	22,012	21,375	20,860	20,665
Upper San Gabriel	7,464	53,958	49,297	14,688	23,125	59,955	30,600	54,326	72,214	45,160
West Basin	153,741	46,621	152,048	136,815	147,522	151,076	140,739	147,020	144,567	147,681
Western	56,173	70,913	74,357	55,513	83,074	85,498	82,158	98,972	96,686	103,109
Total	1,456,082	1,816,711	1,927,614	1,539,272	1,911,184	2,337,644	2,069,742	2,489,321	2,233,151	2,477,736

Figure A.2-1
Sources of Supply to Metropolitan's Service Area



Local supplies fluctuate in response to variations in rainfall. During prolonged periods of below-normal rainfall, local water supplies decrease. Conversely, prolonged periods of above-normal rainfall increase local supplies. Sources of groundwater basin replenishment include local precipitation, runoff from the coastal ranges, and artificial recharge with imported water supplies. In addition to runoff, recycled water provides an increasingly important source of replenishment water for the region.

Major Groundwater Basins

Groundwater sources account for about 90 percent of the natural local water supplies, which are found in many basins throughout the Southern California region and provide an annual average total production that ranges from 1.2 to 1.4 million acre-feet (af) per year. Figure A.2-2 shows the location of the major groundwater basins. The majority of groundwater yield comes from natural recharge, which is accomplished through the percolation of rainfall and stream runoff. In certain major drainage areas, runoff is retained in flood control reservoirs and released into spreading basins or ponds for additional percolation into the ground. The Los Angeles County Department of Public Works operates many groundwater recharge facilities located at the upper reaches of the Los Angeles River and San Gabriel River systems. In addition, the Orange County Water District operates a system of diversion structures and recharge basins along the Santa Ana River that captures most of the storm runoff, as well as water from reclamation facilities in Riverside and San Bernardino counties. This water, which would otherwise flow into the Pacific Ocean, is allowed to percolate into the underlying aquifers so it may be pumped for local use when needed. Groundwater basins are also recharged with imported supplies and recycled water, either by injection, by percolation in spreading basins, or in-lieu storage.

Almost all major groundwater basins in Southern California are either adjudicated or managed by special districts or agencies. The eight adjudicated basins in the region include: Raymond Basin, San Fernando Basins, Main San Gabriel Basin, Central Basin, West Coast Basin, Six Basins, Chino Basin, Cucamonga Basin, Rialto Basin, Colton Basin, and Bunker Hill Basin. The Orange County Groundwater Basin is managed by Orange County Water District; portions of the Ventura County Basins are managed by the Fox Canyon Groundwater Management Agency; and San Jacinto Basin is managed by Eastern Municipal Water District. In general, these basins have management plans that include protection from seawater intrusion, water quality deterioration, and excessive lowering of water levels.

Major River Systems and Reservoirs

Local surface water resources consist of runoff captured in storage reservoirs and diversions from streams. Reservoirs hold the runoff for later direct use, and diversions from streams are delivered directly to local water systems. As Table A2.3 shows, local water agencies currently own and operate 24 major reservoirs. These reservoirs provide a storage capacity of 745 taf. The historic average yield of these local surface supplies, which come from reservoir releases and stream diversions, is about 130 taf per year. The annual yield varies widely between wet and dry years, and most reservoirs that capture local surface runoff are operated with minimal carry-over storage. San Diego County has the greatest storage capacity for these types of reservoirs, with approximately two-thirds of the total local agency storage capacity in Metropolitan's service area.

In addition to the storage that is owned and operated by local agencies, Metropolitan operates Diamond Valley Lake, Lake Skinner and Lake Mathews. Diamond Valley stores water imported during years of ample supply. Of its 800-taf capacity, approximately one-third is dedicated to emergency storage, and the remainder will be 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. Table A.2-4 lists Metropolitan-owned reservoirs.

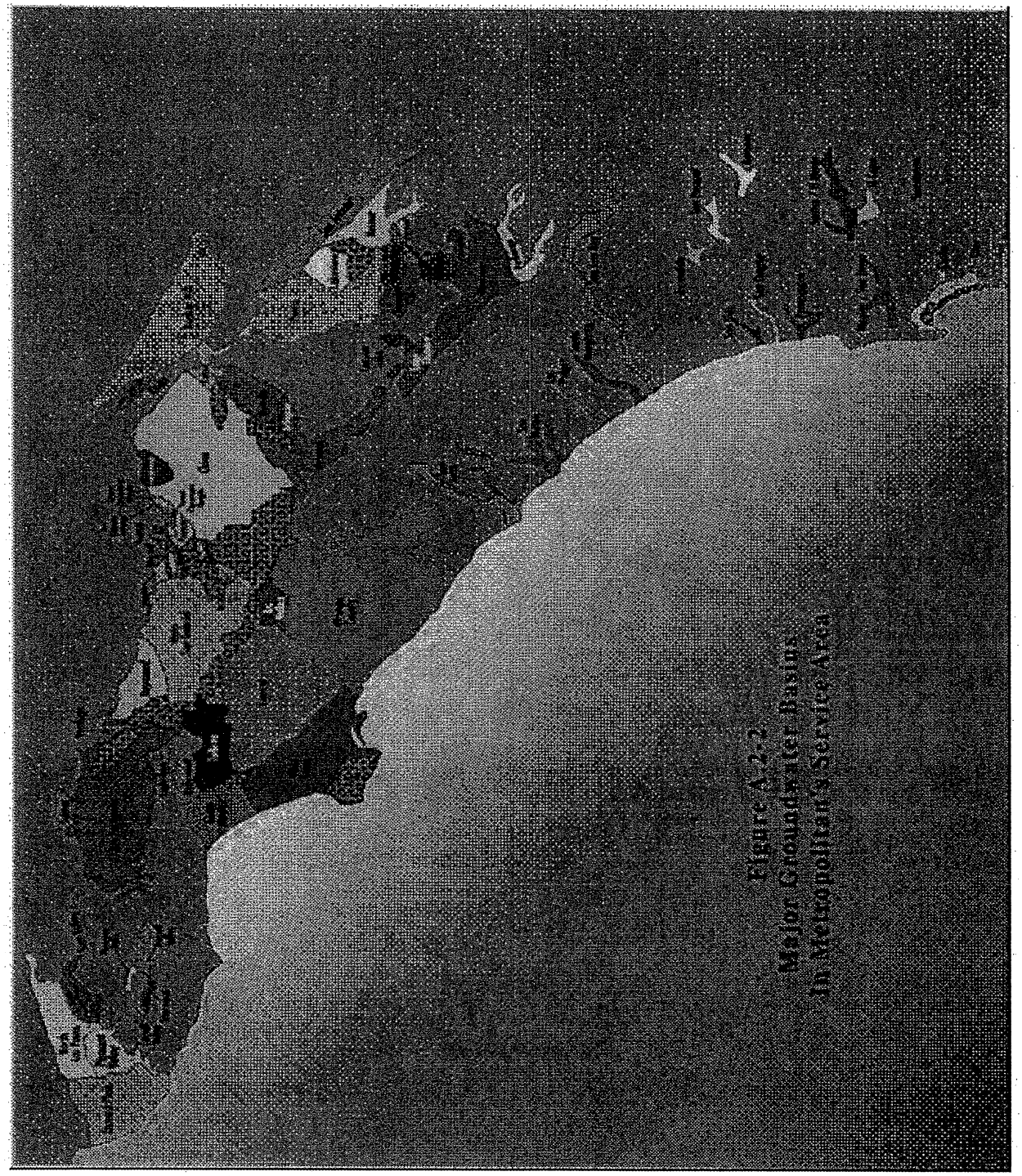


Figure A.2-2
Major Groundwater Basins
in Metropolitan's Service Area

Table A-2.3
Major Local Storage Reservoirs In Metropolitan' Service Area

Member Agency/Subagency	Reservoir	Storage Capacity (1000 af)
Calleguas MWD	Lake Bard	10.0
Eastern MWD		
Rancho California WD	Vail Lake	51.0
Lake Hemet MWD	Lake Hemet	14.0
Las Virgenes MWD	Westlake Reservoir	10.0
City of Los Angeles	Los Angeles	10.2
	Encino	9.8
	Stone Canyon	10.8
	Hollywood	4.2
MWD of Orange Co.		
Irvine Ranch WD & Serrano ID	Santiago	25.0
San Diego CWA		
	Olivenhain	24.8
Vista Irrigation District	Henshaw	51.8
Escondido	Lake Wohlford and Dixon	9.5
Helix ID	Cuyamaca Dam and Lake Jennings	18.0
City of San Diego	Barrett	38.0
	El Capitan	112.8
	Lake Hodges	33.6
	Morena	50.2
	Lower Otay	49.5
	San Vicente	90.2
	Sutherland	29.7
	Miramar	7.2
	Murray	4.8
Sweetwater Authority	Lake Loveland	25.4
	Sweetwater	30.1
Ramona MWD	Lake Ramona	12.0
Western MWD of Riverside		
Temescal Water Company	Railroad Canyon	12.0
Total		**744.6**

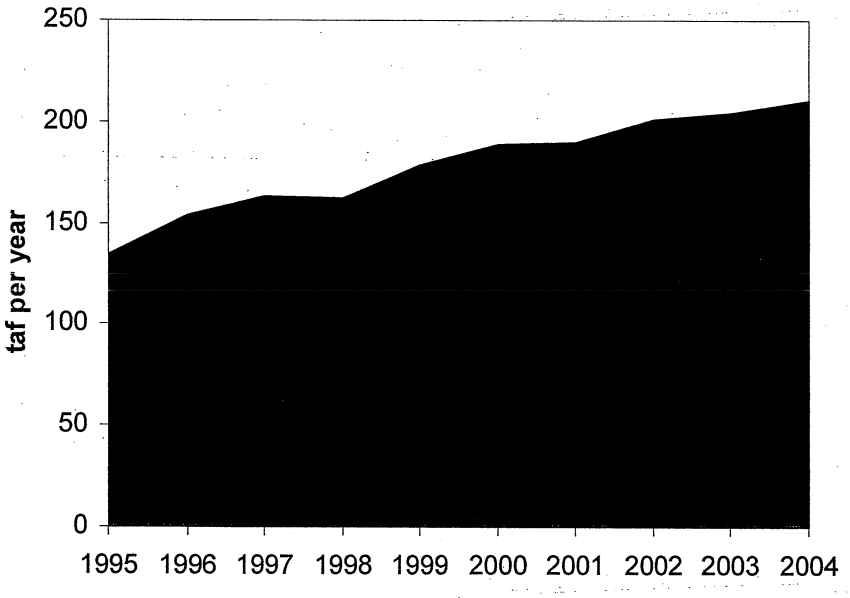
Table A.2-4 Regional Reservoirs In Metropolitan's Service Area	
Reservoir	Capacity (taf)
Diamond Valley	800
Lake Skinner[1]	182
Lake Mathews[1]	44

[1] These are used for operations and not primarily for storage.

Water Recycling and Groundwater Recovery

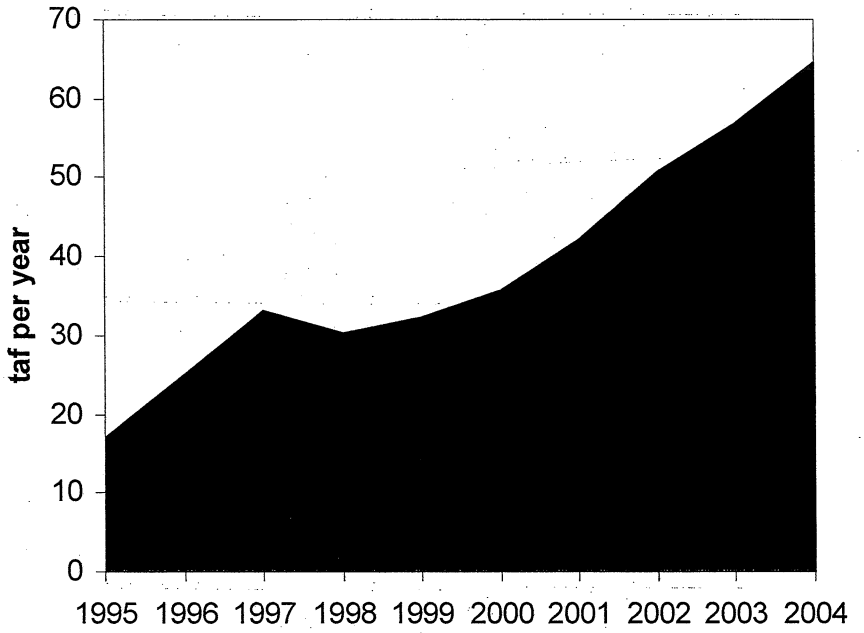
Water recycling projects involve treating wastewater to a level that is acceptable and safe for many nonpotable applications. This resource is providing an increasing level of local water. From 1980 to 2004, Metropolitan invested approximately $124 million in water recycling projects. Supplies from projects in which Metropolitan has invested have increased from just about 15 taf in 1980 to 75 taf in 2004. In 2004, local agency projects that did not receive financial assistance from Metropolitan produced an additional 134 taf, for a regional total of 209 taf. Figure A.2-3 demonstrates the increase in this regional supply for direct use.

Figure A.2-3
Recycled Water Production



In addition, local agencies have implemented several projects to recover contaminated or degraded groundwater for potable uses. The groundwater recovery projects use a variety of treatment technologies to remove nitrates, volatile organic compounds, perchlorate, color and salt. In 1991, Metropolitan began helping to fund its member agencies' groundwater recovery projects. Since that time, Metropolitan has invested approximately $41 million. In 2004 these groundwater recovery projects produced 43 taf. Other member agency projects that did not receive funding from Metropolitan produced another 21 taf, for a regional total of 64 taf. Figure A.2-4 shows this increase in supply.

Figure A.2-4
Recovered Groundwater Production



Since 1982, Metropolitan has committed to providing financial assistance to develop 75 water recycling and groundwater recovery projects throughout its service area. Since adopting the IRP in 1996, Metropolitan and its member agencies have made significant progress in achieving regional targets for recycling and groundwater recovery. Currently, Metropolitan has contracts to participate in 54 recycled water projects, of which 39 were in operation in 2004. For recovered groundwater projects, there are 20 contracts, and 18 of these projects are producing water.

Imported Water

Most member agencies and retail water suppliers depend on imported water for a portion of their water supply. For example, Los Angeles and San Diego (the largest and second largest cities in the state) have historically (1995-2004) obtained about 85 percent of their water from imported

sources. These imported water requirements are similar to those of other metropolitan areas within the state, such as San Francisco and other cities around the San Francisco Bay. Figure A.2-5 shows the conveyance facilities for the state's imported water supplies. Descriptions of each of the imported sources of water available to Metropolitan's service area follow. Justification for projected water supplies from these sources, as required for retail water agencies to comply with Senate Bills 221 and 610, are provided in Appendix A.3.

Colorado River

A number of water agencies within California have rights to divert water from the Colorado River. Through the Seven Party Agreement (1931), seven agencies recommended apportionments of California's share of Colorado River water within the state. Table A.2-5 shows the historic apportionment of each agency, and the priority accorded that apportionment.

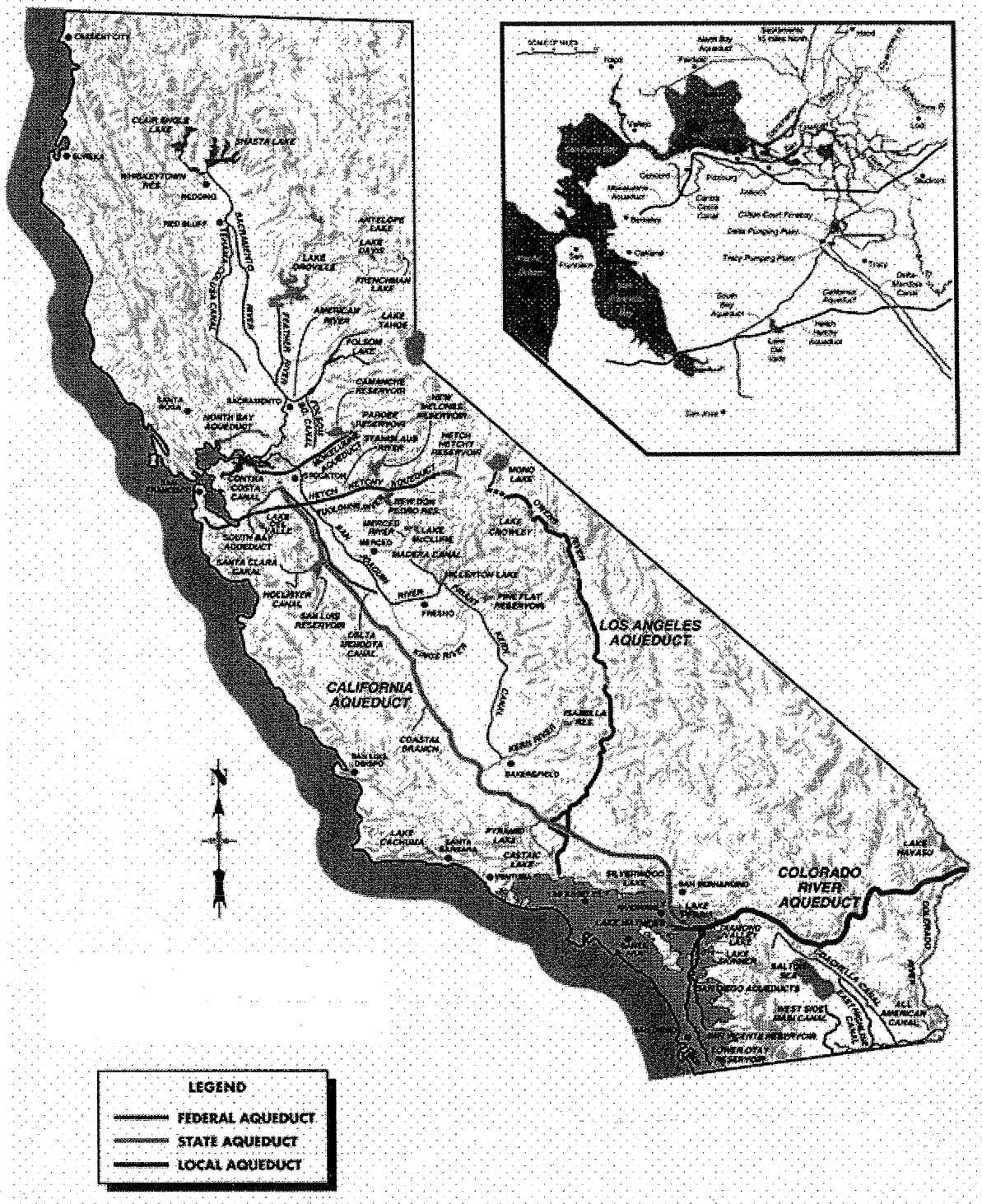
Table A.2-5
Priorities in Seven-Party Agreement and Water Delivery Contracts

Priority	Description	TAF Annually
1	Palo Verde Irrigation District – gross area of 104,500 acres of land in the Palo Verde Valley	
2	Yuma Project (Reservation Division) – not exceeding a gross area of 25,000 acres in California	
3(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by All American Canal	3,850
3(b)	Palo Verde Irrigation District—16,000 acres of land on the Lower Palo Verde Mesa	
4	Metropolitan Water District of Southern California for use on coastal plain	550
Subtotal: California's basic apportionment under 1964 Court Decree		**4,400**
5(a)	Metropolitan Water District of Southern California for use on coastal plain	550
5(b)	Metropolitan Water District of Southern California for use on coastal plain[2]	112
6(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys[1] to be served by the All American Canal	
6(b)	Palo Verde Irrigation District—16,000 acres of land on the Lower Palo Verde Mesa	300
7	Agricultural Use in the Colorado River Basin in California	--
	Total Prioritized Supply	**5,362**

[1] The Coachella Valley Water District now serves Coachella Valley.

[2] In 1946, the City of San Diego, the San Diego County Water Authority, Metropolitan, and the Secretary of the Interior entered into a contract that merged and added the City of San Diego's rights to store and deliver Colorado River water to the rights of Metropolitan. The conditions of that agreement have long since been satisfied.

Figure A.2-5
Major Water Conveyance Facilities



The water is delivered to Metropolitan's service area by way of the Colorado River Aqueduct (CRA), which has a capacity of 1,800 cubic feet per second, or 1.3 million af per year. The CRA conveys water 242 miles from its Lake Havasu intake to its terminal reservoir, Lake Mathews, near the city of Riverside. Conveyance losses along the Colorado River Aqueduct of 10 taf per year reduce the amount of Colorado River water received in the coastal plain.

Since the date of the original contract, several events have occurred that changed the dependable supply that Metropolitan expects from the CRA. The most significant event was the 1964 U.S. Supreme Court decree in *Arizona v. California* that reduced Metropolitan's dependable supply of Colorado River water to 550 taf per year. The reduction in dependable supply occurred with the commencement of Colorado River water deliveries to the Central Arizona Project. In 1987, Metropolitan entered into a contract with the Bureau of Reclamation for an additional 180 taf per year of surplus water. In addition, Metropolitan has obtained a minimum of 80 taf per year of Colorado River water through a conservation program with the Imperial Irrigation District.

In 1979, the Present Perfected Rights (PPRs) of certain Indian reservations, cities, and individuals along the Colorado River were quantified. 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.

In 1999, the Colorado River Board of California developed "California's Colorado River Water Use Plan" (Plan). The Colorado River Board of California protects California's rights and interests in the resources provided by the Colorado River and represents California in discussions and negotiations regarding the Colorado River and its management. The overall purpose of the Plan is to provide Colorado River water users with a framework by which programs, projects, and other activities may be coordinated and cooperatively implemented. This framework specified how California would make the transition from relying on surplus water supplies from the Colorado to living within its normal water supply apportionment.

To implement these plans, a number of agreements have been executed. In October 2003 representatives from Metropolitan, IID, and Coachella Valley Water District (CVWD) executed the Quantification Settlement Agreement (QSA) and several other related agreements. Parties involved include the San Diego County Water Authority (SDCWA), the California Department of Water Resources (DWR), the California Department of Fish and Game, the U.S. Department of the Interior and the San Luis Rey Indian Water Rights Settlement Parties. The QSA quantifies 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 IRP. Quantification of the third priority provides the needed numeric baseline from which conservation and transfer programs may be measured. The QSA helps California reduce its reliance on Colorado River water above its normal apportionment.

Metropolitan is undertaking ongoing efforts to maintain and improve the flexibility and quality of its water supply from the Colorado. Section III-7 of this report describes current programs and plans related to flexibility, and Chapter IV describes water quality programs.

State Water Project

The State Water Project, which is owned by the state and operated by the California Department of Water Resources (DWR), is the second source of Metropolitan's imported water supplies. The SWP comprises 32 storage facilities (reservoirs and lakes), 662 miles of aqueduct, and 25 power and pumping plants.

The SWP conveys water from Northern California to areas south of the Bay Delta region. Water from the SWP originates at Lake Oroville, which is located on the Feather River in Northern California. That water, along with all additional unused water from the watershed, flows into the Sacramento/San Joaquin Delta. Water from the Delta is then either pumped to water users in the San Francisco Bay area or transported through the California Aqueduct to water users in Central and Southern California.

DWR contracted to deliver water in stages to 32 SWP contractors, with an ultimate delivery of 4.23 million af per year. Currently, DWR is delivering water to 29 of these SWP contractors. Metropolitan is the largest, with a contracted entitlement of 2.011 million af per year, or approximately 48 percent of the total contracted amount. Metropolitan receives deliveries of SWP supplies via the California Aqueduct at Castaic Lake in Los Angeles County, Devil Canyon Afterbay in San Bernardino County, and Box Springs Turnout and Lake Perris in Riverside County. The first delivery of SWP water to Metropolitan occurred in 1972.

The initial facilities of the SWP, completed in the early 1970s, were designed to meet the original needs of the SWP contractors. It was intended that additional SWP facilities would be built over time to meet projected increases in contractors' delivery needs. Each contractor's SWP contract provided for a buildup in entitlement over time, with most contractors reaching their maximum annual entitlement by the year 1990. Since the completion of the initial SWP facilities in the early 1970s, major improvements to the system have included: four new pumps added to the Banks Pumping Plant at the Delta, the completion of the Coastal Branch, and the East Branch enlargement. Even with these improvements, however, there are still significant capacity constraints within the SWP that limit the delivery capability of the full contracted entitlement. During the same time, the contractors' needs for water from the SWP have increased. As a result, the contractors' demands for SWP water currently exceed the dependable yield.[1] Metropolitan has developed groundwater storage programs with Semitropic Water Storage District and Arvin-Edison Water Storage District to supplement the available water supply.

The amount of entitlement DWR approves for delivery varies annually with contractor demands and projected water supplies from tributary sources to the Delta, based on snowpack in the Sierra Nevada, reservoir storage, operational constraints, and demands of other water users. Historically, the SWP has been able to meet all contractors' requests for entitlement water except during the drought years of 1977, 1990-92, and 1994. In many years, surplus water has been delivered to contractors. Deliveries to Metropolitan reached a high of 1.792 million af in calendar year 2004. Metropolitan experienced shortages in SWP supplies in fiscal years 1991 and 1992, with reduced deliveries of 391 taf and 710 taf, respectively.[2] Continued investments in conservation and recycling

[1] The dependable yield of the existing SWP facilities is considered to be the delivery capability during a critically dry seven-year period.

[2] These numbers are Metropolitan's allocated entitlement. Total water deliveries to Metropolitan's service area are

have allowed Metropolitan to reduce its requirements for SWP water. In 1998, Metropolitan's SWP deliveries of 410 taf were lower than any year since 1983.[3]

In recent years the listing of several fish species in the Sacramento/San Joaquin Delta (Delta) under both state and federal Endangered Species Acts has constrained SWP operations and created more uncertainty in SWP supply reliability. These listed species include Delta smelt, winter-run Chinook salmon, spring-run Chinook salmon, and splittail. On August 28, 2000, the CALFED agencies concluded the CALFED planning process and launched a seven-year set of actions that, among other objectives, aims to improve water supply reliability and quality. However, in 2005 the abundance of many of the Delta fish has decreased. This issue is currently under investigation.

Metropolitan is undertaking ongoing efforts to maintain and improve the reliability and quality of its water supply from the State Water Project. Sections III-5 and III-6 describe current programs and plans for reliability, and Chapter 4 addresses water quality issues.

Los Angeles Aqueducts

The city of Los Angeles imports water from the eastern Sierra Nevada through the Los Angeles Aqueduct (LAA). The original Los Angeles Aqueduct, completed in 1913, imported water from the Owens Valley. In 1940, the aqueduct was extended to the Mono Basin. A second aqueduct, which parallels the original, was completed in 1970.

With the completion of the aqueduct system in 1970, an average of 470 taf of water was delivered annually through the LAA. Of this total, 380 taf originated from surface water and groundwater in the Owens Valley, while 90 taf came from surface water in the Mono Basin. In 1986, the aqueduct delivered a record 520 taf of water.

In the late 1980s, a series of court injunctions limited the amount of water that Los Angeles could receive from its aqueduct system. In 1990, these limitations, along with a persistent drought, limited the delivery from the aqueduct to only 106 taf. The Mono Lake Water Rights Decision (Decision) in September of 1994 ended the litigation in the Mono Basin, while negotiations continue with Inyo County on the fate of the Owens Valley water supply. In the Decision, the state ruled that Mono Lake should rise 17 feet over the next 25 years. During this time, Los Angeles would only be permitted to divert a fraction of its historical amounts. After the lake had risen, the city of Los Angeles would still be allowed only significantly reduced diversions. However, the high precipitation during the nineties allowed increased diversions of water to the LAA to occur at a much earlier time frame than had been foreseen at the time of the Decision.

More recently, the LAA diversions of water from the Owens Valley came under additional pressure. A long history of diversions of water from the Owens River had led to the drying up of Owens Lake by the end of the 1920s. This dry lakebed became a major source of windblown dust, resulting in EPA pressure to develop a State Implementation Plan to bring the region into compliance with federal air quality standards. In 1998, the Los Angeles Department of Water and Power entered into a Memorandum of Agreement with the Great Basin Air Pollution Control District that specified

shown in Table A.2-1.

[3] With the exception of the drought-constrained deliveries in 1991. These numbers do not correspond with those in Table A.2-1, because that Table includes water transfers delivered over the SWP system, as well as SWP deliveries.

actions needed to control the problem. These actions included shallow flooding and managed vegetation at various lakebed locations. An estimated 54 taf per year will be required to maintain the dust control measures, further restricting the water available for diversion through the LAA. More recently, the City has been required to restore portions of the Owens River, which could further restrict the water that can be provided from this source.

Historic Total Regional Water Supplies

The previous sections have presented the various sources of Metropolitan and the region's water supply. The amount of water supplied by each local and imported source from 1975 through 2004 appears in Table A.2-1. The imported supplies represent the amount of water imported into Metropolitan's service area, *not* the amount delivered to member agencies, which is shown in Table A.2-2. The difference between Metropolitan's imports and deliveries is water placed into or withdrawn from storage. The fluctuation in water supplies that occurred during this 1975-2004 period is the result of a number of factors. California experienced an extended drought during this period, which was particularly severe in 1991 and 1992. The long duration of this drought, which began in 1987, resulted in a decline in local supplies over the period due primarily to a reduction in groundwater availability. In addition, shortages in SWP supplies in 1991 and 1992 resulted in significant efforts to increase water conservation activities and, for part of that time, the imposition of water rationing. Water conservation activities in the region were already considerable before the 1991-92 shortage years, but these efforts were greatly expanded during those years and have stayed at similar levels even though adequate supplies have been available. Efforts at increasing water recycling have also continued. As a result of these efforts, consumers in Metropolitan's service area have reduced their use of both imported and local supplies.

APPENDIX A.3
JUSTIFICATIONS FOR SUPPLY PROJECTIONS

A.3 JUSTIFICATIONS FOR SUPPLY PROJECTIONS

Legislation authored by Senator Sheila Kuehl (SB221 – now Water Code §10613 *et seq.*) and Senator Jim Costa (SB610 – now Water Code §66473.7) requires water retailers to demonstrate that their water supplies are sufficient for certain proposed subdivisions and large development projects subject to the California Environmental Quality Act (CEQA). Although Metropolitan and other wholesalers do not have verification responsibilities under this legislation, information provided by Metropolitan may be useful to retailers in complying with these responsibilities. This Appendix provides the basis for the water availability contained in this report, by major source of supply. Such bases and proofs are required for supply verification under the legislation. Links to copies of the legislation can be found at http://www.groundwater.water.ca.gov/water_laws/index.cfm#otherleg.

Throughout this appendix, references are made to Metropolitan's operating budget and its long-term capital investment plan. The most recent operating budget (for Fiscal Year 2005-06) was adopted at the June 14, 2005 Board Meeting. A copy of the budget summary can be found at. http://www.mwdh2o.com/mwdh2o/pages/finance/Exec2005_web.pdf.
The most recent Capital Investment Plan can be found at
http://www.mwdh2o.com/mwdh2o/pages/finance/CIP2005_web.pdf.
Another document of interest related to Metropolitan's water supply planning is its annual report to the state legislature in compliance with Snate Bill 60 of 1999(Hayden).[1] This requires that Metropolitan report on it progress in increasing its emphasis on cost-effective conservation, recycling and groundwater recharge.

A.3.1 Colorado River Aqueduct Deliveries

A. Colorado River Supplies

Metropolitan obtains water from the Colorado River under two categories: its basic apportionment that is classified as Priority 4 water, and unused/surplus water that is classified as Priority 5 water. In addition, Metropolitan has entered into a number of agreements that allow it to receive supplies unused by agricultural districts for its own use and to store water surplus to immediate needs in groundwater basins adjacent to the Colorado River Aqueduct. This stored water may be withdrawn as needed during years in which insufficient supplies are available. Appendix A-2 describes the history of water supplies and the expected availability from this source, and Chapter III-7 describes the agreements for water supplies.

[1] Metropolitan Water District of Southern California, *Annual Progress Report to the California State Legislature: Achievements in Conservation, Recycling and GroundwaterRecharge* (February 2005), which can be found at http://www.mwdh2o.com/mwdh2o/pages/yourwater/sb60_04/SB%2060%202005_web.pdf The legislation requiring this information is shown on page 40 of the 2005 report.
A similar report was filed with the legislature in February, 2004.

Rationale For Expected Supply

Historical Record
Water supply under Metropolitan's Priority 4 apportionment of Colorado River water has been delivered since 1939. By existing contract, it will continue to be available in perpetuity because of California's senior water rights to use of Colorado River water.

The historical record for available Colorado River water indicates that Metropolitan's fourth priority supply has been available in every year and can reasonably be expected to be available over the next 20 years.

Written Contracts or Other Proof

Metropolitan's entitlement to Colorado River water is based on a series of agreements and compacts collectively known as "The Law of the River,"[2] which govern the distribution and management of Colorado River water. The following documents specifically determine Metropolitan's dependable supplies:

- 1931 Seven Party Agreement.[3] The 1931 Agreement recommended California's Colorado River use priorities and has no termination date. California's basic annual apportionment is 4.4 million acre-feet. Palo Verde Irrigation District (PVID), Yuma Project (Reservation Division), Imperial Irrigation District (IID), Coachella Valley Water District (CVWD), and Metropolitan are the entities that hold the priorities. As shown in Appendix A-2, these priorities are included in the contracts that the Department of the Interior executed with the California agencies in the 1930s for water from Lake Mead. Metropolitan has the fourth priority to California's basic apportionment of Colorado River water and utilizes this water – 550 taf per year – every year. In addition, Metropolitan has access to additional Colorado River water – up to 662 taf per year – through its fifth priority in the California apportionment. Appendix A-2 describes the current status of water available under this priority.
- Metropolitan's Basic Contracts.[4] Metropolitan's 1930, 1931, and 1946 basic contracts with the Secretary of the Interior permit the delivery of 1.212 million acre-feet per year when sufficient water is available. Metropolitan's 1987 surplus flow contract with Reclamation permits the delivery of water to fill the remainder of the Colorado River Aqueduct when water is available. Other programs are also being planned and implemented that will increase the prospect of this water being available.
- 1964 Court Decree[5]. The 1964 U.S. Supreme Court Decree confirmed the Arizona, California, and Nevada basic apportionments of 2.8 million acre-feet per year, 4.4 million acre-feet per year and 300 taf per year, respectively. The Decree also permits the Secretary of the Interior to make water available that is unused by one of the states for use in the other two states. In addition, it permits the Secretary to make surplus water available.

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[2] A description of many of these agreements can be found at http://www.usbr.gov/lc/region/pao/lawofrvr.html.
[3] This agreement between the California contractors was dated August 18, 1931 and was codified in federal regulations promulgated by the Secretary of the Interior on September 28, 1931.
[4] Including contract number IIr-645 dated 04-09-1930, supplemented 09-28-1931.
[5] The 1964 decision in *Arizona v. California et al,* can be found at http://www.usbr.gov/lc/region/pao/pdfiles/supctdec.pdf

- 2003 Quantification Settlement Agreement (QSA) and several other related agreements were executed in October 2003.[6] The QSA quantifies the use of water under the third priority of the Seven Party Agreement. Although this agreement does not directly impact Metropolitan's entitlements, it provides the numeric baseline needed to measure conservation and transfer programs, and it allows for implementation of agricultural conservation, land management, and other programs identified in the 1996 IRP.

Financing

Metropolitan's operating budget (referenced at the beginning of this appendix) includes the cost of delivering fourth priority Colorado River water, which is paid from water sales revenue.

Federal, State, and Local Permits/Approvals

Metropolitan's fourth priority Colorado River water is currently available, and this priority assures delivery of the Basic apportionment.

B. IID - Metropolitan Conservation Program

Source Of Supply

The IID-Metropolitan Conservation Program provides an annual supply that is delivered to Metropolitan's service area via its CRA. In 1988, Metropolitan executed a Conservation Agreement to fund water efficiency improvements within the Imperial Irrigation District's (IID) service area in return for the right to divert the water conserved by those improvements. The program consists of structural and non-structural measures, including the concrete lining of existing canals, the construction of local reservoirs and spill-interceptor canals, installation of non-leak gates, and automation of the distribution system. Other implemented projects include the delivery of water to farmers on a 12-hour basis rather than a 24-hour basis and improvements in on-farm water management through the installation of tailwater pumpback systems, drip irrigation systems, and linear-move irrigation systems.

Expected Supply Capability

The IID-Metropolitan Conservation Program has been operational since 1990. It was initially expected to yield 106 taf per year of conserved water. This initial program agreement provided Coachella Valley Water District (CVWD) the option to call up to about 45 taf per year if needed to meet its demands under non-surplus conditions. Execution of the QSA has reduced CVWD's option to 20 taf. This water is available to Metropolitan if not required by CVWD, but the minimum supply to MWD has been increased to 80 taf.

[6] These agreements can be found at http://www.crss.water.ca.gov/docs/crqsa/Parts/QSA_FE.pdf.

Rationale For Expected Supply

Historical Record
The IID-Metropolitan Conservation Program has been operational since 1990. Existing agreements have extended the initial term to at least 2041 or 270 days after the termination of the QSA, whichever is later, and they guarantee Metropolitan a minimum of 80 taf per year.

With operations beginning in 1990, the program has conserved as much as 109,460 acre-feet per year to date. The historical record indicates that Metropolitan's expected minimum supply of 80 taf per year has been available since 1996 and would be available over the next 36 years at least.

Written Contracts or Other Proof

Metropolitan's annual supply from the IID-Metropolitan Conservation Program is based on four agreements.

- 1988 IID-Metropolitan Conservation and Use of Conserved Water Agreement. This Agreement was executed in December 1988 by Imperial Irrigation District and Metropolitan for a 35-year term following completion of program implementation (1998– 2033).
- 1989 Approval Agreement. This Agreement secured the approval of the Palo Verde Irrigation District and Coachella Valley Water District to not divert an amount of water equal to the amount conserved except under limited circumstances. The Agreement was executed in December 1989.
- 1989 Supplemental Approval Agreement. This Agreement was executed in December 1989 between Metropolitan and Coachella Valley Water District to coordinate Colorado River diversions and the use of the conserved water provided by the Program.
- 2003 Amendments to 1988 Agreement and 1989 Approval Agreement. These amendments specify that Metropolitan will be guaranteed a minimum of 80 taf per year from this program. The remainder of the conserved water from this program would be available to CVWD. Any of this remaining water not used by CVWD would be available to Metropolitan.

Financing

The water efficiency improvements under this Program have already been funded, constructed, and put into operation. Metropolitan's 10-year capital and O&M budgets (referenced above) include the cost of operating, maintaining, and delivering the conserved water under the IID-Metropolitan Conservation Program.

Federal, State, and Local Permits/Approvals

A comprehensive environmental review process supported implementation.

- EIR for Program. The Imperial Irrigation District Board certified the final Environmental Impact Report for the Program in December 1986.[7]
- EIR for Supplemental Program. The Imperial Irrigation District Board certified the final Environmental Impact Report for the Completion Program in June 1994.[8]

[7] Imperial Irrigation District, *Draft EIR for Water Conservation Implementation in Imperial Irrigation District,* April, 1986. SCH Number: 1986012903.

- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[9]
- Addendum to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.

C. Hayfield Groundwater Storage Project

Source Of Supply

The Hayfield Groundwater Storage Project (Hayfield Project) is planned to supply up to 100 taf acre-feet annually during dry year or non-surplus Colorado River conditions. During wet and surplus years, Metropolitan would replenish the Hayfield Project from the CRA.

Expected Supply Capability:

It is estimated that the Hayfield aquifer can hold up to 500 taf of additional CRA water. This water could be extracted during dry year conditions at a rate of up to 100 taf per year. This supply would be available to Metropolitan in any year, but delivery is constrained by the existing capacity of the CRA. Incremental deliveries of water to the CRA from the Hayfield Project can be made during wet or average years depending on operating conditions along the CRA. For example, the Hayfield Project may provide operational efficiencies in meeting delivery obligations at Whitewater or other locations along the CRA.

Rationale For Expected Supply

As an integral part of the Colorado River resource strategy for storage programs, the Hayfield Project could be used by Metropolitan in meeting its demands in future dry years.

Program Facilities
The Hayfield Program would consist of facilities in two general areas:
- 390 acres of spreading basins,
- A well field consisting of 40 new wells to extract water from the aquifer, and pumps to return the water to the Colorado River Aqueduct;

Historical Record
Metropolitan's Board of Directors authorized implementation of the Hayfield Project in April 1999. Approximately 73,000 acre-feet of water have been stored in the Hayfield aquifer since that time.

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[8]Imperial Irrigation District *Draft EIR for Supplement To 86012903*, SCH Number: 1992071061.
[9]Multiple lead agencies, *Programmatic EIR for the Implementation of the Colorado River Water Quantification Settlement Agreement,* January 2002, SCH Number 2000061034.

Written Contracts or Other Proof

The Hayfield Project has been implemented as a component of California's Colorado River Water Use Plan. The following actions have occurred:

- 1998 Memorandum of Understanding (MOU) between Metropolitan and the U. S. Department of the Interior Bureau of Land Management (BLM). This MOU describes the intent of both Metropolitan and the BLM to exchange properties overlying the Hayfield Basin in order to support the implementation of the Hayfield Project. Approximately 3,800 acres of federally owned property in the Hayfield Valley would be exchanged with like properties held by Metropolitan. The purpose of this exchange of properties is to manage the underlying groundwater resource and protect water quality.
- April 1999 Board of Directors Adoption of the CEQA Document. Metropolitan's Board of Directors adopted the Mitigated Negative Declaration for the Hayfield Project at its regularly scheduled Board of Directors meeting in April 1999.
- June 2000 Board of Directors Approval of the Hayfield Project. Metropolitan's Board of Directors approved the Hayfield Project and appropriated an additional $7.35 million for land acquisition, preliminary design, continued water quality monitoring, additional aquifer testing and other tasks. The Board authorized storage of up to 800 taf of CRA water.
- December 2002 Board of Directors Appropriation of Design, Testing and Construction Funds. Metropolitan authorized expenditure of an additional $18 million to implement the Hayfield Project. This action increased the authorized funding to implement the Hayfield Project to more than $27 million. Because of the recent drought in the Colorado River basin, the Hayfield Program is currently on hold until 2006.

Financing

The capital cost of the Hayfield Project is estimated to be approximately $75 million. This cost is included in Metropolitan's 10-year capital budget (referenced above) and would be financed through a combination of bonds and water sales revenue.

Federal, State and Local Permits/Approvals

Metropolitan has applied for and requested all appropriate federal, state and local permits for construction. For example, Metropolitan is currently conducting long term water quality baseline monitoring in support of a possible Source Water Permit application from the Department of Health Services. Monitoring wells and test wells were completed in accordance with Riverside County permitting procedures. Necessary environmental permits would be acquired as needed.

D. Palo Verde Irrigation District Land Management, Crop Rotation And Water Supply Program

Source Of Supply

At its May, 11 2004 meeting, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with the Palo Verde Irrigation District. Under the program, participating farmers in PVID are being 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. PVID has the first priority for Colorado River water under the water delivery contracts with the U.S. Bureau of Reclamation. Partial implementation of the program began in January 2005, and when fully implemented, the program is estimated to provide up to 111 taf per year. The agreement also specifies that the program will provide a minimum of 26 taf per year.

Expected Supply Capability

It is estimated that the PVID/Metropolitan Program would provide up to 111 taf per year of additional Colorado River water. This water would be available in any year as needed and in accordance with the provisions described in the agreements with Palo Verde Valley landowners and PVID.

Rationale For Expected Supply

Historical Record

Metropolitan and PVID tested the concept of developing a water supply for Metropolitan by entering into an agreement in 1992.[10] Agreements were signed with landowners and lessees in the Palo Verde Valley to forego irrigation for a two-year period from August 1992 to July 1994. Water unused by PVID, in the amount of 186, taf was stored in Lake Mead for Metropolitan. Both PVID and Metropolitan signed approved Principles of Agreement in 2001. PVID issued the Final Environmental Impact Report for the Proposed Palo Verde Irrigation District Land Management, Crop Rotation and Water Supply Program in September 2002.[11]

Partial implementation of the final program began in January 2005. In 2005, the water savings in PVID are estimated to be 85 taf, and in 2006 a further 100 taf is expected.

Written Contracts or Other Proof

- August 2004 Forbearance and Fallowing Program Agreement. This agreement establishes the PVID/Metropolitan Program, which provides for a solicitation of and provisional approval of landowner participation offers, specifies the process for incorporating offers into agreements with landowners, and states the terms and conditions for fallowing, including payments made by Metropolitan.
- Landowner Agreements for Fallowing in the PVID. These agreements specify an escrow process to consummate the transaction, an easement deed to encumber land for fallowing, a tenant agreement to subordinate a tenant's lease to the agreement and easement, and an

[10] Presented to Metropolitan's Board at its regular meeting January 14, 1992.

[11] SCH Number 2001101149.

encumbrance agreement to subordinate any encumbrance (e.g. a mortgage) to the easement. These agreements also state the landowner's fallowing obligation, payments to be made by Metropolitan, and land management measures to be implemented.

- 2005 Interim Fallowing Agreements. Beginning as early as January 1, 2005, these bridge agreements were executed to permit landowners to fallow land on an interim basis through July 31, 2005, pending commencement of their participation in the PVID/Metropolitan Forbearance and Fallowing Program on August 1, 2005.
- July 2005 Interim Fallowing Agreements. These agreements were executed to permit landowners to fallow land on an interim basis pending commencement of their participation in the PVID/Metropolitan Program with the close of escrow after August 1, 2005.

Financing

Metropolitan's annual O&M budget (referenced above) includes the cost of the PVID/ Metropolitan Program.

Federal, State and Local Permits

A Notice of Preparation for the PVID/Metropolitan Program was published on October 29, 2001. PVID issued the Final Environmental Impact Report for the Proposed Palo Verde Irrigation District Land Management, Crop Rotation, and Water Supply Program in September 2002 (see reference above).

E. Lower Coachella Valley Groundwater Storage Program

Source Of Supply

Metropolitan has identified the feasibility of developing a conjunctive use storage program in the Lower Coachella groundwater basin. The basin is currently in an over-drafted condition. The Lower Coachella groundwater basin underlies the service area of the Coachella Valley Water District (CVWD). CVWD transports its Colorado River entitlement by way of the All American and Coachella Canal systems. The projected growth for the CVWD service area is expected to gradually increase through 2015, when the area is expected to be built out. This proposed program provides Metropolitan with the flexibility of being able to store water while continuing to keep the CRA full.

Expected Supply Capability

The Program has the potential to provide up to 500 taf of storage capacity. It is expected to produce 100 to 175 taf per year of dry year supplies. Initially, it had a scheduled on-line date by 2015; however, the Board has postponed work on this project for two years due to the current dry conditions in the Colorado River basin.

Rationale For Expected Supply

This Program is one of many identified in California's Colorado River Water Use Plan. If implemented, it would assist in positioning California to use only 4.4 million af of Colorado River water in years in which surplus water, or water apportioned to but not used by Arizona and Nevada, is not available. The storage and dry-year program capacity does not influence the ability to maintain a full Colorado River Aqueduct in the future. However, the use of Colorado River water to put water into the Lower Coachella Valley Storage Program may be influenced by other Colorado River related storage/transfer programs. Program storage and extraction capacities, as well as up-front payments and capital outlays for construction, may impact Metropolitan's budget.

Written Contracts or Other Proof
The terms of the proposed program agreement must be negotiated with CVWD.

Financing

This program would be funded through Metropolitan's annual budget.

Environmental Review

The implementation of a groundwater storage project in Coachella Valley could provide of additional Colorado River water to allow for a reduction in groundwater use and a subsequent reduction in the current rates of groundwater overdraft. The feasibility report identified the environmental checklist in accordance with CEQA guidelines.

F. Chuckwalla Groundwater Storage Program

Source Of Supply

The Chuckwalla Groundwater Basin was identified in Phase I investigations as a groundwater basin along the Colorado River Aqueduct having the potential to store available supplies of CRA water. The Upper Chuckwalla Valley is located near Metropolitan's Eagle Mountain Pumping Plant. Metropolitan initiated the Chuckwalla Study, which investigated the potential for such a program. During surplus years, Metropolitan would replenish the Upper Chuckwalla Basin with available deliveries from the CRA. Up to 150 taf per year would be returned to the CRA in non-surplus Colorado River conditions. Given current dry conditions in the Colorado River Basin, Metropolitan has deferred implementation of this program until further water supplies are available.

Expected Supply Capability

It is estimated that the Upper Chuckwalla groundwater basin could hold up to 500 taf of CRA water. This water would be extracted during non-surplus conditions at a rate of up to 150 taf per year. Delivery of this water is constrained by the existing capacity of the CRA.

Rationale For Expected Supply

As an integral part of the Colorado River resource strategy for storage programs, deliveries of water previously stored under the Chuckwalla Project could be used to assist in keeping the CRA full in 2015 and the following non-surplus years.

Program Facilities

The Chuckwalla Project would consist of facilities in three general areas, as follows:

- 400 acres of spreading basins;
- Water conveyance facilities, including approximately 10 miles of pipeline and a pumping station to pump water from the extraction wells to the Colorado River Aqueduct; and
- A well field, consisting of 40 new wells to extract water from the aquifer, and pumps to return the water to the Colorado River Aqueduct.

Historical Record

Metropolitan's Board of Directors approved the Chuckwalla Study in June 2000, and it is still being completed.

Written Contracts or Other Proof

The Chuckwalla Study has been initiated as a potential component of California's Colorado River Water Use Plan. The following actions have occurred:

- 1998 Phase I Feasibility Report for Off-stream Storage on the Colorado River Aqueduct. This Report identified the Upper Chuckwalla Basin as having the potential for off stream storage of CRA water.
- June 2000 Board of Directors Approval of the Upper Chuckwalla Feasibility Study. Metropolitan's Board of Directors approved the Upper Chuckwalla Feasibility Study, made a CEQA determination and appropriated $2 million to complete geophysical, hydrogeological, infiltration, water quality, and risk assessment investigations for the study.
- June 2001 Department of Water Resources Award. The Department of Water resources awarded Metropolitan an AB 303 Study Grant of $250,000 to conduct the Upper Chuckwalla Feasibility Investigations.
- March 2001 Consultant Contract Award. Metropolitan's Board of Directors approved a contract to conduct feasibility investigations.

The project is now on hold, pending review of other groundwater storage programs and conditions in the Colorado River basin.

Financing

The cost of the Upper Chuckwalla Feasibility Study is estimated to be approximately $2 million. This amount is included in Metropolitan's 10-year capital and O&M budget (referenced above). In addition, an AB 303 planning grant of $250,000 will be reimbursed to Metropolitan under the terms of a contract with the DWR.

Federal, State and Local Permits/Approvals

Metropolitan would acquire all appropriate federal, state and local permits for construction. Monitoring wells and test wells have been constructed in accordance with Riverside County permitting procedures. Additional necessary environmental permits would be acquired as needed.

G. Salton Sea Restoration Transfer

Source Of Supply

The source of supply for the Salton Sea Restoration Transfer is Colorado River water conserved by IID for transfer to Metropolitan.

Expected Supply Capability

The expected supply is up to 1.5 maf. This water would be made available during a period that could start as early as 2007 and will end after 2017.

Rationale For Expected Supply

The program is being developed in accordance with legislative direction to the Resources Secretary to facilitate implementation of the Colorado River transfers and other programs under the QSA. The Resources Secretary was directed to undertake a restoration study to determine a preferred alternative for the restoration of the Salton Sea ecosystem and the protection of wildlife dependent on that ecosystem. As part of this study, the Resources Secretary is to determine the availability to Metropolitan 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 placed in the Salton Sea Restoration Fund. By December 31, 2006, the Resources Secretary is required to submit a plan to the Legislature that identifies a preferred alternative for the restoration of the Salton Sea and the availability of water to Metropolitan. By the end of 2006, approximately 100,000 acre-feet of this water will have already been conserved to permit management of the salinity of the Salton Sea, leaving as much as 1.5 maf available for transfer to Metropolitan beginning in 2007.

Program Facilities
The existing CRA facilities would transport the water from Lake Havasu to Metropolitan. Currently, conserved water is being provided through land fallowing. Additional conservation facilities may be constructed by IID.

Historical Record
Metropolitan has existing contracts with the Secretary of the Interior for delivery of Colorado River water. Additionally, under separate 1988 and 1989 agreements and 2003 amendments, Metropolitan receives Colorado River water made available by IID through conservation activities within IID.

Written Contracts or Other Proof

- 2003 Quantification Settlement Agreement.[12] Umbrella agreement for the related agreements entered into by Metropolitan, IID, CVWD, and/or SDCWA, which together are intended to consensually settle longstanding disputes regarding the priority, use, and transfer of Colorado River water in California from agricultural to urban users. The QSA establishes the structure for the further distribution of Colorado River water among Metropolitan, IID, and CVWD for up to 75 years based upon the water budgets set forth in the agreement.
- 2003 Colorado River Water Delivery Agreement. Agreement among IID, CVWD, SDCWA, Metropolitan, and the Secretary of the Interior memorializing the agreement of the Secretary to deliver Colorado River water to California water users in accordance with the water budgets established by the QSA and related agreements.
- 2003 Agreement between the Imperial Irrigation and the Department of Water Resources for the Transfer of Colorado River Water. One of the QSA-related agreements that specifies IID's obligations to conserve water for transfer to Metropolitan and DWR's commitments and obligations to IID in facilitating the transfer.
- 2003 Agreement between The Metropolitan Water District of Southern California and the Department of Water Resources for the Transfer of Colorado River Water. One of the QSA-related agreements that specifies MWD's obligations to pay for water conserved by IID for transfer to Metropolitan as facilitated by DWR.
- 2003 Quantification Settlement Agreement Joint Powers Authority Creation and Funding Agreement. One of the QSA-related agreements, this agreement among the Department of Fish and Game, CVWD, IID, and SDCWA provides for the funding of a portion of the water that would be conserved by IID for transfer to Metropolitan.
- QSA Implementing Legislation. The 2003 State Legislature passed three bills to facilitate implementation of the QSA--Senate Bill 277 (Ducheny), Senate Bill 317 (Kuehl) as amended in the 2004 legislative session by Senate Bill 1214 (Kuehl), and Senate Bill 654 (Machado) that include provisions for the Salton Sea Restoration Transfer.
- Deadline for Report to Legislature. The QSA implementing legislation requires the Resources Secretary to submit the completed restoration study on or before December 31, 2006 that includes a Program EIR along with a determination of the availability of the Salton Sea Restoration Transfer water to Metropolitan.

Financing

- The Resources Secretary is undertaking the Salton Sea restoration study with $20 million appropriated from state Proposition 50 bond funds.
- Approximately 1/2 of the 1.5 million af transfer will be conserved by IID using funds managed by the QSA Joint Powers Authority with the remainder of the IID conservation funded by water transfer payments from Metropolitan.
- DWR will facilitate the transfer by making direct specified payments to IID and by collecting certain payments from Metropolitan, the proceeds of which would be deposited in the Salton Sea Restoration Fund.

[12] The documents related to the QSA-related agreements discussed in this section are referenced above.

Federal, State and Local Permits for Construction

Under the direction of the Resources Secretary, DWR is in the initial stages of preparing a Program EIR for the plan. A Draft PEIR is scheduled for release to the public in February 2006. The Final PEIR is scheduled for submittal to the Legislature in December 2006 after which the Legislature is expected to consider issuing a Notice of Determination. State legislation would be required before the transfers can take place.

A.3.2 California Aqueduct Deliveries

A. State Water Project Deliveries

Source Of Supply

The State Water Project provides imported water to the Metropolitan service area and has historically provided from 25 to 50 percent of Metropolitan's supplies. In accordance with its contract with the Department of Water Resources (DWR), Metropolitan has a Table A allocation of 2,011,500 acre-feet per year under contract from the State Water Project. Actual deliveries have never reached this amount because they depend on the availability of supplies as determined by DWR. The availability of SWP supplies for delivery through the California Aqueduct over the next 23 years is estimated according to the historical record of hydrologic conditions, existing system capabilities, requests of the state water contractors and SWP contract provisions for allocating Table A, Article 21 and other SWP deliveries to each contractor. As shown in this report, the estimates of SWP deliveries to Metropolitan are based on DWR's most recent SWP reliability estimates contained in its May 25, 2005 Notice to State Water Contractors, Number 05-08.

As part of its contract with DWR, Metropolitan pays both the fixed costs of financing SWP facilities construction and variable costs of operations, maintenance, power and replacement costs for water delivered each year. SWP water is delivered to Metropolitan through the East Branch at Devils Canyon Power Plant afterbay, along the Santa Ana Valley Pipeline, and at Lake Perris. Metropolitan takes delivery from the West Branch at Castaic Lake.

Expected Supply Capability

The Edmund G. Brown California Aqueduct is capable of transporting Metropolitan's full contract amount of 2,011,500 acre-feet per year. However, the quantity of water available for export through the California Aqueduct can vary significantly year to year. The amount of precipitation and runoff in the Sacramento and San Joaquin watersheds, system reservoir storage, regulatory requirements, and contractor demands for SWP supplies impact the quantity of water available to Metropolitan.

Prior to the execution of the Bay-Delta Accord in December 1994, significant uncertainties existed regarding how much of the water in the Sacramento San Joaquin Bay-Delta would be available for export and how much would be required to meet regulatory requirements for meeting water quality standards and sustaining endangered species. The Bay-Delta Accord and the subsequent CALFED process removed significant uncertainties associated with regulatory requirement, thus providing a base for the DWR and the SWP contractors to estimate available water supplies. As discussed in a subsequent section, actions being undertaken by the CALFED process and the Phase 8 water rights process should enhance the reliability of supplies in the future.

DWR estimates the water supply available for export to Metropolitan and the SWP contractors by using the regulatory standards in the Bay-Delta Accord, as well as historic precipitation and runoff data and reservoir levels.

Rationale For Expected Supply

Metropolitan and 28 other public entities have contracts with the State of California for State Water Project water. These contracts require the state, through its DWR, to use reasonable efforts to develop and maintain the SWP supply. The state has made significant investment in infrastructure. It has constructed 28 dams and reservoirs, 26 pumping and generation plants, and about 660 miles of aqueducts. More than 19 million California residents benefit from water from the SWP. To date, the project has delivered in excess of 56 million acre-feet with the single year deliveries exceeding 3.5 million acre-feet in 2000. DWR estimates that with current facilities and regulatory requirements, the project will deliver 3.1 million acre-feet per year on average. Under its contract Metropolitan may use 48 percent of this quantity.

Further, under the water supply contract, DWR is required to use reasonable efforts to maintain and increase the reliability of service to Metropolitan. As discussed in a subsequent section, DWR is participating in the CALFED process to achieve these requirements.

Historical Record

The historical record shows significant accomplishments by DWR in providing its contractors with SWP water supplies. Through 2002, the SWP has delivered more than 100 maf to its contractors. The maximum annual water supply was delivered in 2000, and totaled 4.9 maf. In 2002 the project delivered 4.1 maf. DWR has continued to invest in SWP facilities to deliver water to its contractors.

Written Contracts or Other Proof

- 1960 Contract between the State of California and the Metropolitan Water District of Southern California for a Water Supply. This Contract, initially executed in 1960 and amended numerous times since, is the basis for SWP deliveries to Metropolitan. It requires the DWR to make reasonable efforts to secure water supplies for Metropolitan and its other contractors. The contract expires in 2035. At that time, Metropolitan has the option to renew the contract under the same basic conditions.

Financing

Metropolitan's payments for its State Water contract obligation are approved each year by its Board of Directors and currently constitute approximately 35 percent of the annual budget (referenced above).

Federal, State and Local Permit/Approvals

- Operation of the SWP. The DWR is responsible for acquiring, maintaining and complying with numerous Federal and State permits for operation of the SWP. Metropolitan has been active in monitoring the issues affecting its contract with DWR.
- Environmental Impact Report for the East Branch Enlargement. In April 1984 DWR prepared and finalized an Environmental Impact Report for the Enlargement of the East Branch of the Governor Edmund G. Brown California Aqueduct.
- Environmental Impact Report for the Harvey O. Banks Pumping Plant. In January 1986 DWR prepared and finalized an Environmental Impact Report for the Additional Pumping Units at Harvey O. Banks Delta Pumping Plant.

- Environmental Impact Report for the Mission Hills Extension. In 1990 DWR prepared and finalized an Environmental Impact Report for the State Water Project Coastal Branch, Phase II and Mission Hills Extension.
- East Branch Extension Project Phase 1. In 1998 DWR completed an EIR to extend the East Branch of the California Aqueduct to provide service to San Gorgonio Pass Water Agency. Phase 1 was completed in 2002.

B. Desert Water Agency/Coachella Valley Water District/Metropolitan Water Exchange Program

Source Of Supply

The Desert Water Agency (DWA) and Coachella Valley Water District (CVWD), both in Riverside County, have rights to State Water Project (SWP) deliveries but do not have any physical connections to the SWP facilities. Both agencies are adjacent to the Colorado River Aqueduct. For DWA and CVWD to obtain water equal to their SWP allocations, 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 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.

Expected Supply Capability

Under the existing agreements, Metropolitan provides water from its Colorado River Aqueduct to DWA and CVWD in exchange for SWP deliveries. Metropolitan can deliver additional water to its DWA/CVWD service connections permitting these agencies to store water. When supplies are needed, Metropolitan can then receive its full Colorado River supply as well as the State Water Project allocation from the two agencies, while the two agencies can rely on the stored water for meeting their water supply needs. The combined SWP Table A contract right of DWA and CVWD is 61,200 acre-feet. The amount of DWA and CVWD SWP Table A water available to Metropolitan depends on total SWP deliveries and varies from year-to-year.

Rationale For Expected Supply

The DWR estimates the amount of supplies that are available each year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff and actual deliveries of water.

Historical Record

The 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 Colorado aqueduct. Metropolitan has also been delivering water in advance of the amount needed under the exchange agreement. This water can be called on by Metropolitan during dry years. By the end of 2005, Metropolitan expects to have 325 taf in the Advance Delivery account.

Written Contracts or Other Proof

- 1967 and 1983 Water Exchange Contract and Agreements. The DWA and CVWD Program is currently in operation. The DWA and CVWD water exchange contracts have been in place since 1967, amended in 1972 and were modified with execution of additional agreements in 1983.
- 1984 Advance Delivery Agreement. DWA, CVWD and Metropolitan executed an Advance Delivery Agreement. This Advance Delivery Agreement allows Metropolitan to supply DWA and CVWD with Colorado River water in advance of the time these agencies are entitled to receive water under the Exchange Agreement. In future years, Metropolitan can recover this water by reducing its deliveries under the exchange agreement.

Financing

The funds for deliveries under this Program are included in Metropolitan's O&M budget and Long-range Financial Plan (referenced above).

Federal, State, and Local Permits/Approvals

The DWR is responsible for acquiring, maintaining and complying with numerous Federal and State permits for operation of the SWP.

- July 26, 1983 CVWD Negative Declaration, Whitewater River Spreading Area expansion Phase 1.
- February 1983, DWA Final EIR for the proposed extension of time for utilizing Colorado River water to recharge the upper Coachella Valley groundwater basins to the year 2035, Volume I and II, April 1983 Volume III

C. Semitropic Water Banking And Exchange Program

Source Of Supply

The agreement between Semitropic Water Storage District (Semitropic) and Metropolitan was executed in February 1994. Semitropic obtains water from the SWP through its contracts with the Kern County Water Agency. SWP supplies irrigate an area of 161,200 acres within Semitropic's service area. When this surface water is not available, these growers withdraw water from the underlying aquifer. The agreement between Semitropic and Metropolitan allows Metropolitan to make use of 35 percent of the additional storage in Semitropic's groundwater basin. In years of plentiful supply, Metropolitan can deliver available SWP supplies to Semitropic through the California Aqueduct. During dry years, Metropolitan can withdraw this stored water. Four other banking partners participate in this Program and use the remaining 65 percent of the additional storage in Semitropic's groundwater basin.

Expected Supply Capability

The Semitropic-Metropolitan Program provides Metropolitan with the capacity to store up to 350 taf of water under the current agreement. During dry years, Metropolitan can recover its stored water through a combination of direct pumping of the groundwater and delivery of Semitropic's SWP Table A water in the California Aqueduct. Based on the terms and conditions of the program agreements, the return of water to Metropolitan ranges from a minimum of 31 taf acre-feet per year (peak 4-month summer period) up to 170 taf (over a 12-month period). The average annual supply capability for a single dry year similar to 1977 or multiple dry years similar to the period 1990-1992 is 107 taf.

Rationale For Expected Supply

Historical Record
The Semitropic-Metropolitan Water Banking & Exchange Program has been operational since 1994. With existing agreements, it will continue to operate over the term of 41 years (1994-2035). At the end of 2004, Metropolitan had 315 taf in its storage account. It expects to have 343 taf in its storage account by the end of 2005.

Written Contracts or Other Proof
- 1992 Turn-in/out Construction, Operation and Maintenance Agreement. This Agreement was executed in 1992 by the Department of Water Resources and Semitropic to allow construction, operation and maintenance of the Semitropic California Aqueduct Turn in/out.
- 1993 Temporary Semitropic-Metropolitan Water Banking Agreement. This Agreement was executed in February 1993 by Semitropic and Metropolitan to allow the storage of available Metropolitan supplies in advance of execution of the long-term agreement.
- 1994 Semitropic/Metropolitan Water Banking and Exchange Agreement. This Agreement was executed in December 1994 by Semitropic and Metropolitan to implement the program for a 41 year term (1994-2035).
- 1995 Point of Delivery Agreement. This agreement, with the Department of Water Resources, Kern County Water Agency and Metropolitan, allows Metropolitan to divert water from the California Aqueduct into Semitropic's service area.
- 1995 Introduction of Local Water into the California Aqueduct. This agreement, with the Department of Water Resources, Kern County Water Agency and Semitropic, allows Metropolitan to receive water from the program into the California Aqueduct.

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Semitropic Program.

Federal, State and Local Permits/Approvals

- Final EIR. Semitropic acting as the lead agency under CEQA and Metropolitan acting as a responsible agency jointly completed the Environmental Impact Report for the Program. The EIR was certified by Semitropic in July 1994 and adopted by Metropolitan in August 1994.
- Regulatory Approvals. All regulatory approvals are in place and the program is operational.

D. Arvin-Edison Water Management Program

Source Of Supply

The Arvin-Edison Water Storage District (Arvin-Edison) manages the delivery of local groundwater and water imported into its service area from the Central Valley Project's (CVP) Millerton Reservoir via the Friant-Kern Canal. The surface water service area consists of 132,000 acres of predominantly agricultural land, and to a minor degree, municipal and industrial uses. It is situated in Kern County. Arvin-Edison operates its supplies conjunctively, storing water in the underlying aquifer when imported supplies are available and withdrawing that water when the availability of imported supplies is reduced. In 1997, Metropolitan entered into an agreement with the Arvin-Edison Water Storage District. The agreement allows Metropolitan to store available water in Arvin-Edison's groundwater basin, either through direct spreading operations, or through deliveries to growers in Arvin-Edison's service area. Similar to Arvin-Edison's own usage, this previously stored water could be withdrawn when the availability of imported supplies to Metropolitan is reduced.

Expected Supply Capability

The Arvin-Edison/Metropolitan Program provides Metropolitan with the capacity to store up to 250 taf of water under the current agreement. It also provides an option to increase the storage capacity to 350 taf. During dry years, Metropolitan can recover its stored water either through direct pumping of the groundwater or through exchange. Based on the terms and conditions of the program agreement, the return of water to Metropolitan ranges from a minimum of 40 taf per year (peak 4-month summer period) up to 110 taf (over a 12-month period). The average annual supply capability for this program is 90 taf for either a single dry year similar to 1977 or for each year of a multiple dry year period similar to the period 1990-1992.

Rationale For Expected Supply

Historical Record

The Arvin-Edison/Metropolitan Water Management Program has been operational since 1997. With existing agreements, it will continue to operate over the term of 30 years (1997-2027) with a possible extension to 2035. After withdrawing 43 taf for delivery to its service area in 2004, Metropolitan had 207 taf in its storage account at the end of the year.

Written Contracts or Other Proof

- 1997 Arvin-Edison/Metropolitan Water Management Agreement. This Agreement was executed in December 1997 by Arvin-Edison and Metropolitan to implement the program for a 30-year term (1997-2027).
- 1998 Turn-in/out Construction and Maintenance Agreement. This Agreement was executed in 1998 by the Department of Water Resources, Kern County Water Agency, Arvin-Edison and Metropolitan to allow construction, operation and maintenance of the Arvin-Edison California Aqueduct Turn in/out.
- 1998-2002 Water Delivery and Return Agreements. These agreements, with the Department of Water Resources, Kern County Water Agency, Arvin-Edison and Metropolitan, allow Metropolitan to divert water from, and introduce water to, the California Aqueduct.

- 2004 Point of Delivery Agreement. This agreement, with the Department of Water Resources, Kern County Water Agency and Metropolitan, allows Metropolitan to divert water from the California Aqueduct into Arvin-Edison's service area.
- 2004 Introduction of Water into the California Aqueduct. This agreement, with the Department of Water Resources, Kern County Water Agency and Arvin-Edison, allows Metropolitan to receive water from the program into the California Aqueduct.

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Arvin-Edison Program.

Federal, State and Local Permits/Approvals

- All regulatory approvals are in place.
- Environmental Status: A Negative Declaration was completed in 1996.
- An Addendum to the 1996 Negative Declaration was completed in 2003.
- Regulatory Approvals. All regulatory approvals are in place and program is operational

E. San Bernardino Valley Municipal Water District Program

Source Of Supply

The San Bernardino Valley Municipal Water District Program allows Metropolitan to purchase a dependable annual supply, as well as, an additional supply for dry year needs. Under this program, Metropolitan purchases water provided to San Bernardino Valley Municipal Water District (Valley District) from its annual State Water Project (SWP) water allocation. Valley District delivers the purchased supplies to Metropolitan's service area through the coordinated use of facilities and interconnections within the water conveyance system of the two districts.

The purchased SWP supply is provided to Metropolitan as direct deliveries of annual SWP water through the California Aqueduct to Metropolitan's service area, as well as through deliveries of recaptured SWP water previously stored in the San Bernardino groundwater basin to Metropolitan's service area. Under this program, Metropolitan purchases a minimum of 20 taf per year of SWP allocation every year. In addition, Metropolitan has the option to purchase Valley District's additional SWP allocation, if available, and the first right-of-refusal to purchase additional SWP supplies available beyond the minimum and option amounts. In the event that Metropolitan's operational needs do not require all, or a portion of the minimum purchased water, that unused amount may be carried forward up to a total of 50 taf for later delivery. Finally, the program establishes a critical dry year supply account for Metropolitan that could provide additional amounts of dry year supplies. During any year designated by DWR as a critically dry year, Valley District could deliver from this account up to 50 taf of recaptured SWP water previously stored in the San Bernardino groundwater basin.

To facilitate the transfer, the program also provides the coordinated use of existing facilities, including the Valley District's Foothill Pipeline and the Inland Feeder, to improve the conveyance capabilities of the delivery of SWP water to the service areas of both districts. The

intertie between the foothill Pipeline and existing segment of the Inland Feeder has been constructed and was operational as of December 2002. This intertie allows Metropolitan to move SWP water from the East Branch of the California Aqueduct through the Foothill Pipeline and Inland Feeder, into Diamond Valley Lake and the Colorado River Aqueduct. As a result of this intertie, the conveyance capacity into Metropolitan's system has been increased by 260 cfs, thus increasing Metropolitan's capability to refill and maintain storage in Diamond Valley Lake.

Expected Supply Capability

The average annual supply capability for a single dry year similar to 1977 is 70 taf; for multiple dry years similar to the period 1990-1992 expected supply capability is 37 taf.

Rationale For Expected Supply

Historical Record
The San Bernardino Valley Municipal Water District Program began operations in 2001 and is expected to be renewed continually in the future. Since its inception in 2001 this program has delivered 103 taf to Metropolitan. Deliveries in 2004 were 43 taf. Deliveries in 2005 will be a minimum of 20 taf.

Written Contracts or Other Proof
Metropolitan's dependable annual and dry-year supplies from the San Bernardino Valley Municipal Water District Program are based on Metropolitan Board actions and agreements.

- 2000 Board Approval of Coordinated Operating Agreement. In June 2000, Metropolitan's Board authorized entering into a Coordinated Operating Agreement between Metropolitan and Valley District to develop projects that could provide benefits to both districts through the coordinated use of facilities and SWP supplies.
- 2000 Coordinated Operating Agreement. The Coordinate Operating Agreement between Metropolitan and Valley District was executed in July 2000.
- 2001 Board Approval of the Coordinated Use Agreement. In April 2001, Metropolitan's Board authorized entering into the Coordinated Use Agreement for Conveyance Facilities and SWP Water Supplies between Metropolitan and Valley District for the purchase of dependable annual and dry year supplies by Metropolitan.
- 2001 Coordinated Use Agreement. The Coordinated Use Agreement for Conveyance Facilities and SWP Water Supplies between Metropolitan and Valley District for the purchase of dependable annual and dry year supplies by Metropolitan was executed May 2001. The Agreement is effective as of July 1, 2001, for an "evergreen" term (10-years with automatic annual extensions unless otherwise notified).

Financing

Metropolitan's O&M budget (referenced above) includes the funds to purchase Program water.

Federal, State, and Local Permits/Approvals

The Program became effective as of July 1, 2001. An environmental review process and regulatory approval supported implementation.

- Final EIR. Final Regional Water Facilities Master Plan Environmental Impact Report dated February 1, 2001 was certified by Valley District, as lead agency, and by Metropolitan, as responsible agency. Notices of determinations were filed by Valley District and Metropolitan on May 29, 2001 and April 18, 2001, respectively.
- State Water Contractors' Review. In May 2001 the State Water Contractors reviewed and issued a letter supporting the program.
- DWR Review. The California Department of Water Resources agreed to the program in December 2001.

F. Bay-Delta Improvements

Source Of Supply

Improving the water supply reliability of the State Water Project (SWP) is a primary focus of Metropolitan's long-term planning efforts. Metropolitan's strategy is to reduce its dependence on SWP supplies during dry years, when risks to the Bay-Delta ecosystem are greatest, and to maximize its deliveries of available SWP water during wetter years to store in surface reservoirs and groundwater basins for later use during droughts and emergencies.

Restoring and stabilizing the environmental health and supply reliability of the Bay-Delta through the implementation of CALFED's Bay-Delta Program and the Sacramento Valley Water Management Agreement are important steps to accomplishing this objective. These improvements are necessary for Metropolitan to attain its goal of 650 taf of supply yield from the Bay-Delta in dry years by 2020. This yield is 200 taf to 250 taf over estimates of existing available dry-year supplies, as described above. This goal means that Metropolitan will rely on only 32.5 percent of its total SWP contract amount of 2.0 million acre-feet per year in dry years. In addition, Metropolitan policy objectives for Bay-Delta improvements include an average of 1.5 million acre-feet of supply yield to Metropolitan over all year types.

The SWP conveys water from the western slope of the Sierra Nevada to water users both north and south of the Bay-Delta. Specifically, SWP is delivered to Metropolitan's service area through a system of reservoirs, the Bay-Delta, pumping plants and the California Aqueduct. Owned and operated by the California Department of Water Resources (DWR), the SWP provides municipal and agricultural water to 29 State Water Contractors. Annual deliveries for the SWP average about 2.5 million acre-feet. Municipal uses account for about 60 percent of annual deliveries, with the remaining 40 percent going to agriculture.

Delta Improvements Package and Phase 8 Settlement

CALFED is a process involving numerous stakeholders (federal and state resource agency representatives, water users, environmental entities, and other interests) to develop solutions for Bay-Delta problems. On August 28, 2000, CALFED's Bay-Delta Program was approved, and it laid out final implementation plans for the first phase – the first seven years – of what is conceived to be up to 30 years of improvements in the Bay–Delta. This Program would be implemented through 11 major elements.

Delta Improvements Package. 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.

The key benefits of the proposed Delta Improvement Program for urban Southern California include:

- Increased water supply for regional groundwater and surface water storage initiatives (130 taf per year);
- Enhanced access to voluntary water transfers upstream of the Delta as foreseen in the Record of Decision;
- Continued Endangered Species Act assurances and supply reliability through implementation of a long-term Environmental Water Account;
- Achievement of SWP supply goals for 2020 adopted by the Metropolitan Water District Board in the Southern California IRP; and
- Enhanced operation of the diversified portfolio of supplies developed over the past decade in the IRP.

Metropolitan also has been working with Bay-Delta watershed users toward settling the question of how all Bay-Delta water users would bear some of the responsibility of meeting Delta 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 taf per year in the Sacramento Valley, and approximately 55 taf of this water would come to Metropolitan through its SWP allocation. The Agreement specifies a supply breakdown of 110 taf (60 percent) to the SWP and 75 taf (40 percent) to the CVP.

Based on the work plans for CALFED's Bay-Delta Program and the Sacramento Valley Management Agreement, expected dry-year supply capabilities are projected to be 55 taf for the period 2010 through 2015, and 110 taf beyond 2015.

Rationale For Expected Supply

Implementation Status
Expected supplies are projected in accordance with the approved implementation plan for CALFED's Bay-Delta Program and with the work plans for the Sacramento Valley Water Management Agreement.

Written Contracts or Other Proof
Metropolitan's projected dependable annual and dry-year supplies from planned Bay-Delta improvements are based on Metropolitan Board actions and agreements.

- CALFED's Bay-Delta Program.
  - Bay-Delta Accord approved in December 1994.[13]
  - Proposition 204 funds approved by voters in November 1996.
  - Metropolitan policy direction regarding CALFED's Bay-Delta Program adopted in July 1999. This policy direction established water supply goals.
  - Proposition 13 funds approved by voters in March 2000.
  - CALFED Framework announced in June 2000[14].
  - Final implementation plans for the first phase of CALFED's Bay-Delta Program approved in August 2000, in conjunction with the approval of the Program and conclusion of the environmental review process.
  - Proposition 50 funds approved by voters in November 2002.
  - Annual Federal appropriations.
- Sacramento Valley Water Management Agreement.[15]
  - Work plans detailing projects that could provide benefits by the 2002 and 2003 water years were developed in October 2001.
  - Statement of settlement policy principles recommended in December 2001 by negotiators for approval.
  - Statement of settlement policy principles approved by Metropolitan's Board in January 2002.
  - A Sacramento Valley Water Management Agreement was signed and approved by settlement parties in December 2002.

Financing

Funding for DIP will come from federal, state, and local water supplier sources. Final cost-sharing arrangements for DIP are still under negotiation. Metropolitan expects a funding proposal for DIP and related CALFED actions by the end of 2005.

Phase 8 funding is structured as follows. The agreement calls for 185 taf per year to be produced in below normal, dry and critical years with the ability of Central Valley water agencies to preclude delivery in above-normal years if it impairs their ability to perform in other years. The water is divided equally into two blocks: Block 1 is for local use in the Central Valley and if not

[13] A copy of this agreement can be found at http://calwater.ca.gov/Archives/GeneralArchive/SanFranciscoBayDeltaAgreement.shtml.
[14] California's Water Future: A Framework for Action can be found at http://calwater.ca.gov/Archives/GeneralArchive/adobe_pdf/new_final_framework.pdf.
[15] A copy of this agreement can be found at http://www.norcalwater.org/pdf/agreementfinal.pdf

needed, it becomes available to exporters (the predominant expectation of all); Block 2 is settlement water, available to meet flow standards/exports, except as noted above. Exporters have to buy an equal amount of Block 1 and Block 2 water if it is made available. Capital expenditures for infrastructure needed to deliver this water are assumed to be financed with public/bond funds. O&M expenses are shared for Block 2 on a 50-50 basis. For Block 1 water the price schedule is fixed at $50/af in above normal, $75 in below normal, $100 in dry and $125 in critical years. This price schedule is indexed to a cost-of-living index.

Federal, State, and Local Permits/Approvals

- CALFED's Bay-Delta Program.
  - Programmatic Environmental Impact Report/Statement finalized in July 2000.
  - Record of Decision issued in August 2000 for the final Programmatic Environmental Impact Report/Statement regarding the CALFED Bay-Delta Program.
- Sacramento Valley Water Management Agreement.
  - Settlement parties approved Sacramento Valley Management Agreement in December 2002.
  - Environmental review will be conducted by the applicable lead agencies on the various work plan projects to comply with the California Environmental Quality Act, and as appropriate the National Environmental Policy Act.

G. Kern Delta Water Management Program

Source Of Supply

In December 1999 Metropolitan advertised a request for proposals for participation in "The California Aqueduct Dry-year Transfer Program." As a result of this request for proposals, four programs, including one from the Kern Delta Water District (Kern Delta), were selected for further consideration. In 2001, Metropolitan entered into Principles of Agreement with Kern Delta for the development of a Dry-year supply program. Kern Delta serves 125,000 acres of actively farmed highly productive farmland located in the San Joaquin Valley portion of southern Kern County. Kern Delta has under contract 180 taf per year of good quality highly reliable pre-1914 Kern River water and 25.5 taf per year of SWP Table A contract right (under contract with Kern County Water Agency).

The dry-year supply program between Kern Delta and Metropolitan involves the storage of water with Kern Delta. In years of plentiful supply the agreement allows Metropolitan to store water in Kern Delta's groundwater basin, either through direct spreading operations or through deliveries to growers in Kern Delta's service area. Metropolitan has the ability to store up to 250 taf of water. Agreement provisions may allow for storage beyond this amount. When needed, Metropolitan can recover its stored water either through direct pumping of the groundwater or exchange at a rate of 50 taf per year. The program duration will be from 2002 to 2027 with provisions that allow the water to be withdrawn until 2033.

Expected Supply Capability

The Kern Delta/Metropolitan Program provides Metropolitan with the capacity to store up to 250 taf of water at any one time. When needed, Metropolitan can recover its stored water either through direct pumping of the groundwater or exchange at a rate of 50 taf per year.

Rationale For Expected Supply

Implementation Status
Expected supplies are projected in accordance with accepted detailed groundwater modeling that has been accomplished for the program. In addition, the Kern Delta/Metropolitan Water Management Program was operational and accepting water for storage by fall of 2003. Metropolitan had 42 taf in storage as of the end of 2004 and expects to add up to 20 taf during 2005.

Written Contracts or Other Proof

- 2001 Kern Delta/Metropolitan Principles of Agreement. Principles of agreement were entered into between Kern Delta and Metropolitan in June 2001, covering program costs, operational aspects and risks/responsibilities.
- 2002 Kern Delta and Metropolitan Boards of Directors Approval. These actions approved execution of the Long-term Agreement, which delineates program operations, costs, and risks/responsibilities

Financing

Metropolitan's O&M budget (referenced above) includes payments for the Kern Delta/Metropolitan Program.

Federal, State and Local Permits/Approvals

Kern Delta, acting as lead agency under CEQA has prepared a full Environmental Impact Report. As part of this EIR, Kern Delta published a Notice of Preparation, and held meetings with the general public, interested agencies and resource agencies. In November 2002 the Final EIR certified by Kern Delta and adopted by Metropolitan.

H. Central Valley Transfers

Source Of Supply

Up to 27 million acre-feet of water (80 percent of California's developed water) is delivered for agricultural use every year. Over half of this water is used in the Central Valley; and much of it is delivered by, or adjacent to, SWP and Central Valley Project (CVP) conveyance facilities. This allows for the voluntary transfer of water to many urban areas, including Metropolitan, via the California Aqueduct.

Recent events indicate that a portion of this water could be available to Metropolitan through mutually beneficial transfer agreements:

- The Governor's Water Bank (Bank) in 1991, 1992, and 1994 secured 140 to 820 taf per year of water supply. Further, the Department of Water Resource's (DWR's) Dry Year Water Purchase Program (Purchase Program) in 2001, 2002 and 2003 secured a total of 162 taf. The DWR established and administered the Bank and the Purchase Program by facilitating purchasing water from willing sellers and transferring the water to those with critical needs using the State Water Project (SWP) facilities. Sellers, such as farmers and water districts, made water available for the Bank and Purchase Program by fallowing crops, shifting crops, releasing surplus reservoir storage, and by substituting groundwater for surface supplies.
- Under the Central Valley Improvement Act, passed by Congress in October 1992, water agencies that are not contractors with the Central Valley Project (CVP), such as Metropolitan, may for the first time be able to acquire a portion of the CVP's 7.8 million acre-feet per year of supply.
- In 2003, Metropolitan secured options to purchase approximately 145 taf of water from willing sellers in the Sacramento Valley during the irrigation season. Using these options, Metropolitan purchased approximately 125 taf of water for delivery to the California Aqueduct.
- In 2005, Metropolitan, in partnership with three other State Water Contractors, secured options to purchase approximately 130 taf of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was 113 taf. Metropolitan also had the right to assume the other State Water Contractors options if they chose not to exercise their options. Due to improved hydrologic conditions, Metropolitan and the other State Water Contractors did not exercise these options.

Expected Supply Capability

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 that are selling the water. In critically dry-years or periods of prolonged drought, Metropolitan also anticipates working closely with DWR, 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 over 800 taf of water transfer supplies within a short period from a limited group of sellers. On average, Metropolitan expects to be able to purchase 125 taf in dry years for delivery via the California Aqueduct.

Rationale For Expected Supply

Historical Record

Metropolitan has made rapid progress to date developing Central Valley transfer programs. This progress may be attributed to several factors, including Metropolitan dedicating additional staff to identify, develop, and implement Central Valley storage and transfer programs; increased willingness of Central Valley agricultural interests to enter into storage and transfer programs with Metropolitan; and Metropolitan staff's ability to work with California Department of Water Resources and US Bureau of Reclamation staff to facilitate Central Valley storage and transfer programs. The availability of dry year supplies from the Bank, Purchase Program, and/or Water Transfer Program has been demonstrated 1991, 1992, 1994, 2001,2002, 2003, and 2005.

The historical record for purchases from the Bank, Purchase Program, and Metropolitan-initiated Central Valley programs in 2003 and 2005, as well as the number of sellers and buyers participating in these Programs, are strong indicators that there are significant amounts of water that can be purchased through spot market water transfers during dry years. This historical record is summarized in the table below.

Table A.3-1
Historical Record of Central Valley Water Transfers

Program	Purchases (acre-feet per year)		Participants	
	Total	Metropolitan	Seller	Buyers
1991 Governor's Water Bank	820,000	215,000	351	13
1992 Governor's Water Bank	193,246	10,000	18	16
1994 Governor's Water Bank	220,000	100	6	15
2001 Dry-Year Purchase Program	138,000	80,000	9	8
2003 Water Transfer Program	167,200	167,200	11	1
2005 Water Transfer Program*	130,000	113,000	3	4

* Quantities denote options to purchase. Metropolitan chose not to exercise its options due to improved hydrologic conditions.

Written Contracts or Other Proof

- Executive Order. In response to the extended 1987-92 drought, Governor Wilson issued an executive order establishing a Drought Action Team. This team, made up of state and federal officials, developed an action plan to lessen the impacts of the continuing drought (State 1991). One of the proposed actions was the formation of an emergency water bank managed by DWR. The purpose of the bank would be to help California's urban, agricultural, and environmental interests meet their critical water supply needs.
- Agreements with Buyers. Preceding the implementation of the 1995 and 2001 Water Banks, contracts were executed between DWR and agencies interested in buying. The essential terms and conditions for negotiating purchases, including maximum offering price, quantity of water needed, and the timing of delivery, were established in these contracts.
- Agreements with Sellers. Purchases of water for the Bank and Purchase Program have been secured through written contracts signed by DWR and sellers. In addition, Metropolitan entered into agreements with sellers for its 2003 and 2005 Central Valley water transfer programs.
- 1999 Board Directive. Metropolitan's Board has authorized water transfers in accordance with the Water Surplus and Drought Management Plan (WSDM Plan) adopted in April 1999. The WSDM Plan is a comprehensive policy guideline for managing Metropolitan's water supply during periodic surplus and shortage conditions. During shortage conditions, the plan specifies the type, priority and timing of drought actions, including the purchase of transfers on the spot market that could be taken in order to prevent or mitigate negative impacts on retail demands.

Financing

Funds for Central Valley water transfers are included in the O&M budget.

Federal, State, and Local Permits/Approvals

- Environmental Impact Report for the Bank. In November 1993, DWR prepared and finalized a programmatic Environmental Impact Report for the operation of the drought water banks during future drought events.
- Individual CEQA and NEPA documents for Metropolitan's 2003 and 2005 Central Valley water transfer programs. Individual sellers prepared CEQA documentation to support their transfers. In addition, the U.S. Bureau of Reclamation prepared NEPA documentation for those transfers requiring federal approval.

A.3.3 In-Basin Storage Deliveries

A. Surface Storage

Source Of Supply

Surface storage is a critical element of Southern California's water resources strategy. Because California experiences dramatic swings in weather and hydrology, surface storage is important to regulate those swings and mitigate possible supply shortages. Surface storage provides a means of storing water during normal and wet years for later use during dry years, when imported supplies are limited. Since the early twentieth century the Department of Water Resources and Metropolitan have constructed surface water reservoirs to meet emergency, drought/seasonal and regulatory water needs for Southern California. These reservoirs include 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 Metropolitan's recently completed Diamond Valley Lake. Some reservoirs such as Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, and Orange County Reservoir, which have a total combined capacity of about 3,500 acre-feet, are used solely for regulatory purposes. The remaining surface reservoirs are primarily used to meet emergency, drought and seasonal requirements. The total gross storage capacity for these larger remaining reservoirs is 1,768,100 acre-feet. However, not all of the gross storage capacity is available to Metropolitan; dead storage and storage allocated to others reduce the amount of storage that is available to Metropolitan to 1,669,100 acre-feet.

Expected Supply Capability

Surface storage reservoirs are an important tool that allows Metropolitan to meet the water needs of its service area. As discussed in the Final Environmental Impact Report for the Eastside Reservoir (DVL) Project dated October 1991, in Southern California's Integrated Resources Plan, dated March 1996, and in the IRP Update finalized in 2004, the allocation of available surface storage can be divided into two primary components: emergency, and drought/seasonal. As specified by Metropolitan's Board of Directors in the Final EIR for DVL, "Metropolitan shall maintain sufficient water reserves within its service area to supplement local production during an emergency, or severe water shortage." With DVL in operation, Metropolitan can now re-operate the surface reservoirs and meet the Board's stated objectives.

Updated Emergency Storage Requirements: Metropolitan's criteria for determining emergency storage requirements, which was approved by Metropolitan's Board, was established in the Final EIR for DVL and further discussed in the IRP. Emergency Storage requirements are based on the potential for a major earthquake to damage the Colorado River Aqueduct, Los Angeles Aqueduct, and both branches of the California Aqueducts that could force the aqueducts out of service for 6 months. During this period, all interruptible service deliveries would be suspended, a mandatory reduction in water use of 25 percent from normal-year demand levels would be instituted, water stored in surface reservoirs and groundwater basins under Metropolitan's interruptible program would be made available, and full local groundwater production would be sustained.

The storage reserved in system reservoirs for emergency purposes changes over the next 20 years in accordance with the projected demands on Metropolitan as shown below. The residual storage available to meet other needs, dry-year/seasonal, is also shown below and discussed in greater detail in this appendix.

TableA.3-2
Surface Storage Utilization

	Average Year Storage Projection				
	2010	2015	2020	2025	2030
Surface Storage in MWD Service Area	1,625,700	1,625,700	1,625,700	1,625,700	1,625,700
Emergency	651,000	639,000	688,000	735,000	784,000

Determined in accordance with Metropolitan Board policy objectives, the Integrated Resources Plan dated March 1996, and the IRP Update.

Updated Storage Requirements for Dry-Year Supply and Seasonal Needs: Storage capacity in system reservoirs, including DVL, is also earmarked for dry-year supply and system regulation purposes. Dry-year supply storage within Metropolitan's service area is required to meet the additional water demands that occur during single-year and extended droughts. As specified in the Final EIR for DVL and further discussed in the IRP, this storage requirement is defined as the difference between average-year demand and above average demand during dry years. In addition to dry-year storage, seasonal storage is required to meet seasonal peak demands, which are defined as the difference between average winter demands and average summer demands. The dry-year supply and seasonal storage also provides sufficient reserves to permit approximately 5 percent downtime for rehabilitation, repair and maintenance of raw water transmission facilities.

Historical Record

Metropolitan has a contract with the Department of Water Resources that allows use of DWR's terminal reservoirs, such as Lake Castaic on the West Branch and Lake Perris on the East Branch of the California Aqueduct. Metropolitan makes annual payments to the DWR based on the amount of water delivered, percentage of facilities actually used, power, operations, maintenance and other charges. In addition, Metropolitan owns and operates surface reservoirs such as Lake Skinner, Lake Mathews and Diamond Valley Lake to enhance water supply reliability for its Member Agencies.

Written Contracts or Other Proof of Usage

The Surface Reservoirs used by Metropolitan are available either by contract (in the case of the DWR terminal reservoirs) or by construction of its own facilities. The following historical record is provided:

- November 1960 Contract between the State of California Department of Water Resources and the Metropolitan Water District of Southern California for a Water Supply. This Contract and its numerous amendments describe Metropolitan's legal access to and obligations for the operation of the State Water Project for the benefit of its Contractors. Metropolitan has an entitlement to 2,050,000 acre-feet of water each year subject to

availability. The terms of this Contract describe Metropolitan's rights to and obligations for the terminal surface reservoirs for water supply purposes.

- November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.
- November 1999 Memorandum of Understanding on Operation of Diamond Valley Lake. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.
- Elderberry Forebay Contract for Conditions for Use. Conditions for Use of storage are described in the Contract Between the Department of Water Resources, State of California, and the Department of Water and Power, City of Los Angeles, for Cooperative Development, West Branch, California Aqueduct; Amendment No. 1, July 3, 1969; and Amendment No. 4, June 27, 1985.
- June 2002 Division of Safety of Dams Certificate of Approval. The Department of Water Resources, Division of Safety of Dams issued the Certificate of Approval for operation of Diamond Valley Lake in early 2000, with three conditions. These conditions were: (1) Satisfactory operation of the butterfly valves and emergency gate in the inlet/outlet tower, (2) completion of the Tank Saddle Cutoff remediation and (3) completion of the Signal Spillway. Metropolitan completed these conditions in 2001 and the Diamond Valley Lake is currently operational in accordance with the Certificate of Approval.
- October 1991 Final Environmental Impact Report for the Eastside Reservoir Project (DVL). The EIR established criteria for integrating the operations of Metropolitan's reservoirs and DWR's southern reservoirs for emergency purposes. These criteria also provided that Metropolitan reservoirs could be expected to withdraw all drought storage water within a two-year period.

B. Flexible Storage Use Of Castaic Lake And Lake Perris

Source Of Storage

The flexible storage use of Castaic Lake and Lake Perris, SWP reservoirs, provides Metropolitan with dry-year supply. The State Water Project (SWP) contractors participating in repayment of the capital costs of Castaic Lake and Lake Perris have the contract right to withdraw SWP water from these reservoirs in addition to their allocated supply in any year on an as-needed basis. These contractors must replace the water withdrawn under this program within five years of the first withdrawal. This storage is referred to as "flexible storage". It is available in Castaic Lake to Metropolitan, Ventura County Flood Control and Water Conservation District, and to the Castaic Lake Water Agency. It is available in Lake Perris to Metropolitan only.

Expected Supply Capability

The dry year supply available to Metropolitan from the flexible storage use of Castaic Lake and Lake Perris totals 218, 940 af, made up of 153,940 af in Castaic Lake and 65,000 af in Lake Perris. Table A.3-3 shows the use of this available supply in accordance with Metropolitan's operating criteria:

TableA.3-3
Estimated Water Supplies Available for Metropolitan's Use
Under the Flexible Storage Use of Castaic Lake and Lake Perris *
(thousand acre-feet per year)

Year	Multiple Dry-Years (1990-1992)	Single Dry Year (1977)
2010	73	219
2015	73	219
2020	73	219
2025	73	219
2030	73	219

Source: Metropolitan's operating criteria.

Seismic concerns have arisen at the Lake Perris dam. In response, DWR plans to reduce the storage amount at Lake Perris by half until those concerns can be studied and addressed. In the long-term, the reduction in storage may potentially impact the amount of flexible storage available to Metropolitan from Lake Perris, and also impact the total amount of emergency storage available.

Rationale For Expected Supply

Implementation Status
Express provisions related to flexible storage have been incorporated in Metropolitan's SWP contract since 1995. The operating options have been available for use since that time and will continue to be in effect indefinitely as a part of the SWP contracts.

Historical Record
Metropolitan has exercised the flexible storage provision in 2000, 2001 and 2002. Its use is based on existing contract provisions.

- DWR Bulletin 132-94. The use of Castaic Lake and Lake Perris is determined in accordance with the proportionate use factors from Bulletin 132-94, Table B, upon which capital cost repayment obligations are based. Based on its capital repayment obligations, Metropolitan's proportionate use of Castaic Lake is 96.2 percent and of Lake Perris is 100 percent. Per its SWP contract, Metropolitan has express rights to use certain portions of the SWP southern reservoirs independently of DWR to supply water in amounts in addition to approved SWP deliveries.
- Metropolitan's SWP Contract. Metropolitan's SWP contract was amended in 1995 to include Article 54, "Usage of Lakes Castaic and Perris." This article provides flexible storage to contractors participating in repayment of the capital costs of Castaic Lake and Lake Perris. Each contractor shall be permitted to withdraw up to a Maximum Allocation from Castaic Lake and Lake Perris. These contractors may withdraw a collective Maximum

Allocation up to 160 taf in Castaic Lake and 65 taf in Lake Perris, which shall be apportioned among them pursuant to the respective proportionate use factors, as follows:

Table A.3-4
Flexible Storage Allocations

Participating Contractor	Proportionate Use Factor	Maximum Flexible Storage Allocation (acre-feet)
Castaic Lake		
Metropolitan	.96212388	153,940
Ventura County Flood Control and Water Conservation District	.00860328	1,376
Castaic Lake Water Agency	.02927284	4,684
Total Castaic Lake	**1.00000000**	**160,000**
Lake Perris		
Metropolitan	**1.00000000**	**65,000**

Financing

The cost associated with the withdrawal and replacement of water in the flexible storage is included in Metropolitan's annual payments under the State Water Contract.

Federal, State, and Local Permits/Approvals

The flexible storage provision became effective in 1995. DWR has the approval authority to affect changes in the operations and usage of existing SWP facilities, including Castaic Lake and Lake Perris.

C. Metropolitan Surface Reservoirs

Source Of Supply

Storage capacity in Metropolitan reservoirs, including Lake Skinner, Lake Mathews, Live Oak Reservoir, Garvey Reservoir, Palos Verdes Reservoir, Orange County Reservoir and Metropolitan's recently completed Diamond Valley Lake, is earmarked to meet emergency, dry-year/seasonal and system regulation needs, as these have been defined above.

Expected Supply Capability

The total available storage capacity for all Metropolitan-controlled surface reservoirs (Metropolitan-owned and DWR terminal reservoirs) is 1,625,700. As discussed earlier, approximately 651 taf in 2010 rising to 735 taf acre-feet in 2025 has been set aside to meet the emergency storage requirements of the service area. After accounting for emergency storage, the surface storage available in Metropolitan-owned reservoirs to meet dry-year/seasonal requirements is presented below:

Table A.3-5
Estimated Supplies Available From Metropolitan's Surface Storage
(thousand acre-feet)

Year	Multiple Dry-Years (1990-1992)	Single Dry Year (1977)
2010	244	733
2015	248	745
2020	232	697
2025	217	650
2030	200	601

Source: Metropolitan analysis

Rationale for Expected Supply

Program Facilities
Major facilities for Lake Mathews include an earthen dam to impound water and a recently completed new outlet tower. Major facilities for Lake Skinner include an earthen dam to impound water, an outlet tower, a inlet from the San Diego Canal to deliver water into the reservoir, a water treatment filtration facility, and recreational facilities consisting of a marina, parks, swimming areas, golf course, and hiking trails. Major facilities at Diamond Valley Lake include three earthen dams to impound water, an inlet/outlet tower, a secondary inlet from the Inland Feeder, a large pumping station to deliver water into the reservoir, and power generating facilities. Recreational facilities consisting of a marina, parks, swimming areas, golf course, hiking trails, equestrian trails and lodging are planned.

Historical Record
The Diamond Valley Lake is currently operational and is essentially full. Lake Mathews and Lake Skinner have been service for over 30 years and are currently available for full operations.

- November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.
- October 1991 Final Environmental Impact Report for the Eastside Reservoir Project (DVL). The EIR established criteria for integrating the operations of Metropolitan's reservoirs and DWR's southern reservoirs for emergency purposes. These criteria also provided that Metropolitan reservoirs could be expected to withdraw all drought storage water within a two-year period.

- November 1999 Memorandum of Understanding on Operation of Diamond Valley Lake. This MOU, signed by Metropolitan and other affected parties, governs Metropolitan's operations of Lake Skinner in Riverside County. The DWR Division of Safety and Dams also reviews monitoring data on the safety of the dam annually.
- June 2002 Division of Safety of Dams Certificate of Approval. The Department of Water Resources, Division of Safety of Dams issued the Certificate of Approval for operation of Diamond Valley Lake in early 2000, with three conditions. These conditions were: (1) Satisfactory operation of the butterfly valves and emergency gate in the inlet/outlet tower, (2) completion of the Tank Saddle Cutoff remediation and (3) completion of the Signal Spillway. Metropolitan completed these conditions in 2001 and the Diamond Valley Lake is currently operational in accordance with the Certificate of Approval.

Financing

The capital cost of Diamond Valley Lake, Lake Mathews and Lake Skinner was financed by a combination of revenue bonds and operating revenues. Annual operating costs, including maintenance and pumping, are included in Metropolitan's annual O&M budget (referenced above).

Federal, State, and Local Permits/Approvals

All necessary permits have been obtained. A permit to generate and sell power has been acquired from the Federal Energy Regulatory Commission. No further regulatory permits are required.

D. Groundwater Conjunctive Use Programs

Source Of Supply

The Integrated Resources Plan (IRP) approved by the Metropolitan Board established Metropolitan's strategy to store imported water that is most available during wet years in surface reservoirs or groundwater aquifers for later use during droughts and emergencies. In this way, Metropolitan can reduce its reliance on direct deliveries from the State Water Project (SWP) and the Colorado River during dry years when competing demands by other users and risks to the watershed ecosystems are greatest. During the development of the IRP and in cooperation with Metropolitan, the Association of Groundwater Agencies (AGWA) undertook a study to examine the potential for groundwater storage. AGWA, which is composed of representatives from six major basins in Southern California, was created to work collectively on groundwater issues, including conjunctive use of imported water. The findings of the AGWA study indicated that up to 1.5 million acre-feet of total storage capacity could be dedicated to regional storage of imported supplies.

Use of current facilities, along with some facilities improvements, could result in up to 350 taf of additional groundwater production as a result of storing imported water over the next 20 to 30 years. Based on the AGWA study, the 1996 IRP set a resource objective to develop about 275 taf per year of dry-year supply from in-basin groundwater storage by 2010 and 300 taf per year by 2020. These targets were maintained in the 2004 Update of the IRP. Groundwater conjunctive

use capabilities are being developed in accordance with the IRP as described in the body of this report.

Rationale For Expected Supply

Implementation Status:
The status of implementation for the groundwater conjunctive use programs has been described in the body of this report.

Historical Record

- Long-term Replenishment Program. As a result of Metropolitan's Long-term Replenishment Program, local agencies are currently storing available imported water in order to maintain groundwater production during the summer season and dry years. Based on the historical record for replenishment deliveries, it is estimated that an average of 100 taf per year of groundwater supply is produced as a result of Metropolitan's existing Long-term Replenishment Program.
- The Main San Gabriel Cyclic Agreement. This was originally signed in 1979 for a term of five years. It has since been renewed five times, each time for a five-year term. It currently expires in 2009, but is expected to be renewed repeatedly in future.
- North Las Posas Groundwater Storage Program. Two phases of the program's ASR wells have been constructed, providing approximately 8 taf per year of replenishment capacity and 12 taf per year of withdrawal capacity. As of June 30, 2005, 48 taf are in storage. Upon completion of the Moorpark pipeline pumpstation by Calleguas MWD in 2007, the wellfield will be fully operational and able to pump 47 taf per year of stored water from the basin. This agreement is in place for forty years, through 2035.

As of August 1, 2005, approximately 125 taf of water has been stored in contractual dry-year storage programs in the North Las Posas, Chino, Orange County, Live Oak, Central, and Raymond groundwater basins.

Written Contracts or Other Proof
Metropolitan's dry-year supply from the ground water conjunctive use programs is based on Metropolitan's Board actions and agreements.

- Approval of Long-term Replenishment Program. Beginning in fiscal year 1989-90, Metropolitan implemented the Long-term Replenishment Program. The continuation of this program was reaffirmed as part of the new rate structure that was approved by Metropolitan's Board in October 2001.
- Agreements for North Las Posas Groundwater Storage Program. An Agreement between Metropolitan and Calleguas Municipal Water District (Calleguas) was executed in June 1995 and amended in May 1998. The term of the Agreement extends to2035.
- Proposition 13 Groundwater Conjunctive Use Programs Operational by 2010.
  - AGWA study dated month 1994, identifying the potential storage capacity and return capabilities from groundwater conjunctive use programs.
  - Principles for groundwater storage adopted by the Metropolitan Board in January 2000.
  - Resolution for Proposition 13 Funds adopted by the Metropolitan Board in October 2000.
  - Agreement executed with the California Department of Water Resources for Interim Water Supply Construction Grant Commitment Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection (Proposition 13, Chapter 9, Article 4)

providing for Metropolitan to administer $45 million in state Proposition 13 grant funds for groundwater reliability programs; October 2000
- Agreement executed for Long Beach Conjunctive Use Project, July 2002
- Agreement executed for Live Oak Conjunctive Use Project, October 2002
- Agreement executed for Foothill Area Groundwater Storage Project, February 2003
- Agreement executed for Chino Basin Programs, June 2003
- Agreement executed for Orange County Groundwater Storage Program, June 2003
- Agreement executed for Compton Conjunctive Use Program, February 2005
- Agreement executed for Long Beach Conjunctive Use Project—Expansion in Lakewood, July 2005

All of these programs have an initial 25 year term, with provision for renewal or extension after that period.

Financing

Financing has been supplied from multiple sources as discussed below:

- Financing for Long-term Replenishment Program. No capital or O&M costs are associated with the implementation of the Long-term Replenishment Program. Rather, Metropolitan provides a discounted water rate to encourage member agencies to take delivery of surplus water for storage purposes.
- Financing for North Las Posas Groundwater Storage Program.
  - Metropolitan's Board appropriated $6 million to construct wells and appurtenant facilities in Phase 1 of the program in June 1995.
  - Metropolitan's Board appropriated $25 million to construct wells and appurtenant facilities Phase 2 of the program in January 1998.
  - Metropolitan has reimbursed Calleguas MWD for over $28 million for capital facilities for this program.

- Financing for Proposition 13 and Additional Groundwater Storage Programs.
  - Metropolitan's Board appropriated $210,000 to conduct initial environmental, engineering and planning studies for the Raymond Basin storage program in January 2000.
  - Proposition 13 funds ($45 million) were allocated to Metropolitan by the state in May 2000 for the development of local groundwater storage projects.
  - Metropolitan has executed groundwater storage funding agreements committing over $39 million of the Proposition 13 funds for seven storage programs and has appropriated over $35 million of Metropolitan capital funds for the storage programs in the Orange County and Chino groundwater basins. For these seven Proposition 13 programs, over $30 million of Prop 13 and Metropolitan capital funds have been expended for design and construction of program facilities.
  - Metropolitan's long-term capital program (referenced above) includes $210 million to implement groundwater conjunctive use programs through 2020.

Table A.3-6 provides details of funding for specific groundwater storage programs.

Table A.3-6
Metropolitan's In-Region Groundwater Storage Programs
June 21, 2005

Program	Metropolitan Agreement Partners	Agreement Execution Date	Max Storage AF	Dry-Year Yield AF/Yr	Capital Funding
Long Beach Conjunctive Use Storage Project (Central Basin)	Long Beach	June 2002	13,000	4,300	$4.5 million – Prop. 13 funds
Foothill Area Groundwater Storage Program (Monk hill/Raymond Basin)	Foothill MWD	February 2003	9,000	3,000	$1.7 million – Prop. 13 funds
Orange County Groundwater Conjunctive Use Program	MWDOC OCWD	June 2003	60,000+	20,000	$29.8 million: $15.0 million – Prop 13 $14.8 million – Met CIP*
Chino Basin Programs	IEUA TVMWD Watermaster	June 2003	100,000	33,000	$27.5 million: $9.0 million – Prop 13 $18.5 million – Met CIP*
Live Oak Basin Conjunctive Use Project (Six Basins)	TVMWD City of LaVerne	October 2002	3,000	1,000	$3.3 million – Prop 13
City of Compton Conjunctive Use Project (Central Basin)	Compton	February 2005	2,289	763	$2.43 million – Prop 13
Metropolitan—Calleguas MWD Groundwater Storage Project (North Las Posas Basin)	Calleguas MWD	1995, amended 1999	210,000	47,000 (70,000)	$31 million – Met CIP* $28.2 million expended.
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach Metropolitan	July 2005	3,600	1,200	$3.1 million – Prop 13
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD Metropolitan	Sept. 2005 Board	3,000	1,000	$1.23 million – Prop 13
TOTAL			**403,889**	**111,263**	**$40.26 million – Prop 13[#] $61.5 million – Met CIP***

* Metropolitan's Capital Investment Plan

$4.7 million of Prop 13 funds requires reallocation. Per letter to Metropolitan's Executive Committee in Aug 2004, staff indicated that funds would be substituted for Metropolitan CIP funds on the Proposition 13 projects. Discussions are underway with IEUA to explore options for using those funds for increased storage.

Federal, State, and Local Permits/Approvals

- Final EIR for North Las Posas Groundwater Storage Program. Environmental Impact Report for the North Las Posas Groundwater Storage Program was certified by Calleguas Municipal Water District, lead agency, and by Metropolitan, responsible agency, in April 1995 and June 1995, respectively.
- Long Beach Conjunctive-use Storage Project. Environmental documentation for the Long Beach Conjunctive-use Storage Project was certified by the City of Long Beach in August 2001.
- Live Oak Basin Conjunctive-use Storage Project. Environmental documentation for the Live Oak Basin Conjunctive-use Storage Project was certified by Three Valleys MWD in January 2002.
- Foothill Area Groundwater Storage Project. Environmental documentation for the Foothill Area Groundwater Storage Project was certified by Foothill Municipal Water District in January 2003.
- Chino Basin Programs Groundwater Storage Project. Environmental documentation for the Chino Basin Programs Groundwater Storage Project was certified by Inland Empire Utility Agency in December 2002.
- Long Beach Conjunctive Use Storage Project -- Expansion in Lakewood. Environmental documentation for the project was certified by the City of Lakewood in May 2005.
- City of Compton Conjunctive Use Program. Environmental documentation for the project was certified by the City of Compton in December 2004.
- Orange County Groundwater Conjunctive Use Program. Environmental documentation for the project was certified by Orange County Water District in March 1999 and in July 2002.
- Environmental Review for 2010 Programs. Environmental review of the 2010 Groundwater Conjunctive Use Programs will be completed prior to signing agreements.

The following Table A.3-7 shows the detailed water supply forecasts by water source, in five-year increments and for single dry-year, multiple dry years and average years. Table A.3-8 shows the minimum supplies expected over the next three years.

Table A.3-7
Details of Projected Supplies

Colorado River Aqueduct Program Capabilities Year 2010 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	526,000	526,000	526,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	30,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	***722,000***	***722,000***	***711,000***
Programs Under Development			
Hayfield Storage Program	0	0	0
Lower Coachella Storage Program	0	0	0
Chuckwalla Storage Program	0	0	0
Salton Sea Restoration Transfer	95,000	95,000	0
Subtotal of Proposed Programs	***95,000***	***95,000***	***0***
Less: Coachella SWP/QSA Transfer	0	0	0
Maximum Metropolitan Supply Capability	**817,000**	**817,000**	**711,000**
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	70,000	70,000	70,000
Coachella & All-American Canals Lining	94,000	94,000	94,000
Maximum CRA Supply Capability [1]	**981,000**	**981,000**	**875,000**
Maximum Expected CRA Deliveries	**981,000**	**981,000**	**875,000**

[1] Colorado River Aqueduct deliveries limited to 1.250 MAF annually

Table A.3-7
Details of Projected Supplies

Colorado River Aqueduct Program Capabilities Year 2015 (acre-feet per year)			
Hydrology	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	20,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	***699,000***	***699,000***	***678,000***
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	0	0	0
Salton Sea Restoration Transfer	210,000	210,000	0
Subtotal of Proposed Programs	***460,000***	***460,000***	***0***
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	**1,124,000**	**1,124,000**	**643,000**
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	100,000	100,000	100,000
Coachella & All-American Canals Lining	94,000	94,000	94,000
Maximum CRA Supply Capability [1]	**1,318,000**	**1,318,000**	**837,000**
Maximum Expected CRA Deliveries	**1,250,000**	**1,250,000**	**837,000**

[1] Colorado River Aqueduct deliveries limited to 1.250 MAF annually

Table A.3-7
Details of Projected Supplies

Colorado River Aqueduct Program Capabilities Year 2020 (acre-feet per year) **Hydrology**	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	19,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	***699,000***	***699,000***	***677,000***
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	150,000	150,000	0
Salton Sea Restoration Transfer	0	0	0
Subtotal of Proposed Programs	***400,000***	***400,000***	***0***
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	**1,064,000**	**1,064,000**	**642,000**
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	190,000	190,000	190,000
Coachella & All-American Canals Lining	94,000	94,000	94,000
Maximum CRA Supply Capability 1	**1,348,000**	**1,348,000**	**926,000**
Maximum Expected CRA Deliveries	**1,250,000**	**1,250,000**	**926,000**

[1] Colorado River Aqueduct deliveries limited to 1.250 MAF annually

Table A.3-7
Details of Projected Supplies

Colorado River Aqueduct Program Capabilities Year 2025 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	19,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	***699,000***	***699,000***	***677,000***
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	150,000	150,000	0
Salton Sea Restoration Transfer	0	0	0
Subtotal of Proposed Programs	***400,000***	***400,000***	***0***
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	**1,064,000**	**1,064,000**	**642,000**
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canals Lining	94,000	94,000	94,000
Maximum CRA Supply Capability 1	**1,358,000**	**1,358,000**	**936,000**
Maximum Expected CRA Deliveries	**1,250,000**	**1,250,000**	**936,000**

[1] Colorado River Aqueduct deliveries limited to 1.250 MAF annually

Table A.3-7
Details of Projected Supplies

Colorado River Aqueduct Program Capabilities Year 2030 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Base Apportionment – Priority 4	503,000	503,000	503,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment	0	0	19,000
PVID Land Management Program	111,000	111,000	70,000
Subtotal of Current Programs	***699,000***	***699,000***	***677,000***
Programs Under Development			
Hayfield Storage Program	100,000	100,000	0
Lower Coachella Storage Program	150,000	150,000	0
Chuckwalla Storage Program	150,000	150,000	0
Salton Sea Restoration Transfer	0	0	0
Subtotal of Proposed Programs	***400,000***	***400,000***	***0***
Less: Coachella SWP/QSA Transfer	(35,000)	(35,000)	(35,000)
Maximum Metropolitan Supply Capability	**1,064,000**	**1,064,000**	**642,000**
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canals Lining	94,000	94,000	94,000
Maximum CRA Supply Capability 1	**1,358,000**	**1,358,000**	**936,000**
Maximum Expected CRA Deliveries	**1,250,000**	**1,250,000**	**936,000**

[1] Colorado River Aqueduct deliveries limited to 1.250 MAF annually

Table A.3-7
Details of Projected Supplies

California Aqueduct Program Capabilities Year 2010 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
SWP Deliveries[1,2]	509,000	175,000	1,472,000
San Luis Carryover[3]	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	26,000	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	***912,000***	***777,000***	***1,772,000***
Programs Under Development			
Delta Improvements[4]	55,000	55,000	185,000
Market Transfer Options	150,000	150,000	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	0	0	0
IRP SWP Target	0	0	0
Subtotal of Proposed Programs	***330,000***	***330,000***	***185,000***
Maximum Supply Capability	**1,242,000**	**1,107,000**	**1,957,000**

[1] Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

[2] Multiple and Single Dry year figures include DWCV Table A supplies

[3] Includes DWCV carryover supplies

[4] Includes Phase 8 and increased pumping capacity

Table A.3-7
Details of Projected Supplies

California Aqueduct Program Capabilities Year 2015 (acre-feet per year) **Hydrology**	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
SWP Deliveries[1,2]	509,000	175,000	1,472,000
San Luis Carryover[3]	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	26,000	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	***912,000***	***777,000***	***1,772,000***
Programs Under Development			
Delta Improvements[4]	55,000	55,000	185,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	35,000	35,000	0
IRP SWP Target	0	44,000	0
Subtotal of Proposed Programs	***215,000***	***259,000***	***185,000***
Maximum Supply Capability	**1,127,000**	**1,036,000**	**1,957,000**

[1] Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

[2] Multiple and Single Dry year figures include DWCV Table A supplies

[3] Includes DWCV carryover

[4] Includes Phase 8 and increased pumping capacity

Table A.3-7
Details of Projected Supplies

California Aqueduct
Program Capabilities
Year 2020
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
SWP Deliveries[1,2]	509,000	175,000	1,472,000
San Luis Carryover[3]	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	26,000	5,000	
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	***912,000***	***777,000***	***1,772,000***
Programs Under Development			
Delta Improvements[4]	110,000	110,000	240,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	35,000	35,000	0
IRP SWP Target	29,000	80,000	0
Subtotal of Proposed Programs	***299,000***	***350,000***	***240,000***
Maximum Supply Capability	**1,211,000**	**1,127,000**	**2,012,000**

[1] Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

[2] Multiple and Single Dry year figures include DWCV Table A supplies

[3] Includes DWCV carryover

[4] Includes Phase 8 and increased pumping capacity

Table A.3-7
Details of Projected Supplies

California Aqueduct Program Capabilities Year 2025 (acre-feet per year) **Hydrology**	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
SWP Deliveries[1,2]	509,000	175,000	1,472,000
San Luis Carryover[3]	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	26,000	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	***912,000***	***777,000***	***1,772,000***
Programs Under Development			
Delta Improvements[4]	110,000	110,000	240,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	35,000	35,000	0
IRP SWP Target	29,000	80,000	0
Subtotal of Proposed Programs	***299,000***	***350,000***	***240,000***
Maximum Supply Capability	**1,211,000**	**1,127,000**	**2,012,000**

[1] Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

[2] Multiple and Single Dry year figures include DWCV Table A supplies

[3] Includes DWCV carryover

[4] Includes Phase 8 and increased pumping capacity

Table A.3-7
Details of Projected Supplies

California Aqueduct Program Capabilities Year 2030 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
SWP Deliveries[1,2]	509,000	175,000	1,472,000
San Luis Carryover[3]	93,000	280,000	280,000
SWP Call-back of DWCV Table A Transfer	26,000	5,000	0
Central Valley Storage and Transfers			
Semitropic Program	107,000	107,000	0
Arvin Edison Program	90,000	90,000	0
San Bernardino Valley MWD Program	37,000	70,000	20,000
Kern Delta Program	50,000	50,000	0
Subtotal of Current Programs	***912,000***	***777,000***	***1,772,000***
Programs Under Development			
Delta Improvements[4]	110,000	110,000	240,000
Market Transfer Options	0	0	0
Central Valley Transfers/Purchases	125,000	125,000	0
Mojave Program	35,000	35,000	0
IRP SWP Target	29,000	80,000	0
Subtotal of Proposed Programs	***299,000***	***350,000***	***240,000***
Maximum Supply Capability	**1,211,000**	**1,127,000**	**2,012,000**

[1] Single Dry-year figure includes 76 TAF of additional SWP supplies in 1977 per DWR

[2] Multiple and Single Dry year figures include DWCV Table A supplies

[3] Includes DWCV carryover

[4] Includes Phase 8 and increased pumping capacity

Table A.3-7
Details of Projected Supplies

In Basin Storage Activities Program Capabilities Year 2010 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	244,000	733,000	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use			
Long Term Replenishment and Cyclic Storage	86,000	86,000	0
North Las Posas Storage	47,000	47,000	0
Proposition 13 Storage	64,000	64,000	0
Subtotal of Current Programs	***514,000***	***1,149,000***	***0***
Programs Under Development			
Groundwater Conjunctive-use			
Raymond Basin	22,000	22,000	0
Prop 13 Storage Programs	1,000	1,000	0
Additional Programs[1]	55,000	55,000	0
Subtotal of Proposed Programs	***78,000***	***78,000***	***0***
Maximum Supply Capability	**592,000**	**1,227,000**	**0**

[1] Includes expansions of existing programs

Table A.3-7
Details of Projected Supplies

In Basin Storage Activities Program Capabilities Year 2015 (acre-feet per year) **Hydrology**	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	248,000	745,000	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use			
Long Term Replenishment and Cyclic Storage	86,000	86,000	0
North Las Posas Storage	47,000	47,000	0
Proposition 13 Storage	64,000	64,000	0
Subtotal of Current Programs	***518,000***	***1,161,000***	***0***
Programs Under Development			
Groundwater Conjunctive-use			
Raymond Basin	22,000	22,000	0
Prop 13 Storage Programs	1,000	1,000	0
Additional Programs[1]	80,000	80,000	0
Subtotal of Proposed Programs	***103,000***	***103,000***	***0***
Maximum Supply Capability	**621,000**	**1,264,000**	**0**

[1] Includes expansions of existing programs

Table A.3-7
Details of Projected Supplies

In Basin Storage Activities Program Capabilities Year 2020 (acre-feet per year) **Hydrology**	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	232,000	697,000	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use			
Long Term Replenishment and Cyclic Storage	86,000	86,000	0
North Las Posas Storage	47,000	47,000	0
Proposition 13 Storage	64,000	64,000	0
Subtotal of Current Programs	***502,000***	***1,113,000***	***0***
Programs Under Development			
Groundwater Conjunctive-use			
Raymond Basin	22,000	22,000	0
Prop 13 Storage Programs	1,000	1,000	0
Additional Programs[1]	80,000	80,000	0
Subtotal of Proposed Programs	***103,000***	***103,000***	***0***
Maximum Supply Capability	**605,000**	**1,216,000**	**0**

[1] Includes expansions of existing programs

Table A.3-7
Details of Projected Supplies

In Basin Storage Activities Program Capabilities Year 2025 (acre-feet per year) **Hydrology**	**Multiple Dry Years (1990-92)**	**Single Dry Year (1977)**	**Average Year (1922-2004)**
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	217,000	650,000	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use			
Long Term Replenishment and Cyclic Storage	86,000	86,000	0
North Las Posas Storage	47,000	47,000	0
Proposition 13 Storage	64,000	64,000	0
Subtotal of Current Programs	***487,000***	***1,066,000***	***0***
Programs Under Development			
Groundwater Conjunctive-use			
Raymond Basin	22,000	22,000	0
Prop 13 Storage Programs	1,000	1,000	0
Additional Programs[1]	80,000	80,000	0
Subtotal of Proposed Programs	***103,000***	***103,000***	***0***
Maximum Supply Capability	**590,000**	**1,169,000**	**0**

[1] Includes expansions of existing programs

Table A.3-7
Details of Projected Supplies

In Basin Storage Activities Program Capabilities Year 2030 (acre-feet per year) Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Metropolitan Surface Storage (DVL, Mathews, Skinner)	200,000	601,000	0
Flexible Storage in Castaic & Perris	73,000	219,000	0
Groundwater Conjunctive-use			
Long Term Replenishment and Cyclic Storage	86,000	86,000	0
North Las Posas Storage	47,000	47,000	0
Proposition 13 Storage	64,000	64,000	0
Subtotal of Current Programs	***470,000***	***1,017,000***	***0***
Programs Under Development			
Groundwater Conjunctive-use			
Raymond Basin	22,000	22,000	0
Prop 13 Storage Programs	1,000	1,000	0
Additional Programs[1]	80,000	80,000	0
Subtotal of Proposed Programs	***103,000***	***103,000***	***0***
Maximum Supply Capability	**573,000**	**1,120,000**	**0**

[1] Includes expansions of existing programs

Table A.3-8

Multiple Dry-year Supply Capability [1]

(Repeat of 1990-92 Hydrology)
(acre-feet per year)

	2006	2007	2008
Current Supplies			
In-Basin Storage	396,000	419,000	421,000
California Aqueduct	1,769,717	887,346	962,910
Colorado River Aqueduct	735,000	734,000	733,000
Supplies Under Development			
In-Basin Storage	0	0	0
California Aqueduct	200,000	200,000	200,000
Colorado River Aqueduct	0	25,000	25,000
Transfers to Other Agencies	0	0	0
Metropolitan Supply Capability	***3,100,717***	***2,265,346***	***2,341,910***

[1] Represents supply capability for resource programs under listed year type.

[2] Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct

[3] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct

APPENDIX A.4
PUBLIC INVOLVEMENT

Appendix A.4
Public Involvement

In developing this report and the IRP Update process on which it relies, Metropolitan involved its member agencies in the planning process and in reviews of the various draft documents and assumptions. The details of these meetings are provided in the introductory chapter to this document.

In addition to those planning and member meetings, Metropolitan held public meetings with the Southern California Water Dialogue group. Through this group, outreach was attempted to over 400 individuals, affiliated with a very broad and diverse set of agencies, consultants, environmental groups and other non-profit organizations. Participants represent organizations ranging from the Sierra Club, the Mono Lake Committee and The Nature Conservancy, to the Building Industry Association and the Southern California Water Committee, to agencies such as the Los Angeles Department of Water and Power, the San Diego County Water Authority, and the Mojave Water Agency.

Finally, Metropolitan held the publicly-noticed meeting required by the Urban Water Management Planning Act. This Appendix includes a copy of the letter sent to cities and counties in Metropolitan's service area notifying them of the meeting. It also includes a copy of the Public Notice advertising the meeting that was included in Southern California newspapers on Monday, September 26 and Monday, October 3, 2005.

Finally, the last page of this Appendix contains a copy of the resolution of the Metropolitan Board of Directors adopting the 2005 Regional Urban Water Management Plan.

Letter Notifying Cities and Counties

September 14, 2005

To Whom It May Concern:

This letter serves as notification that The Metropolitan Water District of Southern California (Metropolitan) will be holding a public hearing at the Water Planning, Quality and Resources Committee Board meeting to receive input on the draft 2005 Regional Urban Water Management Plan (RUWMP). The RUWMP presents Metropolitan's long-term plans for ensuring the reliability and quality of water resources for the region. The RUWMP complies with California state law requiring urban water suppliers to prepare and update Urban Water Management Plans every five years. Public Input is encouraged, appreciated, and will be considered during finalization of the 2005 RUWMP.

Public Hearing will be held on:

Monday, October 10, 2005 (exact time to be determined)
Metropolitan Water District Headquarters
700 N. Alameda Ave.
Los Angeles, Ca 90012

The draft Plan is posted on Metropolitan's web site at www.mwdh2o.com. Please check on the website for updated room and time information. Written comments are due by **October 10, 2005** to:

Metropolitan Water District
700 N. Alameda Ave.
Los Angeles, Ca 90012
Attn: Michael Hurley

If you would like more information or have any questions, please contact Michael Hurley at (213) 217-6221 or via email at mhurley@mwdh2o.com.

Very Truly Yours,

Stephen N. Arakawa
Water Resource Management

PUBLIC HEARING SCHEDULED ON

DRAFT REGIONAL URBAN WATER MANAGEMENT PLAN

The Metropolitan Water District of Southern California (Metropolitan) will hold a public hearing on **Monday, October 10, 2005** to receive comments on the draft 2005 Regional Urban Water Management Plan (RUWMP).

The hearing will be held at 2:00 p.m. in the Board Room of Metropolitan's headquarters building at 700 North Alameda Street, Los Angeles, California before the Water Planning, Quality and Resources Committee of Metropolitan's Board of Directors.

The RUWMP presents Metropolitan's long-term plans for ensuring the reliability and quality of water resources for the region. The RUWMP complies with California state law requiring urban water suppliers to prepare and update urban water management plans every five years. The draft plan is posted on Metropolitan's Web site at www.mwdh2o.com.

Public input is encouraged, appreciated, and will be considered during finalization of the 2005 RUWMP. In addition to the public hearing, Metropolitan will accept written comments on the draft plan. All written comments must be received by **October 10, 2005** to:

The Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153
Attn: Michael Hurley

For more information on the draft RUWMP, please call Michael Hurley of Metropolitan's Water Resources Management Group at (213) 217-6221

Board Resolution

DRAFT
RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
APPROVING THE 2005 REGIONAL URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers to prepare and adopt an Urban Water Management Plan every five years on or before December 31, in years ending in five and zero; and

WHEREAS, the California Urban Water Management Planning Act specifies the requirements and procedures for adopting such Urban Water Management Plans; and

WHEREAS, the Board of Directors of the Metropolitan Water District of Southern California has duly reviewed, discussed, and considered such Urban Water Management Plan and has determined the 2005 Regional Urban Water Management Plan to be consistent with the California Urban Water Management Planning Act and to be an accurate representation of the water resources plan for the Metropolitan Water District of Southern California

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of The Metropolitan Water District of Southern California that, on Nov. 8, 2005 this District hereby adopts this 2005 Regional Urban Water Management Plan for submittal to the State of California.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on Nov. 8, 2005

Executive Secretary
The Metropolitan Water District
of Southern California

APPENDIX A.5
EXISTING AND COMMITTED LOCAL PROJECTS

A.5 Existing and Committed Local Projects

The following tables contain local projects that have been identified by Metropolitan's member agencies.

Table A.5-1
Groundwater Recovery and Treatment Projects

Agency	Project Name	Ultimate Yield	2005 Est. Yield
City of Beverly Hills	Beverly Hills Desalter	2,600	1,362
City of Burbank	Burbank Lake Street GAC Plant	2,744	0
City of Burbank	Burbank/Lockheed Valley Plant	10,000	10,000
Calleguas Municipal Water District	Tapo Canyon Water Treatment Plant	1,445	0
Central Basin Municipal Water District	Juan Well Filter Facility	900	330
Eastern Municipal Water District	Menifee Basin Desalter	3,360	664
Eastern Municipal Water District	Perris Desalter	4,500	0
Foothill Municipal Water District	Glenwood Nitrate	1,600	0
City of Glendale	San Fernando Wells	7,200	7,200
Inland Empire Utilities Agency	Chino Basin Desalter No. 1 - IEUA	4,780	3,916
Inland Empire Utilities Agency	Chino Basin Desalter No. 1 Expansion - IEUA	3,000	0
Inland Empire Utilities Agency	Chino Basin Desalter No. 2 - IEUA	3,350	0
Las Virgenes Municipal Water District	Westlake Wells - Tapia WRF Intertie	150	150
Las Virgenes Municipal Water District	Two Wells in Westlake	600	600
Municipal Water District of Orange County	Irvine Desalter	6,700	0
Municipal Water District of Orange County	Tustin Desalter	3,271	881
Municipal Water District of Orange County	Capistrano Beach Desalter	1,300	0
Municipal Water District of Orange County	San Juan Desalter	4,800	1,619
Municipal Water District of Orange County	Mesa Consolidated Colored Water Treatment Facility	11,300	4,607
Municipal Water District of Orange County	Water Factory 21 Blend	3,500	0
Municipal Water District of Orange County	Garden Grove Nitrate Blending Project	2,166	2,166
Municipal Water District of Orange County	Tustin Nitrate	1,172	1,172
City of Santa Monica	Santa Monica GW Treatment Plant	1,800	1,800
San Diego County Water Authority	Oceanside Desalter Phase I	2,399	0
San Diego County Water Authority	Lower Sweetwater Desalter Phase 1	3,600	1,974
San Diego County Water Authority	Oceanside Desalter Phase I and II	6,500	2,227
Three Valleys Municipal Water District	Pomona Well # 37	1,100	0
Three Valleys Municipal Water District	Pomona, City of	3,600	3,600
City of Torrance	Madrona Desalter (Goldsworthy)	2,446	2,082
West Basin Municipal Water District	West Basin Desalter No. 1	1,576	0
Western Municipal Water District of Riverside County	Arlington Desalter	6,176	4,926
Western Municipal Water District of Riverside County	Chino Basin Desalter No. 1 - Western	4,240	4,168
Western Municipal Water District of Riverside County	Chino Basin Desalter No. 1 Expansion - Western	3,000	0
Western Municipal Water District of Riverside County	Chino Basin Desalter No. 2 - Western	6,650	0
Western Municipal Water District of Riverside County	Temescal Basin Desalting Facility	10,000	10,000

Table A.5-2
Recycling Water Projects

Agency	Project Name	Ultimate Yield	2005 Est. Yield
City of Burbank	Caltrans	100	65
City of Burbank	Media City Center	50	38
City of Burbank	PSD Power Plant	900	900
City of Burbank	Burbank Reclaimed Water System Expansion Proj.	850	509
Calleguas Municipal Water District	Conejo Creek Diversion Project	14,000	1,790
Calleguas Municipal Water District	Oak Park/North Ranch Water Reclamation Proj.	1,300	1,032
Central Basin Municipal Water District	Bellflower Reclamation Project	50	50
Central Basin Municipal Water District	Cerritos Reclamation Project	3,600	1,700
Central Basin Municipal Water District	Cerritos Reclaimed Water Expansion Project	260	206
Central Basin Municipal Water District	Lakewood Water Reclamation Project	447	353
Central Basin Municipal Water District	Century Reclamation Program	10,500	3,165
Central Basin Municipal Water District	Rio Hondo Water Reclamation Program	2,80.9	0
Eastern Municipal Water District	Eastern Recycled Water Pipeline Reach 16	820	0
Eastern Municipal Water District	Hemet/SJ Regional Reclamation - Direct	8,300	8,300
Eastern Municipal Water District	Moreno Valley Regional Reclamation	9,514	6,352
Eastern Municipal Water District	Perris Valley Regional Reclamation	5,917	5,672
Eastern Municipal Water District	Rancho California Reclamation (Existing non-LPP)	450	450
Eastern Municipal Water District	Temecula Valley Regional Reclamation	7,073	6,447
Eastern Municipal Water District	Eastern Regional Reclaimed Water System	4,830	0
Eastern Municipal Water District	EMWD Reach I Phase II	1,700	227
Eastern Municipal Water District	Rancho California Reclamation Expansion	6,250	3,273
Eastern Municipal Water District	Lake Elsinor Make Up Water	3,000	0
Foothill Municipal Water District	La Canada-Flintridge Country Club	135	135
City of Glendale	Power Plant Project	450	450
City of Glendale	Glendale Water Reclamation Expansion Project	500	264
City of Glendale	Glendale Brand Park Reclaimed Water Project	73.3	0
City of Glendale	Glendale Verdugo-Scholl Canyon Recl. Water Proj.	2,225	655
Inland Empire Utilities Agency	Upland Hills Country Club	224	224
Inland Empire Utilities Agency	Existing IEUA Regional Recycled Water Dist. System - Non LRP	3,500	3,500
Inland Empire Utilities Agency	IEUA Regional Recycled Water Dist. System	45,500	1,738
Las Virgenes Municipal Water District	Decker Canyon WRP	300	0
Las Virgenes Municipal Water District	Calabasas System	1,000	1,000

Table A.5-2 (continued, page 2)
Recycling Water Projects

Agency	Project Name	Ultimate Yield	2005 Est. Yield
Las Virgenes Municipal Water District	Las Virgenes Valley System	300	300
Las Virgenes Municipal Water District	Calabasas Reclaimed Water System Expansion	700	700
Las Virgenes Municipal Water District	Las Virgenes Reclamation Project	2,772	2,023
City of Long Beach	Long Beach Reclamation Project	2,500	2,500
City of Long Beach	THUMS	2,145	1,390
City of Long Beach	Long Beach Reclamation Expansion Phase I	3,600	0
City of Long Beach	Long Beach Reclamation Project	1,700	1,178
City of Los Angeles	Hansen Area Water Recycling Project Phase 1	2,500	0
City of Los Angeles	Hansen Area Water Recycling Project Phase 2	1,165	0
City of Los Angeles	Sepulveda Basin Water Recycling Project Phase IV	546	0
City of Los Angeles	Cal Trans (5 & 134 Fwys)	100	100
City of Los Angeles	Griffith Park	2,000	1,500
City of Los Angeles	Los Angeles Greenbelt Project - MCA	325	325
City of Los Angeles	MGM/SONY Building	10	10
City of Los Angeles	Los Angeles Greenbelt Project	1,610	662
City of Los Angeles	Sepulveda Basin Water Reclamation Project	1,500	0
City of Los Angeles	Import from West Basin for Irrigation	2,500	283
Municipal Water District of Orange County	Capistrano Valley Non-Domestic Water System Expansion	2,895	0
Municipal Water District of Orange County	Development of Non-Domestic Water Sys. Exp. Ladera	2,772	0
Municipal Water District of Orange County	Moulton Niguel Phase 4 Reclamation System Expansion	1,276	0
Municipal Water District of Orange County	IRWD Recycled Water System Upgrade	8,500	0
Municipal Water District of Orange County	El Toro Existing	500	500
Municipal Water District of Orange County	Irvine Ranch Part 1 Expansion	3,700	3,700
Municipal Water District of Orange County	Los Alisos WD	2,100	2,100
Municipal Water District of Orange County	Moulton Niguel WD Existing	470	470
Municipal Water District of Orange County	Santa Margarita WD - Oso	1,284	1,216
Municipal Water District of Orange County	Trabuco Canyon Reclamation Project (Existing)	280	280
Municipal Water District of Orange County	Capistrano Non-Domestic Water System	750	750
Municipal Water District of Orange County	Irvine Ranch Reclamation Project	10,000	10,000
Municipal Water District of Orange County	Moulton Niguel Reclamation Project	8,000	6,794
Municipal Water District of Orange County	San Clemente Water Reclamation Project	1,500	207
Municipal Water District of Orange County	Santa Margarita Reclamation Expansion Project	3,600	1,951

Table A.5-2 (continued, page 3)
Recycling Water Projects

Agency	Project Name	Ultimate Yield	2005 Est. Yield
Municipal Water District of Orange County	South Laguna Reclamation Expansion Project	700	0
Municipal Water District of Orange County	South Laguna Reclamation Project	866	860
Municipal Water District of Orange County	Trabuco Canyon Reclamation Expansion Project	800	349
Municipal Water District of Orange County	Green Acres Reclamation Project - Coastal	800	143
Municipal Water District of Orange County	Green Acres Reclamation Project - MWDOC	5,400	1,285
City of Santa Ana	Green Acres Reclamation Project - Santa Ana	800	118
City of Santa Monica	Dry Weather Runoff Reclamation Facility	280	21
City of Santa Monica	Santa Monica Water Gardens	33	33
San Diego County Water Authority	Encina Basin Water Rec. Prog - Phases I and II (5)	5,000	1,342
San Diego County Water Authority	Olivenhain Recycled Project - SE Quadrant	1,788	443
San Diego County Water Authority	Otay Recycled Water System	7,500	0
San Diego County Water Authority	RDDMWD Recycled Water Program	648	52
San Diego County Water Authority	RDDMWD Recycled Water Program Sempra - Non LRP	3,400	2,000
San Diego County Water Authority	Camp Pendleton	3,900	2,400
San Diego County Water Authority	Rancho Santa Fe (Existing)	350	250
San Diego County Water Authority	San Vincente	600	600
San Diego County Water Authority	Santa Maria - Phase A	700	700
San Diego County Water Authority	Valley Center - Phase A	300	300
San Diego County Water Authority	Encina Water Pollution Control Facility Recl. Proj. (2)	165	165
San Diego County Water Authority	Oceanside Water Reclamation Project	200	110
San Diego County Water Authority	Ramona/Santa Maria Water Reclamation Project	400	176
San Diego County Water Authority	Shadowridge Reclaimed Water System	375	0
San Diego County Water Authority	Encina Basin Water Reclamation Project Phase I (5)	1,396	0
San Diego County Water Authority	Escondido Regional Reclaimed Water Project	2,800	89
San Diego County Water Authority	Fallbrook Reclamation Project	1,200	315
San Diego County Water Authority	North City Water Reclamation Project	17,500	3,323
San Diego County Water Authority	Otay Water Reclamation Project	1,277	1,038
San Diego County Water Authority	Padre Dam Reclaimed Water System Phase I	850	652
San Diego County Water Authority	San Elijo Water Reclamation System	1,600	1,054
San Diego County Water Authority	San Pasqual Reclamation Project	1,100	0
San Diego County Water Authority	South Bay Water Reclamation Project (excluding Otay)	200	200
Three Valleys Municipal Water District	City of Industry Regional Water System - Rowland	1,884	0

Table A.5-2 (continued, page 4)
Recycling Water Projects

Agency	Project Name	Ultimate Yield	2005 Est. Yield
Three Valleys Municipal Water District	City of Industry Regional Water System - Suburban	2,584	0
Three Valleys Municipal Water District	City of Industry Regional Water System - Walnut	4,400	0
Three Valleys Municipal Water District	City of Industry Reclaimed System - Phase A	3,360	3,360
Three Valleys Municipal Water District	Pomona Reclamation Project	9,320	5,527
Three Valleys Municipal Water District	Walnut Valley Reclamation Project	1,900	1,700
Three Valleys Municipal Water District	Walnut Valley Reclamation Expansion Project	500	500
City of Torrance	Import from West Basin for Mobil Refinery	7,500	6,917
Upper San Gabriel Valley Municipal Water District	California Country Club	375	375
Upper San Gabriel Valley Municipal Water District	Puente Hills/Rose Hills	4,000	1,763
Upper San Gabriel Valley Municipal Water District	Direct Reuse Project Phase IIA	2,258	0
West Basin Municipal Water District	West Basin Water Reclamation Program	70,000	13,070
Western Municipal Water District of Riverside County	Ellsinore Valley/Horse Thief Reclamation	560	392
Western Municipal Water District of Riverside County	Ellsinore Valley/Railroad Canyon Reclamation	730	730
Western Municipal Water District of Riverside County	Indian Hills Reclamation Project	1,310	1,310
Western Municipal Water District of Riverside County	March AFB Reclamation Project	261	261
Western Municipal Water District of Riverside County	Santa Rosa Water Reclamation Facility	5	3

Table A.5-3
Recycling Water for Seawater Barriers

Agency	Project Name	Ultimate Yield	Est. 2005
Central Basin Municipal Water District	Alamitos Barrier Reclaimed Water Project	3,024	0
City of Los Angeles	Harbor Water Recycling Project	5,000	0
Municipal Water District of Orange County	Water Factory 21 Blend	3,500	0
Municipal Water District of Orange County	OCWD WF21 Above 12-yr. Avg.	5,000	5,000
Municipal Water District of Orange County	Groundwater Replenishment System Talbert Seawater Intrusion Barrier Component	31,000	0

Table A.5-4
Recycling Water for Groundwater Replenishment

Agency	Project Name	Ultimate Yield	Est. 2005
Central Basin Municipal Water District	Montebello Forebay	50,000	50,000

Table A.5-5
Recycling Water for Groundwater Recharge*

Agency	Project Name	Yield
Inland Empire Utilities Agency	Chino Basin Recharge Improvement Project	8,000
Inland Empire Utilities Agency	Chino Basin Recharge Improvement Project (New Yield Capture)	10,000

* All member agencies were surveyed, however only the member agency listed responded with groundwater recharge.

APPENDIX A.6
IDENTIFIED POTENTIAL LOCAL PROJECTS TO MEET REMAINING IRP TARGET

The projects in the following table have been identified by Metropolitan's member agencies as being under investigation for the potential to meet local resource targets in future.

Table A.6-1
Identified Potential Projects*

Agency	Project Name	Yield
Inland Empire Utilities Agency	Chino Basin Desalter No. II Expansion	10,000
Inland Empire Utilities Agency	Chino Basin Desalter No. III	16,000
Inland Empire Utilities Agency	IEUA Recycled Water Expansion	46,000
Inland Empire Utilities Agency	Dry Year Yield Expansion (GW Conjunctive Use)	132,000
Eastern Municipal Water District	Perris Desalter II	4,500
Eastern Municipal Water District	San Jacinto Valley RWRF Expansion to 14 MGD	3,400
Eastern Municipal Water District	San Jacinto Valley RWRF Expansion to 18 MGD	4,500
Eastern Municipal Water District	Moreno Valley RWRF Expansion to 21 MGD	9,000
Eastern Municipal Water District	Temecula Valley RWRF Expansion to 18 MGD	6,700
Eastern Municipal Water District	Perris Valley RWRF Expansion to 22 MGD	12,300
Municipal Water District of Orange County	ETWD Portion of El Toro AWT Joint project with MNWD and IRWD	200
Municipal Water District of Orange County	IRWD Wells 51, 52, 53, 21 & 22	5,327
Municipal Water District of Orange County	IRWD Other Groundwater	1,500
Municipal Water District of Orange County	IRWD Irvine Desalter Wells 106,115	2,900
Municipal Water District of Orange County	IRWD Michelson Reclamation Expansion Phase II	4,300
Municipal Water District of Orange County	Laguna Beach Well in the OCWD Basin	2,025
Municipal Water District of Orange County	MNWD portion of SOCWA AWT	204
Municipal Water District of Orange County	MNWD portion of El Toro AWT Joint project	50
Municipal Water District of Orange County	SMWD Chiquita Reclamation Expansion I	739
Municipal Water District of Orange County	SMWD Chiquita Reclamation Expansion II	3,400
Municipal Water District of Orange County	SMWD Canada Gobernadora	725
Municipal Water District of Orange County	SMWD Arroyo Trabuco	473
Municipal Water District of Orange County	SMWD Horno Basin Surface Water	215
Municipal Water District of Orange County	Groundwater Replenishment System (for Direct Replenishment)	38,000
City of Pasadena	Ion-Exchange System - Perchlorate Removal at Sunset Reservoir	TBD
City of Pasadena	Ion-Exchange System - Perchlorate Removal at Windsor Reservoir	TBD
San Diego County Water Authority	City of SD North City Reclamation Facility	100
San Diego County Water Authority	Santa Fe Valley WRF/Olivenhain MWD	200
San Diego County Water Authority	Meadowlark WRF/Vallecitos WD	1,200
San Diego County Water Authority	NC WRP & San Pasqual WRP/City of SD	425
San Diego County Water Authority	South Bay WRP/City of San Diego	3,500

* All member agencies were surveyed for potential projects, however only the member agencies listed responded.

ENCLOSED DOCUMENTS

RECENT CUWCC FILINGS

2004 CUWCC Filing

Reported as of 8/

Water Supply & Reuse

Reporting Unit:
Metropolitan Water Dist of SC

Year:
2004

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	750115	Imported
SWP	1734020	Imported

Total AF: 2484135

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	25078	retail
Beverly Hills	12188	retail
Burbank	14547	retail
Calleguas MWD	121461	wholesale
Central Basin MWD	87691	wholesale
Compton	3205	retail
Eastern MWD	3822	wholesale
Eastern MWD	91719	retail
Foothill MWD	14831	wholesale
Fullerton	13975	retail
Glendale	23796	retail
Inland Empire UA	72728	wholesale
Las Virgenes MWD	24882	retail
Long Beach	43081	retail
Los Angeles	367693	retail
MWD Orange Co	360586	wholesale
Pasadena	24719	retail
San Diego CWA	637552	wholesale
San Fernando	508	retail
San Marino	1602	retail
Santa Ana	19978	retail
Santa Monica	14444	retail
Three Valleys MWD	89653	wholesale
Torrance	20517	retail
Upper San Gabriel VMWD	61841	wholesale
West Basin MWD	150447	wholesale
Western MWD	115112	wholesale

Total AF: 2417656

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	2417656
b. Determine other system verifiable uses (AF)	141260
c. Determine total supply into the system (AF)	2484135
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	1.03
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	yes
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

System is monitored by 10+ patrols who also collect WQ samples, pilots flying the CRA and pipeline staff in the normal course of their duties. If water is detected near any of our facilities, we analyze a water sample to determine if it's our water leaking. Normally it is not. If it is, we may hire a leak detection firm to locate the leak.

B. Survey Data

1. Total number of miles of distribution system line.	1017
2. Number of miles of distribution system line surveyed.	1017

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	350000	350000
2. Actual Expenditures	350000	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 8/

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Major media campaign for CA Friendly landscaping and outdoor water efficiency. Full complement of brouchures for retailers' use. Educational facility tours for the public.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	68
b. Public Service Announcement	yes	24
c. Bill Inserts / Newsletters / Brochures	yes	15
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	26
f. Special Events, Media Events	yes	5
g. Speaker's Bureau	yes	8
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	1600000	2700000
2. Actual Expenditures	2460000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures include $300K for staff expense (2.5 FTEs x $120K/FTE)

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	7	11525	293
Grades 4th-6th	yes	26	82020	405
Grades 7th-8th	yes	15	9160	81
High School	yes	13	22465	83

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 11/1/1983

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	1571000	1152350
2. Actual Expenditures	1365000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures include $600K for staff (6 FTEs x $100K/FTE)

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2004**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	106000	106558	8	No		
2	yes	79000	78952	9	yes	4500000	4427785
3	No			10	No		
4	No			11	No		
5	yes	1410000	1441819	12	No		
6	yes	3500000	3530665	13	No		
7	No			14	yes	9200000	9215540

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	yes
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

2004 CUWCC Filing

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.45	8	No	
2	yes	.45	9	yes	2
3	No		10	yes	2.2
4	No		11	No	
5	yes	2.7	12	No	
6	yes	1.4	13	No	
7	No		14	yes	1.2

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	8	yes
2	No	9	yes
3	No	10	No
4	No	11	No
5	yes	12	No
6	yes	13	No
7	yes	14	No

2004 CUWCC Filing

B. Wholesale Agency Assistance Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	22000000	22000000
2. Actual Expenditures	23425319	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Section A values include CCP$, consulting, CUWCC dues, and assigned FTEs @ $120K Section B includes Section A + BMPs 3,7,8. BMP 12 expenses are imbedded in Sec A expenses by BMP

Reported as of 8/

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$839000000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$214000000
2. Commercial	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
3. Industrial	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
4. Institutional / Government	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
5. Irrigation	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
6. Other	
a. Water Rate Structure	

2004 CUWCC Filing

b. Sewer Rate Structure

c. Total Revenue from Volumetric Rates $

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources $

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator? yes
2. Is this a full-time position? yes
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?
4. Partner agency's name:
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? 80%
   - b. Coordinator's Name Andy Hui
   - c. Coordinator's Title Unit Manager V
   - d. Coordinator's Experience and Number of Years 2 years managing unit
   - e. Date Coordinator's position was created (mm/dd/yyyy) 8/8/1988
6. Number of conservation staff, including Conservation Coordinator. 10

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	1695000	1811000
2. Actual Expenditures	1733600	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

RSU Labor (including travel, training, materials, etc)(minus 45400-45550)+ $500,000 (to cover AH and TB whose salary expenses are under AS's budget) x 0.65 = BMP staff expenses

2003 CUWCC Filing

Reported as of 8/

Water Supply & Reuse

Reporting Unit:
Metropolitan Water Dist of SC

Year:
2003

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	917771	Imported
SWP	1476822	Imported

Total AF: 2394593

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	23951	retail
Beverly Hills	13178	retail
Burbank	12098	retail
Calleguas MWD	116756	wholesale
Central Basin MWD	82009	wholesale
Compton	2892	retail
Eastern	108293	retail
Eastern	4512	wholesale
Foothill MWD	12514	wholesale
Fullerton	12545	retail
Glendale	21948	retail
Inland Empire UA	71033	wholesale
Las Virgenes MWD	21155	retail
Long Beach	40789	retail
Los Angeles	370914	retail
MWD Orange Co.	314242	wholesale
Pasadena	24581	retail
San Diego CWA	613560	wholesale
San Fernando	383	retail
San Marino	442	retail
Santa Ana	12141	retail
Santa Monica	13027	retail
Three Valleys MWD	83399	wholesale
Torrance	20980	retail
Upper San Gabriel VMWD	62326	wholesale
West Basin MWD	143762	wholesale
Western MWD	68154	wholesale

Total AF: 2271584

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2003**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	2271584
b. Determine other system verifiable uses (AF)	61995
c. Determine total supply into the system (AF)	2394593
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.97
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	yes
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

System is monitored by 10+ patrols who also collect WQ samples, pilots flying the CRA and pipeline staff in the normal course of their duties. If water is detected near any of our facilities, we analyze a water sample to determine if it's our water leaking. Normally it is not. If it is, we may hire a leak detection firm to locate the leak.

B. Survey Data

1. Total number of miles of distribution system line.	1017
2. Number of miles of distribution system line surveyed.	1017

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	350000	350000
2. Actual Expenditures	350000	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2003**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Major media campaign for CA Friendly landscaping and outdoor water efficiency. Full complement of brouchures for retailers' use. Educational facility tours for the public.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	56
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	yes	18
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	no	
f. Special Events, Media Events	yes	4
g. Speaker's Bureau	yes	11
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	450000	1600000
2. Actual Expenditures	438000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures include $300K for staff expense (2.5 FTEs x $120K/FTE)

2003 CUWCC Filing

Reported as of 8/

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2003**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	8	13700	390
Grades 4th-6th	yes	29	109000	540
Grades 7th-8th	yes	17	9680	88
High School	yes	12	34305	122

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 11/1/1983

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	1526000	1571000
2. Actual Expenditures	1475000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures include $600K for 6 FTEs

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2003**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	94000	93970	8	No		
2	yes	70000	69132	9	yes	2950000	3232497
3	No			10	No		
4	No			11	No		
5	yes	1300000	1291701	12	No		
6	yes	1750000	1741556	13	No		
7	No			14	yes	10600000	10671440

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	No
2) Residential retrofits	No
3) Commercial, industrial, and institutional surveys	yes
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	yes

3. Staff Resources by BMP

2003 CUWCC Filing

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.45	8	No	
2	yes	.45	9	yes	2
3	No		10	yes	2.2
4	No		11	No	
5	yes	2.7	12	No	
6	yes	1.4	13	No	
7	No		14	yes	1.2

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	8	yes
2	No	9	yes
3	No	10	No
4	No	11	No
5	yes	12	No
6	yes	13	No
7	yes	14	No

2003 CUWCC Filing

B. Wholesale Agency Assistance Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	20000000	22000000
2. Actual Expenditures	19849000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Budget discontinuity from FY 2002 due to including staff, consulting, etc this FY, unlike previous years.

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2003**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$870000000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$254000000
2. Commercial	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
3. Industrial	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
4. Institutional / Government	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
5. Irrigation	
a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$
6. Other	
a. Water Rate Structure	

2003 CUWCC Filing

b. Sewer Rate Structure

c. Total Revenue from Volumetric Rates $

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources $

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	1125000	0
2. Actual Expenditures	1125000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Conservation pricing expenses were for consulting, 3 FTEs, and $650,000 for billing system programming prior to the Jan 2003 implementation of unbundled, tiered rates.

Reported as of 8/

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2003**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	yes
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	80%
b. Coordinator's Name	Andy Hui
c. Coordinator's Title	Unit Manager V
d. Coordinator's Experience and Number of Years	1 year managing unit
e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
6. Number of conservation staff, including Conservation Coordinator.	10

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	1750000	1695000
2. Actual Expenditures	1274000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

RSU Labor (including travel, training, materials, etc)(minus 45400-45550)+ $500,000 (to cover AH and TB whose salary expenses are under AS's budget)x 0.65 = staff expenditures for BMPs

2002 CUWCC Filing

Reported as of 8/

Water Supply & Reuse

Reporting Unit:

Year:
2002

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type

Total AF:

Reported as of 8/

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2002**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year? yes

2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:

   a. Determine metered sales (AF) 2307710

   b. Determine other system verifiable uses (AF) 153224

   c. Determine total supply into the system (AF) 2517881

   d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required. 0.98

3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production? yes

4. Did your agency complete a full-scale audit during this report year? yes

5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit? yes

6. Does your agency operate a system leak detection program? yes

   a. If yes, describe the leak detection program:

   System audits are a continuous process. This presumably satisfies the pre-screening system audit requirement (A.1). Water balances are done daily. Distribution system is visually inspected on an ongoing basis.

B. Survey Data

1. Total number of miles of distribution system line. 1015

2. Number of miles of distribution system line surveyed. 1015

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	84633	88864
2. Actual Expenditures	84633	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 8/

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2002**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? — yes

a. If YES, describe the program and how it's organized.

Conservation messages are a standard part of Metropolitan's outreach message efforts. Metropolitan has also developed and financed educational materials and programs for use by schools and community groups.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	8
b. Public Service Announcement	yes	2
c. Bill Inserts / Newsletters / Brochures	yes	2
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	no	
f. Special Events, Media Events	yes	16
g. Speaker's Bureau	yes	18
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	390000	3800000
2. Actual Expenditures	745000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? — No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2002**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	27	7873	15
Grades 4th-6th	yes	43	54650	86
Grades 7th-8th	yes	15	10043	6
High School	yes	28	27120	17

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 11/1/1983

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	925000	925000
2. Actual Expenditures	820000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2002**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	270000	94292	8	No		
2	yes	0	13149	9	yes	1630000	710350
3	No			10	yes	370000	334575
4	No			11	No		
5	yes	310000	280821	12	No		
6	yes	1460000	863470	13	No		
7	No			14	yes	9810000	11413320

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	yes
2) Residential retrofits	yes
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

2002 CUWCC Filing

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.4	8	No	
2	yes	.1	9	yes	2
3	No		10	yes	1.5
4	No		11	No	
5	yes	2	12	No	
6	yes	1	13	No	
7	No		14	yes	2.5

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	8	yes
2	No	9	yes
3	No	10	yes
4	No	11	No
5	yes	12	No
6	No	13	No
7	yes	14	No

2002 CUWCC Filing

B. Wholesale Agency Assistance Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	13670000	12687092
2. Actual Expenditures	13709977	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2002**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
2. Commercial	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
3. Industrial	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
4. Institutional / Government	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
5. Irrigation	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
6. Other	
a. Water Rate Structure	Uniform

2002 CUWCC Filing

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$844000000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$139000000

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2002**

A. Implementation

1. Does your Agency have a conservation coordinator? yes
2. Is this a full-time position? yes
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?
4. Partner agency's name:
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? 100%
   - b. Coordinator's Name Ed Thornhill
   - c. Coordinator's Title Ed Thornhill
   - d. Coordinator's Experience and Number of Years 13 Years
   - e. Date Coordinator's position was created (mm/dd/yyyy) 8/8/1988
6. Number of conservation staff, including Conservation Coordinator. 9

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	850000	820000
2. Actual Expenditures	830000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Estimated staff expenses are based on 9.5 of the 17 staff members of the Regional Supply Unit doing work full-time.

2001 CUWCC Filing

Reported as of 8/

Water Supply & Reuse

Reporting Unit:

Year:
2001

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type

Total AF:

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2001**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	2075204
b. Determine other system verifiable uses (AF)	242424
c. Determine total supply into the system (AF)	2369913
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.98
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	yes
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

System audits are a continous process. This presumably satisfies the pre-screening system audit requirement (A.1). Water balances are done daily. Distribution system is visually inspected on an ongoing basis.

B. Survey Data

1. Total number of miles of distribution system line.	1015
2. Number of miles of distribution system line surveyed.	1015

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	80603	84633
2. Actual Expenditures	80603	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

2001 CUWCC Filing

Reported as of 8/

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2001**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Conservation messages are a standard part of Metroploitan's outreach message efforts. Metroploitan has also developed and financed educational materials and programs for use by schools and community groups

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	2
b. Public Service Announcement	yes	1
c. Bill Inserts / Newsletters / Brochures	yes	2
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	no	
f. Special Events, Media Events	yes	2
g. Speaker's Bureau	yes	11
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	160600	390000
2. Actual Expenditures	235476	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2001**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	31	9221	20
Grades 4th-6th	yes	44	58505	92
Grades 7th-8th	yes	17	10200	6
High School	yes	25	25200	15

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 11/1/1983

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	975000	925000
2. Actual Expenditures	815000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2001**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	yes	70000	92427	8	No		
2	yes	0	17378	9	yes	330000	252280
3	No			10	No		
4	No			11	No		
5	yes	321800	327668	12	No		
6	yes	260000	239800	13	No		
7	No			14	yes	8820000	7882860

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	No
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	No
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	yes
2) Residential retrofits	yes
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	yes
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

2001 CUWCC Filing

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.4	8	No	
2	yes	.1	9	yes	1.5
3	No		10	yes	.5
4	No		11	No	
5	yes	1	12	No	
6	yes	1	13	No	
7	No		14	yes	2.5

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	8	yes
2	No	9	yes
3	No	10	yes
4	No	11	No
5	yes	12	No
6	No	13	No
7	yes	14	No

2001 CUWCC Filing

B. Wholesale Agency Assistance Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	9550000	13670000
2. Actual Expenditures	9216525	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2001**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
2. Commercial	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
3. Industrial	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
4. Institutional / Government	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
5. Irrigation	
a. Water Rate Structure	Service Not Provided
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
6. Other	
a. Water Rate Structure	Uniform

2001 CUWCC Filing

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$809000000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$145000000

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 8/

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Metropolitan Water Dist of SC	**100% Complete**	**2001**

A. Implementation

1. Does your Agency have a conservation coordinator? yes
2. Is this a full-time position? yes
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?
4. Partner agency's name:
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? 100%
   - b. Coordinator's Name Ed Thornhill
   - c. Coordinator's Title Ed Thornhill
   - d. Coordinator's Experience and Number of Years 12 years
   - e. Date Coordinator's position was created (mm/dd/yyyy) 8/8/1988
6. Number of conservation staff, including Conservation Coordinator. 7

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	808600	850000
2. Actual Expenditures	610000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Last year conservation labor was budgeted separately.

APPENDIX D

AGREEMENT 00/833/01

AGREEMENT BY AND BETWEEN LOS ALISOS WATER DISTRICT AND SANTA MARGARITA WATER DISTRICT RELATING TO INTERCONNECTING OF THE DISTRICTS' NONDOMESTIC SYSTEMS

Agreement No. 00/833/01

AGREEMENT BY AND BETWEEN LOS ALISOS WATER DISTRICT AND SANTA MARGARITA WATER DISTRICT RELATING TO INTERCONNECTING OF THE DISTRICTS' NONDOMESTIC SYSTEMS, C-1036B

This Agreement is dated as of the 27th day of July, 1999 ("the Effective Date"), by and between the SANTA MARGARITA WATER DISTRICT (hereinafter referred to as "Santa Margarita") and the LOS ALISOS WATER DISTRICT (hereinafter referred to as "Los Alisos"), each being a California water district organized and existing pursuant to Division 13 of the Water Code of the State of California and hereinafter sometimes individually or collectively referred to as "Party" or "the Parties," respectively.

RECITALS

1. Los Alisos owns and operates a reclaimed water system, which distributes nondomestic water that meets all applicable regulations for irrigation purposes.

2. Santa Margarita owns and operates a reclaimed water system, which distributes nondomestic water that meets all applicable regulations in irrigation purposes.

3. Los Alisos prepared a study titled "Zone C Reclaimed Water System Conceptual Alignment and Siting" which identified the opportunity to develop a Zone "C" system with a connection to the Santa Margarita Zone "C" system.

4. Santa Margarita prepared a report titled "Los Alisos Water District Use of Upper Oso Reservoir for Seasonal Storage" which identified the opportunity to interconnect the nondomestic water distribution systems and would allow Los Alisos to utilize capacity in Upper Oso Reservoir for operational or seasonal storage.

5. Los Alisos has indicated it presently has excess capacity available in the nondomestic system annually and Los Alisos prefers to operate utilizing Upper Oso Reservoir, not including seasonal storage.

6. Although Los Alisos expects the continued availability of reclaimed water during winter months, it does have the expectations to construct an infill facility for irrigation uses and therefore may not be able to make future commitments of additional reclaimed water supply for Santa Margarita's use. However, Los Alisos expects to have a sustained yield of 1500 acre feet per year to supply Santa Margarita.

7. Santa Margarita has insufficient nondomestic supplies and desires to acquire Los Alisos' excess capacity.

NOW, THEREFORE, in consideration of the mutual covenants and promises between the Parties hereinafter set forth, the Parties agree as follows:

Section 1. Capital Improvements.

Santa Margarita has constructed a pipeline to connect to the Los Alisos Zone "C" system in the general vicinity of Portola Parkway and Saddleback Parkway. Santa Margarita shall be responsible for operation, repair and maintenance of this pipeline.

Los Alisos has constructed a Zone "C" reclaimed water system to serve customers within its jurisdiction and to supply available reclaimed water to Santa Margarita. Los Alisos has constructed facilities for the purpose of utilizing the Upper Oso Reservoir for daily operational storage with a maximum hydraulic grade line of elevation 953 feet. Los Alisos shall be responsible for operation, repair and maintenance of these facilities.

Section 2. Operation.

Santa Margarita and Los Alisos will, respectively, produce reclaimed water, which shall meet the applicable sections of Title 22 of the California Code of Regulations (CCR) for reuse. Santa Margarita will be responsible for any water losses within its system.

Los Alisos shall report monthly the amount of reclaimed water delivered to Santa Margarita by using the following calculation: (1) the amount of reclaimed water pumped to Upper Oso Reservoir; (2) less the water used by all Los Alisos customers within the Zone "C" System; and (3) less any water bypassed to its Zone "B" distribution system. This amount shall be considered reclaimed water delivered to Santa Margarita for use within its distribution system. Los Alisos will be responsible for any water losses within its system.

Section 3. Costs.

Santa Margarita will pay Los Alisos two hundred and eighty dollars per acre-foot ($280/AF) for the reclaimed water, representing the cost of producing tertiary treated water suitable for purposes of this Agreement from secondary effluent, pumped and delivered to Upper Oso Reservoir on a monthly basis. Said cost will be subject to review every two (2) years commencing upon the Effective Date of the agreement based on revisions to components of the cost limited to labor (excepting changes in overhead allocations from the Effective Date of this Agreement), chemicals and power.

Los Alisos will be allowed to utilize Upper Oso Reservoir for operational storage at no costs to Los Alisos. In the future however, if Los Alisos desires to utilize Upper Oso Reservoir for seasonal storage, a cost will be determined, if capacity is available as determined solely by Santa Margarita.

It is further agreed if there is a dispute as to the annual costs billed, the Parties will select an independent certified public accountant to make an audit of the disputed cost and said accountant's figure for the disputed cost shall be final.

Section 4. Water Quality.

Reclaimed water delivered to the Upper Oso System shall meet the current requirements for the highest quality landscape irrigation use set forth in Title 22 CCR, or amendments thereto, and applicable Regional Water Quality Control Board standards. The Parties to this Agreement acknowledge that reclaimed water stored in the Upper Oso Reservoir is subject to changes in bacteriological and algal content due to the inherent nutrients and exposure to atmosphere, sunlight, and tributary runoff, and is subject to increases in dissolved constituent concentrations due to evaporation. The Parties to this Agreement acknowledge that reclaimed water in the Upper Oso System is subject to changes in dissolved constituents' concentrations due to the addition of and commingling with other water supply sources.

Section 5. Availability of Supply

Los Alisos expects to supply Santa Margarita with 1500 acre feet of reclaimed water annually, provided the Los Alisos system remains operational. Los Alisos makes no representation with respect to the availability of reclaimed water for the Santa Margarita system in Upper Oso Reservoir.

Section 6. Term of Agreement.

This Agreement shall be for a period of not less than ten years ("the Term") subject to the Parties recovering their respective capital costs for the Capital Improvements provided for in Section 1 with such recovery determined for Santa Margarita by the cost of: (1) reclaimed water as provided for in Section 3 compared to (2) purchasing potable water from Metropolitan Water District of Southern California (MWD) based on the Treated Non-Interruptible Rate as may be amended from time-to-time by MWD, including without limitation any such changes in MWD's rate structure which may include other fees or charges together which comprise the total cost of MWD's potable treated non-interruptible water supply; (3) times the volume of water delivered pursuant to this Agreement; and determined for Los Alisos by the income from the sale of: (1)reclaimed water as provided for in Section 3, (2) times the volume of water delivered pursuant to this Agreement. If those capital costs are not recovered within the Term, the Term shall automatically extend until the Parties recover all their capital costs. Following such period of time this Agreement shall renew automatically for one (1) year periods, unless either Party provides 90 days prior written notice.

Section 7. Attorney's Fees.

In the event that an action is commenced by either Party to this Agreement to enforce or construe its rights or obligation arising here under, the prevailing Party in

such action, in addition to any other relief or recovery awarded by the court, shall be entitled to recover all statutory costs plus a reasonable amount of attorneys' fees.

Section 8. Agreement.

This Agreement constitutes the entire agreement and supersedes all prior agreements and understandings, both written and oral, between Santa Margarita and Los Alisos with respect to the subject matter hereof.

Section 9. Notices.

All notices required or permitted under this Agreement shall be mailed, delivered or transmitted by the Parties at the address of the administrative headquarters as designated by the Parties.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the first day and year hereinabove written.

SANTA MARGARITA WATER DISTRICT

By: _____

By: Judy K. Takacs
Secretary

LOS ALISOS WATER DISTRICT

By: _____
Member of Board of Directors
Dr. Preston T. Bishop, President

By: _____
Assistant Secretary
Kenneth J. Petersen, General Manager

APPENDIX E

AGREEMENT NO 04/916/00

OPTION AGREEMENT BY AND BETWEEN CUCAMONGA COUNTY WATER DISTRICT AND SANTA MARGARITA WATER DISTRICT

OPTION AGREEMENT

Cucamonga County Water District / Santa Margarita Water District

THIS OPTION AGREEMENT ("**Agreement**") is entered into as of March 25, 2003 (the "**Effective Date**"), by and between CUCAMONGA COUNTY WATER DISTRICT, an independent public corporation organized and operating under the provisions of California Water Code Section 30000 *et seq.* ("**CCWD**"), and SANTA MARGARITA WATER DISTRICT, a special district organized and operating under the provisions of California Water Code Section 34000 *et seq.* ("**SMWD**").

RECITALS

A. SMWD provides domestic water services for the benefit of approximately 62,674 acres located in southeastern Orange County, California.

B. SMWD is presently engaged in long-range planning to meet expected and anticipated water supply needs for future projects located within SMWD's service area. Of specific importance, SMWD is currently evaluating the projected water demands for a planned community project (the "**Ranch Plan**") proposed by Rancho Mission Viejo, LLC ("**RMV**") within SMWD's service area. The Ranch Plan project would result in the development, over approximately 30 years, of up to 14,000 dwelling units, 130 acres of urban activity center uses, 258 acres of business park uses, 39 acres of neighborhood retail uses, up to four golf courses, a proposed 1,079-acre regional park, and open space areas totaling approximately 13,161 acres.

C. In order to ensure the provision of an adequate water supply for the Ranch Plan, and to mitigate against any future challenges concerning the ability of SMWD to provide a sufficient water supply to meet the needs of the Ranch Plan and other users, SMWD is desirous of securing additional water rights to supplement those water resources that would otherwise be available to SMWD.

D. CCWD owns, operates and maintains a series of water supply, treatment and distribution resources in San Bernardino County, California. The water resources held, controlled and managed by CCWD are sufficient to satisfy all water demands within CCWD's service area, while concurrently generating an excess supply that is available for export, exchange or sale.

E. SMWD is desirous of acquiring an exclusive option to enter into a long-term contract with CCWD wherein SMWD, following exercise of the option, would have the right to purchase up to 4,250 acre feet per year of firm water supply from CCWD for a period of not less than twenty-five (25) years.

F. CCWD has the ability to provide SMWD with the desired water supply and, subject to the terms and conditions set forth herein, CCWD is willing to grant SMWD an exclusive option to enter into a long-term contract for the purchase and sale of said water supply.

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. Grant of Option. Subject to the following terms and conditions, CCWD hereby grants to SMWD an exclusive option (the "**Option**") to enter into a long-term contract ("**Contract**") with CCWD that, upon execution and delivery by the parties, will entitle SMWD to purchase up to 4,250 acre-feet per year of firm water supply from CCWD (the "**Reserved Water Supply**") for a period of not less than twenty-five (25) years. The Contract, as heretofore negotiated and approved as to both form and content by SMWD and CCWD, is attached hereto and incorporated herein as **Exhibit A**.

2. Term of Option. The term of the Option ("**Option Term**") shall commence as of the Effective Date and shall remain open and subject to exercise by SMWD for a period of three (3) years thereafter (i.e., until 5:00 o'clock p.m. PST on March ___, 2006 [the "**Expiration Date**"]). Notwithstanding any provision herein to the contrary, and provided that SMWD has not previously exercised the Option in accordance with the provisions of Section 3, below, the Option and all rights appurtenant thereto shall automatically terminate on the earlier to occur of the following:

a. The Expiration Date;

b. SMWD's failure to remit to CCWD any portion of the Option Fees (as more specifically described in Section 4, below, and subject to the cure provisions set forth in Section 11, below); or

c. SMWD's rejection of the Option in accordance with the provisions of Section 6, below.

3. Method of Exercise. While the Option remains outstanding and exercisable in accordance with the provisions of this Agreement, SMWD may exercise the Option by complying with the following procedures:

a. Exercise Notice. SMWD shall deliver to CCWD a written notice (the "**Exercise Notice**") declaring SMWD's desire to execute, deliver and perform vis-à-vis the Contract.

b. Execution and Delivery of Contract. Concurrent with SMWD's delivery of the Exercise Notice, SMWD shall tender to CCWD two (2) fully executed copies of the Contract.

4. Option Fees. As consideration for CCWD's grant of the Option, SMWD shall pay to CCWD an annual fee for each year that the Option remains open and exercisable by SMWD during the Option Term. Each annual fee due to CCWD hereunder shall be individually identified as an "**Option Fee**." The amount of each Option Fee shall vary according to the following schedule:

a. For the first twelve (12) months of the Option Term, the Option Fee shall be equal to ONE HUNDRED FIFTY THOUSAND AND NO/100 DOLLARS ($150,000.00).

b. For months thirteen (13) through twenty-four (24) of the Option Term, the Option Fee shall be equal to ONE HUNDRED FIFTY THOUSAND AND NO/100 DOLLARS ($150,000.00).

c. For months twenty-five (25) through thirty-six (36) of the Option Term, the Option Fee shall be equal to TWO HUNDRED FIFTY THOUSAND AND NO/100 DOLLARS ($250,000.00).

Each Option Fee shall be payable by SMWD within thirty (30) days following SMWD's receipt of written invoice from CCWD requesting payment. CCWD shall be entitled to invoice SMWD for the first Option Fee concurrent with the execution and delivery of this Agreement; subsequent Option Fees may be invoiced by CCWD on the first and second anniversary of the Effective Date hereof, respectively, in the amount specified in this Section.

5. Cooperation and Assistance. At all times during the Option Term, CCWD shall cooperate with and assist SMWD in analyzing and evaluating the water supply purchase and exchange transaction that is the subject of the Contract. In thus assisting SMWD, CCWD shall deliver or otherwise make available to SMWD, free of charge, all documents, plans, maps, studies, reports, records, permits, licenses, contracts and other information that (i) pertain to the Reserved Water Supply that is available for exchange and/or transfer pursuant to the terms of the Contract and (ii) demonstrates CCWD's ability to perform its obligations under the Contract. Furthermore, CCWD shall provide SMWD and its representatives with prompt and reasonable access to key employees, consultants, contractors and other individuals who are in possession of information concerning CCWD's operations, the Reserved Water Supply, and CCWD's ability to perform under the Contract.

6. Rejection of Option. Notwithstanding any provision herein to the contrary, SMWD shall have the right, subject to the prior written approval of RMV, to reject the Option and terminate this Agreement at any time. SMWD shall signify its rejection by (i) delivering written notice to CCWD that declares SMWD's termination of the Option and (ii) providing to CCWD a document executed by RMV that signifies RMV's consent to said termination. Upon SMWD's delivery of said notice and document, the Option shall automatically terminate and the parties shall be relieved of any and all further obligations under this Agreement; provided, however, that said rejection shall not limit or otherwise excuse SMWD from paying to CCWD any Option Fees due and owing to CCWD as of the rejection date SO LONG AS CCWD is not in breach of any of the provisions hereof.

7. Exclusive Dealing; Defense of Water Rights. During the Option Term, CCWD will not discuss, negotiate or enter into any agreement with any other water district, corporation, government entity or other person concerning the ownership, operation, rights or use of the Reserved Water Supply that would in any way interfere with, impede, prejudice or compromise SMWD's rights with respect to (or otherwise arising under) the Reserved Water Supply, this Agreement and/or the Contract. Furthermore, CCWD shall undertake, at its sole

cost and expense, all actions necessary to (i) defend, preserve and protect the Reserved Water Supply from physical, legal and/or other challenge and (ii) ensure the availability of the Reserved Water Supply for exchange to SMWD pursuant to the terms of the Contract. CCWD shall also cooperate with and assist SMWD in the defense of any and all challenges concerning the viability and/or enforceability of this Agreement and the Contract (excluding challenges regarding the sufficiency of the Agreement and/or the Contract to satisfy the evidentiary requirements of SB 221 (Kuehl) and/or SB 610 (Costa)). In performing its obligations hereunder, CCWD shall make all of its personnel and information resources reasonably available to SMWD (including testimonial support before all boards, commissions, courts and other venues).

8. Environmental Review. To the extent that the activities contemplated by this Agreement constitute a "project" within the meaning of the California Environmental Quality Act (Calif. Pub. Res. Code Sections 21000 *et seq.* ["**CEQA**"]), implementation and accomplishment of such activities shall be expressly contingent upon completion by CCWD (as the lead agency) and SMWD (as the responsible agency) of any and all required program-level or project-specific environmental review. If CCWD shall deem it necessary or advisable to retain the services of one (1) or more qualified consultants/professionals to assist in complying with the requirements of CEQA, CCWD shall, after consultation with and subject to the prior written approval of SMWD, retain the services of said consultant(s)/professional(s) for the benefit of the proposed water supply and exchange program. SMWD shall be responsible for the payment of all costs and fees associated with the retention of said consultant(s)/professional(s). Each party shall reasonably cooperate with and assist the other party in accomplishing the mandates and requirements of CEQA.

9. CCWD's Obligations upon SMWD's Exercise of Option. Upon SMWD's timely exercise of the Option in accordance with the provisions of Section 3, above, CCWD shall execute the two (2) copies of the Contract previously delivered by SMWD (which Contracts shall be dated as of the Option exercise date) and shall thereafter remit one (1) fully executed copy of the Contract to SMWD. Notwithstanding any provision herein to the contrary, CCWD shall accomplish the execution and delivery of the Contract to SMWD, immediately following the first available CCWD Board meeting date, but in no event later than thirty (30) days following SMWD's delivery of the Exercise Notice and the accompanying, partially-executed copies of the Contract.

10. Representations and Warranties.

a. CCWD. In addition to any express agreements of CCWD contained herein and in the Contract, and in order to induce SMWD to enter into this Agreement and to pay the Option Fees, the following constitute representations, warranties and covenants of CCWD that are true and correct as of the Effective Date and shall be true and correct as of the date the Exercise Notice is delivered to CCWD:

(1) CCWD is duly formed, validly existing and in good standing under the laws of the State of California and has full power and authority to conduct its business as presently conducted and to enter into and carry out the transactions contemplated herein and in the Contract.

(2) The individuals executing this Agreement on behalf of CCWD have the legal power, right and authority to enter into this Agreement and the instruments referenced herein and to bind CCWD to the terms and conditions herein.

(3) All requisite action (corporate and otherwise) has been taken by CCWD in connection with the entering into of this Agreement, the instruments referenced herein, and the consummation of the transactions contemplated hereby. CCWD has obtained all necessary third-party and government consents (including all certificates, permits and approvals) required in connection with executing this Agreement and making available the Reserved Water Supply pursuant to the express terms of the Contract.

(4) The execution, delivery and performance of this Agreement: (i) will not violate any provision of law; (ii) will not conflict with or result in any breach of any of the terms, conditions or provisions of, or constitute (with or without notice or lapse of time, or both) a default under or a violation of, (A) CCWD's charter or other governing documents, (B) any indenture, loan or credit agreement, note agreement, deed of trust, mortgage, security agreement or other agreement, lease or other instrument, commitment or arrangement to which CCWD is a party or by which any of its properties, assets or rights are bound or affected, (C) any decree, judgment, order, statute, rule or regulation applicable to CCWD, including, but not limited to, governmental pronouncements and requirements dealing with or regulating the quality of water delivered and the location of any facilities or other assets of CCWD; and (iii) will not result in the imposition of any lien or other encumbrance on any property, asset or right held by CCWD or any environmental laws, rules or regulations. CCWD is not in violation of, or (with or without notice or lapse of time or both) in default under, any term or provision of any indenture, loan or credit agreement, note agreement, deed of trust, or arrangement to which CCWD is not a party or by which any of the properties, assets or rights are bound or affected that would have a material adverse effect upon the transaction contemplated hereby and in the Contract.

(5) CCWD is the owner of and has good and marketable title to the Reserved Water Supply free and clear of all debts, liens, claims, mortgages, encumbrances, and any other contractual or legal restrictions. No mortgage, trust deed, financing statement or other instrument similar in effect filed or permitted to be filed by CCWD covering the Reserved Water Supply with respect thereto shall be on file in any recording office except as such may be filed in favor of SMWD or its assignees in accordance with this Agreement.

(6) CCWD has not sold, transferred, assigned, licensed or subjected to any lien or other encumbrance, the Reserved Water Supply or any interest therein.

(7) No litigation, including any arbitration, audit, investigation or other proceeding of or before any court, arbitrator or governmental or regulatory authority, is pending (or, to the best knowledge of CCWD, is threatened), involving the Reserved Water Supply, and CCWD is not aware of any likely basis for any such litigation, arbitration, audit, investigation or proceeding. With the exception of the Chino Basin Judgment (as referenced and defined in Recitals B and C of the Contract), CCWD is not a party to or subject to the provision of any judgment, order, writ, injunction, decree or award of any court, arbitrator or governmental or regulatory official, body or authority relative to the Reserved Water Supply.

(8) No statement by CCWD contained in this Agreement and no written statement furnished by CCWD or any officer, employee, director, counsel or other agent of CCWD to SMWD or any officer, director, employee, counsel or other agent of SMWD pursuant to or in connection with this Agreement contains or will contain any untrue statement of a material fact, or omits or will omit to state a material fact necessary in order to make the statements therein contained not misleading. There is no fact that adversely affects, or in the future might reasonably be expected to adversely affect the condition (financial or otherwise), operations (present or prospective), business (present or prospective), properties, assets or liabilities of CCWD relating to the Reserved Water Supply in any material respect that is not set forth in this Agreement.

(9) CCWD shall maintain adequate facilities, personnel and resources, including maintenance, service and support personnel, to meet its obligations under this Agreement and the Contract.

b. SMWD. In addition to any express agreements of SMWD contained herein, and in order to induce CCWD to enter into this Agreement and to perform its obligations hereunder, the following constitute representations, warranties and covenants of SMWD that are true and correct as of the Effective Date and shall be true and correct as of the date the Exercise Notice is delivered to CCWD:

(1) SMWD is duly formed, validly existing and in good standing under the laws of the State of California and has full power and authority to conduct its business as presently conducted and to enter into and carry out the transactions contemplated herein and in the Contract.

(2) The individuals executing this Contract on behalf of SMWD have the legal power, right and authority to enter into this Contract and the instruments referenced herein and to bind SMWD to the terms and conditions herein.

(3) All requisite action (corporate and otherwise) has been taken by SMWD in connection with the entering into of this Contract and the consummation of the transactions contemplated hereby.

11. Default and Remedies. In the event that either party is in material default of this Agreement, the non-defaulting party may provide written notice to the defaulting party, identifying with reasonable specificity the nature of the claimed default. If the defaulting party has not cured the event(s) of material default which is (are) identified in the notice required by the previous sentence of this Section 11 within ten (10) business days of receipt of such written notice, then the non-defaulting party shall be entitled to any and all remedies which may be available to it at law or in equity. Furthermore, in the event of a material breach by CCWD wherein CCWD fails or otherwise refuses to execute and deliver the Contracts specified in Section 9, above, SMWD shall be entitled to the remedy of specific performance against CCWD. Specifically, CCWD shall be obligated to perform its obligations under the Contract and to provide to SMWD (from any and all sources, and irrespective of cost, provider or other terms) the Reserved Water Supply, for a period of not less than 25 years, in exchange for the consideration identified in the Contract.

12. Notices. The Exercise Notice and all other notices, requests and demands hereunder must be in writing to be effective. All notices required to be given hereunder or by operation of law in connection with the performance or enforcement hereof shall be deemed given upon delivery if delivered personally (which includes notices delivered by messenger, telecopy/facsimile or overnight courier) or, if delivered by mail, shall be deemed given after being deposited by certified mail in any duly authorized United States mail depository, postage prepaid. All such notices shall be addressed as follows or to such other address or addresses as the parties may from time to time specify in writing:

If to CCWD: Cucamonga County Water District
10440 Ashford Street
Rancho Cucamonga, CA 91730-3057
Attn: Robert A. DeLoach, General Manager/CEO
Fax No.: (909) 476-8032

If to SMWD: Santa Margarita Water District
26111 Antonio Parkway
Rancho Santa Margarita, CA 92688-1993
Attn: John J. Schatz, General Manager
Fax No.: (949) 459-6463

13. Miscellaneous.

a. Successors and Assigns. This Agreement and the rights and obligations of the parties hereunder shall inure to the benefit of, and be binding upon, the parties' respective successors, permitted assigns and legal representatives.

b. Governing Law. This Agreement shall be governed by and construed under the laws of the State of California, as such laws apply to agreements among California residents made and to be performed entirely within the State of California, without giving effect to the choice of law or conflict of law provisions (whether of the State of California or any other jurisdiction) that would cause the application of the laws of any other jurisdiction other than the State of California.

c. Entire Agreement. This writing constitutes the entire agreement among the parties, and no modification of this Agreement shall be valid unless executed in writing by the parties hereto. Further, none of the parties to this Agreement shall be bound by any representations, warranties, promises, statements, or information unless expressly set forth herein.

d. Change of Control. This Agreement shall survive and SMWD shall continue to have the right to exercise the Option and to achieve all benefits and entitlements afforded herein notwithstanding any change in ownership or control of CCWD.

e. Third-Party Beneficiaries. SMWD and CCWD specifically acknowledge and agree that Rancho Mission Viejo, LLC, and its parent, subsidiary and affiliated entities (collectively, "RMV") are the direct, intended and sole third party creditor beneficiaries of this Contract and the rights and privileges afforded to SMWD hereunder. Absent the prior

written consent and approval of RMV, any amendment, change or other modification to this Agreement shall be deemed void and unenforceable vis-à-vis the rights, privileges and entitlements accruing to RMV hereunder.

f. No Waiver. The failure of any party to enforce against the other a provision of this Agreement shall not constitute a waiver of that party's right to enforce such a provision at a later time.

g. Captions. The captions of the various Sections in this Agreement are for convenience and organization only, and are not intended to be any part of the body of this Agreement, nor are they intended to be referred to in construing the provisions of this Agreement.

h. Counterparts. This Agreement may be executed in one or more counterparts, and all the counterparts shall constitute but one and the same agreement, notwithstanding that all parties hereto are not signatories to the same or original counterpart.

i. Attorneys' Fees. In the event of litigation involving this Agreement, the prevailing party in any such action or proceeding shall be entitled to recover its costs and expenses incurred in such action from the other party including, without limitation, the cost of reasonable attorneys' fees.

j. Brokerage Fees. The parties expressly acknowledge that Optimal Water, Inc. has performed certain services in relation to the negotiation, execution and delivery of this Agreement. However, Optimal Water, Inc. is not owed any compensation or remuneration from either SMWD or CCWD in connection with the services thus provided. Furthermore, CCWD warrants that it has not dealt with any other broker in connection with this transaction, and SMWD warrants that it has not dealt with any other broker in connection with this transaction. If any person or entity shall assert a claim to a finder's fee, brokerage commission or other compensation on account of alleged employment as a finder or broker or performance of services as a finder or broker in connection with this transaction, the party under whom the finder or broker is claiming shall indemnify and hold the other party harmless for, from and against any such claim and all costs, expenses and liabilities incurred in connection with such claim or any action or proceeding brought on such claim, including, but not limited to, counsel and witness fees and court cots in defending against such claim. This indemnity shall survive the exercise of the Option or the termination of this Agreement.

k. Public Announcement. All press releases and public announcements, if any, relating to this Agreement and the transaction contemplated hereby shall be agreed to and prepared jointly by the parties.

[THIS SPACE INTENTIONALLY LEFT BLANK]

1. Time. Time is of the essence with respect to this Agreement and the rights, obligations, conditions and entitlements set forth herein.

IN WITNESS WHEREOF, the parties have entered into this Agreement as of the Effective Date hereof.

"CCWD"

CUCAMONGA COUNTY WATER DISTRICT

By: _____

Its: GENERAL MANAGER/CEO

"SMWD"

SANTA MARGARITA WATER DISTRICT

By: _____

Its: General Manager

EXHIBIT A

The Contract

APPENDIX F

AGREEMENT NO 04/915/00

WATER SUPPLY CONTRACT BY AND BETWEEN CUCAMONGA COUNTY WATER DISTRICT AND SANTA MARGARITA WATER DISTRICT

WATER SUPPLY CONTRACT

Cucamonga County Water District / Santa Margarita Water District

THIS WATER SUPPLY CONTRACT ("**Contract**") is entered into as of _____ ___, 200___ (the "**Effective Date**"), by and between CUCAMONGA COUNTY WATER DISTRICT, an independent public corporation organized and operating under the provisions of California Water Code Section 30000 *et seq.* ("**CCWD**"), and SANTA MARGARITA WATER DISTRICT, a special district organized and operating under the provisions of California Water Code Section 34000 *et seq.* ("**SMWD**").

RECITALS

A. CCWD owns, operates and maintains a series of water supply, treatment and distribution resources in San Bernardino County, California.

B. CCWD possesses and holds adjudicated water rights ("**Groundwater**") from the Chino Groundwater Basin (the "**Chino Basin**"), which is governed by a management oversight body ("**Watermaster**") under and pursuant to the Chino Basin Judgment (*Chino Basin Municipal Water District v. City of Chino, et al.*, San Bernardino Superior Court No. 164327) and promulgating agreements, procedures, programs, and rules and regulations adopted by Watermaster and approved by the Court pursuant to the Judgment. CCWD's adjudicated water rights in the Chino Basin ensure a sufficient quantity of safe yield allocation to meet the requirements of this Contract.

C. The parties to the Chino Basin Judgment entered into a Peace Agreement on June 29, 2000 for the purpose of adopting the goals and plans of the Optimum Basin Management Plan ("**OBMP**"), which had been developed by Watermaster for the ongoing administration and management of the Chino Basin; and Watermaster subsequently approved and adopted the Peace Agreement and OBMP.

D. In addition to its Groundwater, CCWD obtains imported contract water ("**Imported Water**") supplied by the Metropolitan Water District of Southern California ("**Metropolitan**"), a regional water wholesaler, through the Inland Empire Utilities Agency ("**IEUA**"), one of Metropolitan's member agencies.

E. CCWD owns, operates, maintains and/or has access to adequate capital facilities to produce, treat and deliver the water supplies necessary to fulfill all of the current demands within its service area. Furthermore, the water resources held, controlled and managed by CCWD are sufficient to generate an excess supply that is available for export, exchange, sale or use outside of CCWD's service area.

F. SMWD provides domestic water services for the benefit of approximately 62,674 acres located in southeastern Orange County, California.

G. SMWD is currently evaluating the projected water demands for a planned community project (the "**Ranch Plan**") proposed by Rancho Mission Viejo, LLC ("**RMV**")

within SMWD's service area. The Ranch Plan project would result in the development, over approximately 30 years, of up to 14,000 dwelling units, 130 acres of urban activity center uses, 258 acres of business park uses, 39 acres of neighborhood retail uses, up to four golf courses, a proposed 1,079-acre regional park, and open space areas totaling approximately 13,161 acres.

H. In order to ensure the provision of an adequate water supply for the Ranch Plan, and to mitigate against any future challenges concerning the ability of SMWD to provide a sufficient water supply to meet the needs of the Ranch Plan and other users, SMWD is desirous of securing additional water rights to supplement those water resources that otherwise are (or may hereafter become) available to SMWD.

I. In furtherance of its water supply planning for the Ranch Plan, SMWD is desirous of acquiring certain rights to water from CCWD that will supplement and/or augment SMWD's Tier I and Tier II water deliveries from Metropolitan (as determined from time to time). Specifically, and for the exclusive benefit of the Ranch Plan, SMWD desires the right to purchase up to 4,250 acre-feet per year of firm water supply from CCWD for a period of not less than twenty-five (25) years.

J. Subject to the terms and conditions hereof, CCWD is willing and able to reserve for SMWD's account (with a first priority option to purchase) the water supplies desired by SMWD for the benefit of the Ranch Plan.

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. Purpose of Contract; Limitations. As set forth in Recitals H and I, above, SMWD is desirous of augmenting those water resources available (presently and prospectively) to serve the Ranch Plan. Although SMWD currently anticipates that its local and imported water resources/rights will be sufficient to accommodate full development of the Ranch Plan, SMWD wishes to expand its array of available water supplies to (i) further ensure that approval and development of the Ranch Plan will not jeopardize or otherwise compromise SMWD's ability to serve all domestic water users within SMWD's service area and (ii) eliminate or otherwise mitigate any future challenges (whether judicial or otherwise) concerning the ability of SMWD to provide a sufficient water supply to meet the needs of the Ranch Plan and other users. SMWD desires to reserve a finite amount of water (see Section 3, below) and to call upon said water (see Section 4, below) if and when SMWD's local water rights and Tier I and Tier II supplies from Metropolitan appear, in any given year, to be insufficient to accommodate both the Ranch Plan and SMWD's other customers. During any such period of insufficiency, SMWD shall exercise its rights hereunder and call upon CCWD to deliver that amount of water (up to 4,250 acre-feet per annum) necessary to eliminate any shortfall in SMWD's aggregate water supplies that are available to serve the Ranch Plan.

2. Term of the Contract.

a. Initial Term. The initial term of this Contract ("**Initial Term**") shall commence upon the Effective Date and shall (unless otherwise earlier terminated in

accordance with the provisions of Section 2.c., below) end on the twenty-fifth (25th) anniversary of the Effective Date.

b. Extension of the Contract. At the end of the Initial Term, unless earlier terminated in accordance with the provisions of Section 2.c., below, SMWD shall have the right to extend the term of this Contract for an additional period of twenty-five (25) years (the "**Extension Period**") SUBJECT TO the following terms and conditions: SMWD shall provide written notice to CCWD of its intent to extend the term of the Contract not less than ninety (90) days prior to the expiration of the Initial Term. Following CCWD's receipt of the notice of intent to extend, and prior to the expiration of the Initial Term, the parties shall meet in good faith to negotiate and agree upon the additional/modified terms and conditions (if any) that will govern the parties' relationship hereunder during the Extension Period. In the event that the parties are unable to negotiate and agree upon the additional/modified terms and conditions that will govern the parties during the Extension Period, this Contract shall automatically terminate on the expiration of the Initial Term."

c. Termination of the Contract. Notwithstanding any provision herein to the contrary, the term of this Contract shall expire upon the earlier to occur of the following events:

(1) Upon SMWD's delivery to CCWD of (a) written notice advising that SMWD is terminating the Contract effective as of the date specified in the notice and (b) a document executed by RMV signifying RMV's consent to the proposed termination;

(2) Upon mutual agreement of the parties (SUBJECT TO the prior written consent of RMV); or

(3) Upon breach of this Contract by either party, and the decision of the non-breaching party to terminate this Contract following expiration of any applicable cure period(s).

(i) In the event of a breach by SMWD, CCWD shall notify RMV concerning the alleged breach and shall provide RMV with an opportunity to cure said breach in accordance with the provisions of this Contract.

3. Reservation of Water. Commencing on the Effective Date, and during the Initial Term and any renewal or extension thereof, CCWD shall reserve for SMWD's account, with a first priority option to purchase pursuant to Section 4, below, a firm supply of four thousand two hundred fifty (4,250) acre-feet of Groundwater on an annual basis (the "**Reserved Water Supply**").

a. Substitution of Reserved Water Supply. During the Initial Term of this Contract (including any renewal or extension hereof), CCWD shall have the right to substitute or combine new or additional lawful sources of water to replace (for its own account) the Reserved Water Supply held and maintained for the benefit of SMWD; provided, however, that any such substitutions shall not (i) compromise, jeopardize, impair or adversely affect SMWD's rights and entitlements under this Contract or (ii) increase or enlarge SMWD's

financial obligations or exposure with respect to achieving SMWD's purposes set forth in Section 1, above.

4. First Priority Option. CCWD hereby grants to SMWD a first priority option ("Water Option") to purchase all (or any portion of) the Reserved Water Supply set aside by CCWD during each year of the Contract.

a. Preservation of Priority Rights. CCWD covenants and agrees that during the Initial Term of this Contract (including any renewal or extension hereof), CCWD will not enter into any transaction(s), entertain any discussion(s), or execute any agreement(s) that will (or may) compromise, jeopardize or negatively affect SMWD's annual priority rights to the Reserved Water Supply. CCWD further agrees to execute, or otherwise arrange for the execution of, any and all documents requested by SMWD that demonstrate (i) SMWD's annual priority rights with respect to the Reserved Water Supply and (ii) the subordination of any and all third-party agreements, documents, negotiations and/or understandings to SMWD's priority rights vis-à-vis the Reserved Water Supply. CCWD shall immediately notify SMWD concerning the existence or occurrence of any agreements, documents, negotiations and/or discussions that may impact, compromise or otherwise affect SMWD's annual priority rights to the Reserved Water Supply. Furthermore, CCWD shall defend, at its sole cost and expense, the annual priority rights afforded to SMWD hereunder and shall take all steps necessary to ensure that the annual priority rights (and the underlying Reserved Water Supply) are preserved, protected and maintained for the benefit of SMWD.

b. Exercise of Water Option. During the Initial Term of this Contract (including any renewal or extension hereof), SMWD shall have the annual, recurring right to exercise the Water Option by complying with the following procedures: On or before March 15 of each calendar year, SMWD shall deliver written notice to CCWD (the "**Call**") declaring SMWD's intention to exercise its priority option rights during the immediate calendar year. The Call shall specify the amount of the Reserved Water Supply that SMWD will purchase from CCWD pursuant to the provisions of Section 6, below. Furthermore, the Call shall identify a definitive delivery schedule for the water supplies thus requested. In no event, however, shall the water delivery schedule identify a water delivery date (whether for all or part of the Reserved Water Supply) that is less than thirty (30) days from the date of the Call.

c. Limitations on Call. Consistent with the provisions of Section 1, above, SMWD shall be entitled to submit a Call and receive the requested water from CCWD only if SMWD's available Tier I and Tier II water supplies/deliveries are insufficient to accommodate the water demands of the Ranch Plan.

5. Delivery of Requested Water; Exchange Program and Individual Party Responsibilities. Upon receipt of a Call from SMWD, CCWD shall deliver to SMWD the amount of Reserved Water Supply identified and requested in the Call.

a. Exchange Program. CCWD shall accomplish its water delivery obligations hereunder through the use of an exchange program (the "**Exchange**") whereby the amount of the Reserved Water Supply identified and requested in the Call shall be exchanged for Imported Water (the "**Exchange Water**"). The Exchange Water shall be made available to

SMWD for collection and use at a point/location within Metropolitan's water delivery system (the "**Delivery Location**"). No actual Groundwater from within the Chino Basin shall be physically transferred to SMWD pursuant to this Contract; accordingly, the parties do not anticipate that any additional connections to or additional capacity within Metropolitan's system shall be required in order to accomplish CCWD's water delivery obligations hereunder.

b. CCWD's Responsibilities. CCWD shall make all arrangements and accomplish all tasks necessary for ensuring that a firm, reliable water supply is made available for SMWD at the Delivery Location upon the dates/times specified in the Call. Said obligations include, but are not limited to, coordinating and contracting with Metropolitan and IEUA concerning the Exchange Water, and ensuring that any necessary arrangements for backup exchange and/or source supplies or transportation capacity in Metropolitan's water delivery system are complete and readily available. Furthermore, CCWD shall be responsible for any and all costs, fees and expenses associated with the local production, treatment and delivery of any water utilized by CCWD for its own account to replace the Exchange Water delivered to SMWD (including, but not limited to, the design, construction, operation and maintenance of new capital facilities necessary for making the replacement water available).

(1) Losses. CCWD shall assume all losses (whether arising from storage, delivery or otherwise) with respect to any and all water to be supplied and/or exchanged hereunder, with no recourse to SMWD for such losses.

c. SMWD's Responsibilities. Consistent with the provisions of Section 6, below, SMWD shall pay all costs, fees and expenses charged or otherwise assessed by Metropolitan to accomplish any Exchange contemplated and completed hereunder. Furthermore, SMWD, at its sole cost and expense, shall be responsible for arranging with Metropolitan and/or the Municipal Water District of Orange County for the delivery of any and all Exchange Water from the Delivery Location to SMWD's service area.

6. Payments; Expense Obligations.

a. Annual Reservation Fee. Commencing on the Effective Date, and continuing thereafter on each successive anniversary of the Effective Date hereof during the term of this Contract, SMWD shall be obligated to pay to CCWD an annual water reservation fee ("**Annual Reservation Fee**") for the water supply reserved hereunder for the benefit of SMWD. The Annual Reservation Fee shall be equal to Three Hundred Eighteen Thousand Seven Hundred Fifty and No/100 Dollars ($318,750.00), calculated as follows:

Annual Reserved Water Supply (i.e., 4,250 acre-feet) –TIMES-
Seventy-Five and No/100 Dollars ($75.00) per acre-foot.

Each Annual Reservation Fee due to CCWD hereunder shall be payable by SMWD within thirty (30) days following SMWD's receipt of written invoice from CCWD requesting payment.

(1) Annual Fee Adjustment. Beginning on the first anniversary of the Effective Date, and continuing thereafter on each successive anniversary of this Contract

during the term hereof, the Annual Reservation Fee shall be increased by a factor equal to three percent (3%).

b. Exchange Fees. SMWD shall reimburse CCWD for all reasonable fees, costs and expenses ("**Exchange Fees**") assessed or otherwise charged by Metropolitan and/or IEUA as a result of each Exchange contemplated and completed pursuant to the terms of this Contract. CCWD shall invoice SMWD on a monthly basis for any Exchange Fees related to Exchange Water delivered during the previous month. Each Exchange Fee invoice shall be payable by SMWD within thirty (30) days following SMWD's receipt of the relevant invoice.

c. Early Termination Fee. Upon SMWD's early termination of this Contract pursuant to Section 2.c.(1), above, SMWD shall pay to CCWD a termination fee ("**Early Te rmination Fee**") equal to three (3) years of the then-current Annual Reservation Fee. Notwithstanding the foregoing, in the event that SMWD elects to voluntarily terminate this Contract at any time during the final two (2) years of the Initial Term (including any renewal or extension thereof), the Early Termination Fee shall be equal to the remaining number of years in the Contract term (as modified) –TIMES- the then-current Annual Reservation Fee.

7. Remarketing of Unclaimed Water. In any year when SMWD does not submit a Call for delivery of all or any portion of the Reserved Water Supply (as more specifically defined in Section 4.b., above), CCWD, in it sole discretion, shall have the right to sell, transfer, remarket or produce for its own account, any portion of the Reserved Water Supply not claimed or otherwise requested by SMWD in the Call. CCWD shall be entitled to retain any and all proceeds derived from the sale, transfer, remarketing or production of this excess water supply not specifically claimed or requested by SMWD.

8. Supplemental Obligations of CCWD.

a. Cooperation and Assistance. At all times during the Initial Term (including any extension or renewal thereof), CCWD shall cooperate with and assist SMWD in implementing the water supply purchase and exchange transaction that is the subject of this Contract. In thus assisting SMWD, CCWD shall deliver or otherwise make available to SMWD, free of charge, all documents, plans, maps, studies, reports, records, permits, licenses, contracts and other information that (i) pertain to the Reserved Water Supply that is available for exchange and/or transfer pursuant to the terms of this Contract and (ii) demonstrates CCWD's ability to perform its obligations under this Contract. Furthermore, CCWD shall provide SMWD and its representatives with prompt and reasonable access to key employees, consultants, contractors and other individuals who are in possession of information concerning CCWD's operations, the Reserved Water Supply, and CCWD's ability to perform under this Contract.

b. Exclusive Dealing; Defense of Water Rights. During the Initial Term (including any extension or renewal thereof), CCWD will not discuss, negotiate or enter into any agreement with any other water district, corporation, government entity or other person concerning the ownership, operation, rights or use of the Reserved Water Supply that would in any way interfere with, impede, prejudice or compromise SMWD's rights with respect to (or otherwise arising under) the Reserved Water Supply and/or this Contract. Furthermore, CCWD shall, at its sole cost and expense, undertake all actions necessary to (i) defend, preserve and

protect the Reserved Water Supply from physical, legal and/or other challenge and (ii) ensure the availability of the Reserved Water Supply for exchange and/or transfer to SMWD pursuant to the terms of this Contract. CCWD's shall also cooperate with and assist SMWD in the defense of any and all challenges concerning the viability and/or enforceability of this Contract (excluding challenges regarding the sufficiency of the Contract and the Reserved Water Supply to satisfy the evidentiary requirements of SB 221 (Kuehl) and/or SB 610 (Costa)). In performing its obligations hereunder, CCWD shall make all of its personnel and information resources reasonably available to SMWD (including testimonial support before all boards, commissions, courts and other venues).

c. Supplemental Documentation. Upon the request of SMWD, CCWD shall prepare, execute and deliver (or, as appropriate, shall arrange for the preparation, execution and delivery) of such additional documentation as SMWD may deem necessary, important or essential for purposes of protecting its rights under this Contract and preserving its entitlement to the Reserved Water Supply.

9. Representations and Warranties.

a. CCWD. In addition to any express agreements of CCWD contained herein, and in order to induce SMWD to enter into this Contract and to perform its obligations hereunder, the following constitute representations, warranties and covenants of CCWD that are true and correct as of the Effective Date and shall be true and correct throughout the Initial Term (and any renewal or extension thereof):

(1) CCWD is duly formed, validly existing and in good standing under the laws of the State of California and has full power and authority to conduct its business as presently conducted and to enter into and carry out the transactions contemplated herein and in the Contract.

(2) The individuals executing this Contract on behalf of CCWD have the legal power, right and authority to enter into this Contract and the instruments referenced herein and to bind CCWD to the terms and conditions herein.

(3) All requisite action (corporate and otherwise) has been taken by CCWD in connection with the entering into of this Contract and the consummation of the transactions contemplated hereby. CCWD has obtained all necessary third-party and government consents (including all certificates, permits and approvals) required in connection with executing this Contract and making available the Reserved Water Supply pursuant to the express terms hereof.

(4) The execution, delivery and performance of this Contract: (i) will not violate any provision of law; (ii) will not conflict with or result in any breach of any of the terms, conditions or provisions of, or constitute (with or without notice or lapse of time, or both) a default under or a violation of, (A) CCWD's charter or other governing documents, (B) any indenture, loan or credit agreement, note agreement, deed of trust, mortgage, security agreement or other agreement, lease or other instrument, commitment or arrangement to which CCWD is a party or by which any of its properties, assets or rights are bound or affected, (C) any

decree, judgment, order, statute, rule or regulation applicable to CCWD, including, but not limited to, governmental pronouncements and requirements dealing with or regulating the quality of water delivered and the location of any facilities or other assets of CCWD; and (iii) will not result in the imposition of any lien or other encumbrance on any property, asset or right held by CCWD or any environmental laws, rules or regulations. CCWD is not in violation of, or (with or without notice or lapse of time or both) in default under, any term or provision of any indenture, loan or credit agreement, note agreement, deed of trust, or arrangement to which CCWD is not a party or by which any of the properties, assets or rights are bound or affected that would have a material adverse effect upon the transaction contemplated in this Contract.

(5) CCWD is the owner of and has good and marketable title to the Reserved Water Supply free and clear of all debts, liens, claims, mortgages, encumbrances, and any other contractual or legal restrictions. No mortgage, trust deed, financing statement or other instrument similar in effect filed or permitted to be filed by CCWD covering the Reserved Water Supply with respect thereto shall be on file in any recording office except as such may be filed in favor of SMWD or its assignees in accordance with this Contract.

(6) CCWD has not sold, transferred, assigned, licensed or subjected to any lien or other encumbrance, the Reserved Water Supply or any interest therein.

(7) No litigation, including any arbitration, audit, investigation or other proceeding of or before any court, arbitrator or governmental or regulatory authority, is pending (or, to the best knowledge of CCWD, is threatened), involving the Reserved Water Supply, and CCWD is not aware of any likely basis for any such litigation, arbitration, audit, investigation or proceeding. With the exception of the Chino Basin Judgment, CCWD is not a party to or subject to the provision of any judgment, order, writ, injunction, decree or award of any court, arbitrator or governmental or regulatory official, body or authority relative to the Reserved Water Supply.

(8) No statement by CCWD contained in this Contract and no written statement furnished by CCWD or any officer, employee, director, counsel or other agent of CCWD to SMWD or any officer, director, employee, counsel or other agent of SMWD pursuant to or in connection with this Contract contains or will contain any untrue statement of a material fact, or omits or will omit to state a material fact necessary in order to make the statements therein contained not misleading. There is no fact that adversely affects, or in the future might reasonably be expected to adversely affect the condition (financial or otherwise), operations (present or prospective), business (present or prospective), properties, assets or liabilities of CCWD relating to the Reserved Water Supply in any material respect that is not set forth in this Contract.

(9) CCWD shall maintain adequate facilities, personnel and resources, including maintenance, service and support personnel, to meet its obligations under this Contract.

b. SMWD. In addition to any express agreements of SMWD contained herein, and in order to induce CCWD to enter into this Contract and to perform its obligations hereunder, the following constitute representations, warranties and covenants of

SMWD that are true and correct as of the Effective Date and shall be true and correct throughout the Initial Term (and any renewal or extension thereof):

(1) SMWD is duly formed, validly existing and in good standing under the laws of the State of California and has full power and authority to conduct its business as presently conducted and to enter into and carry out the transactions contemplated herein and in the Contract.

(2) The individuals executing this Contract on behalf of SMWD have the legal power, right and authority to enter into this Contract and the instruments referenced herein and to bind SMWD to the terms and conditions herein.

(3) All requisite action (corporate and otherwise) has been taken by SMWD in connection with the entering into of this Contract and the consummation of the transactions contemplated hereby.

10. Default and Remedies. In the event that either party is in material default of this Contract, the non-defaulting party shall provide written notice to the defaulting party, identifying with reasonable specificity the nature of the claimed default. If the defaulting party has not cured the event(s) of material default which is (are) identified in the notice required by the previous sentence of this Section 10 within ten (10) business days of receipt of such written notice, then the non-defaulting party shall be entitled to any and all remedies which may be available to it at law or in equity. Furthermore, in the event of a material breach by CCWD wherein CCWD fails or otherwise refuses to deliver the Reserved Water Supply in accordance with the provisions hereof, SMWD shall be entitled to the remedy of specific performance against CCWD. Specifically, CCWD shall be obligated to perform its obligations hereunder and to provide to SMWD (from any and all sources, and irrespective of cost, provider or other terms) the Reserved Water Supply, for a period of not less than 25 years, in exchange for the consideration specified in Section 6, above.

11. Authorized Assignment by SMWD. If, in the exclusive judgment of SMWD, it shall become necessary for SMWD to assign this Contract to the Third Party Beneficiaries (as identified in Section 14(e), below) or a mutual water company (or other entity) designated by the Third Party Beneficiaries (collectively, an "Assignee") in order to accomplish the delivery of any Exchange Water or to otherwise obtain or preserve the benefits accruing to SMWD hereunder, SMWD shall have the unconditional right to assign this Contract (or any portion hereof) to an Assignee. Upon any such assignment, the Assignee shall assume all of the rights set forth in this Contract and shall be bound according to the terms and conditions hereof.

12. Division of Risk.

a. Indemnity. Each party ("**Indemnitor**") agrees to fully indemnify the other ("**Indemnitee**"), and to hold Indemnitee, its officers, directors, employees, agents, successors and assigns, completely free and harmless from and against any and all liabilities, claims, demands, litigation, or any other claims of whatever kind or nature resulting from pertaining to, or occasioned by (i) Indemnitor's breach of this Contract and (ii) the actual or alleged negligence or willful misconduct of the Indemnitor and/or its agents in performing or

attempting to perform any of Indemnitor's obligations under this Contract. The parties' respective obligations hereunder shall survive the expiration or earlier termination of this Contract. Furthermore, the parties shall provide each other with prompt notice of any such claim(s) as provided for in subpart (f) of this Section 12.

b. Third Party Claims. CCWD will indemnify, defend and hold SMWD harmless from and against any and all liabilities and losses in connection with any claim(s) brought by or on behalf of a third party, arising out of or in any way relating to the water to be reserved or supplied by CCWD to SMWD under this Contract. This duty shall include, but not be limited to, liability or losses because the water deviated from exportability or reliability specifications as set forth herein. CCWD's obligation hereunder shall survive the expiration or earlier termination of this Contract. CCWD shall provide SMWD with prompt notice of any third party claims as provided for in subpart (f) of this Section 12.

c. Condemnation by Third Party. CCWD shall oppose any attempt by a third party to condemn all or any part of the Reserved Water Supply. If the whole of the Reserved Water Supply or so much thereof as to render the balance unusable for Exchange pursuant to Section 5 shall be taken under power of eminent domain, or is sold, transferred or conveyed in lieu thereof, this Contract shall automatically terminate as of the date of such condemnation, or as of the date possession is taken by the condemning authority, at SMWD's option. In the event of total or partial condemnation, though the award shall be paid to CCWD, SMWD shall be entitled to claim and receive from CCWD, in SMWD's sole and absolute discretion, and CCWD hereby assigns to SMWD, from such award: (i) a sum attributable to the then fair market value of the volume of Reserved Water Supply condemned; or (b) a sum equal to the value of the volume of Reserved Water Supply identified and set aside under this Agreement as of the date of condemnation. The parties expect that the total award will fully compensate both parties for their respective losses, and they agree to cooperate in all ways practicable to maximize the total award. If, however, the total award shall not be adequate to compensate both parties fully for their respective losses, then CCWD shall bear the burden of the inadequacy of the award and the award shall be apportioned in a manner that fully compensates SMWD for SMWD's loss. CCWD shall provide SMWD with prompt notice of any third party condemnation attempt as provided for in subpart (f) of this Section 12.

d. Condemnation by CCWD. CCWD shall not use its powers of condemnation or eminent domain to take all or any part of the Reserved Water Supply from SMWD.

e. Force Majeure. CCWD's obligation to deliver water at the Delivery Location shall be temporarily suspended in the event of a disruption of delivery to the Delivery Location resulting from an unexpected event (e.g., earthquake or other natural disaster), other acts of God, or war. During such suspension, SMWD's payment obligations hereunder shall be discharged and waived. CCWD shall use reasonable best efforts to find a deliverable replacement supply and/or implement a cure to the disruption event. Hydrologic conditions (including drought) and/or unexpected events that disrupt CCWD's recharge and/or extraction facilities in the Chino Basin are expressly excluded as force majeure events and shall not entitle CCWD to disrupt or otherwise suspend deliveries to the Delivery Location. CCWD shall

provide SMWD with prompt notice of any force majeure event as provided for in subpart (f) of this Section 12.

f. Notice of Claims. The parties shall promptly notify each other within ten (10) days of becoming aware of: (i) any claims or suits brought against CCWD or SMWD for which they seek indemnification from the other party; (ii) any third-party claims; (iii) any condemnation attempt by a third-party; and (iv) any force majeure event. Any such notice shall conform to the requirements specified in Section 13.

13. Notices. All notices, requests and demands hereunder must be in writing to be effective. All notices required to be given hereunder or by operation of law in connection with the performance or enforcement hereof shall be deemed given upon delivery if delivered personally (which includes notices delivered by messenger, telecopy/facsimile or overnight courier) or, if delivered by mail, shall be deemed given after being deposited by certified mail in any duly authorized United States mail depository, postage prepaid. All such notices shall be addressed as follows or to such other address or addresses as the parties may from time to time specify in writing:

If to CCWD:
Cucamonga County Water District
10440 Ashford Street
Rancho Cucamonga, CA 91730-3057
Attn: Robert A. DeLoach, General Manager/CEO
Fax No.: (909) 476-8032

If to SMWD:
Santa Margarita Water District
26111 Antonio Parkway
Rancho Santa Margarita, CA 92688-1993
Attn: John J. Schatz, General Manager
Fax No.: (949) 459-6463

If to RMV:
Rancho Mission Viejo, LLC
P.O. Box 9
San Juan Capistrano, CA 92693
Attn: Vice President of Planning and Entitlement
Fax No.: (949) 248-1763

14. Miscellaneous.

a. Successors and Assigns. This Contract and the rights and obligations of the parties hereunder shall inure to the benefit of, and be binding upon, the parties' respective successors, permitted assigns and legal representatives.

b. Governing Law. This Contract shall be governed by and construed under the laws of the State of California, as such laws apply to agreements among California residents made and to be performed entirely within the State of California, without giving effect to the choice of law or conflict of law provisions (whether of the State of California or any other jurisdiction) that would cause the application of the laws of any other jurisdiction other than the State of California.

c. Entire Agreement. This writing constitutes the entire agreement among the parties, and no modification of this Contract shall be valid unless executed in writing by the parties hereto. Further, none of the parties to this Contract shall be bound by any representations, warranties, promises, statements, or information unless expressly set forth herein.

d. Change of Control. This Contract shall survive and SMWD shall continue to have the right to call upon and purchase/receive the Reserved Water Supply (or any portion thereof), as set forth herein, upon any change in ownership or control of CCWD.

e. Third-Party Beneficiaries. SMWD and CCWD specifically acknowledge and agree that Rancho Mission Viejo, LLC, and its parent, subsidiary and affiliated entities (collectively, "RMV") are the direct, intended and sole third party creditor beneficiaries of this Contract and the rights and privileges afforded to SMWD hereunder ("Third Party Beneficiaries"). Absent the prior written consent and approval of RMV, any amendment, change or other modification to this Agreement shall be deemed void and unenforceable vis-à-vis the rights, privileges and entitlements accruing to RMV hereunder.

f. No Waiver. The failure of any party to enforce against the other a provision of this Contract shall not constitute a waiver of that party's right to enforce such a provision at a later time.

g. Captions. The captions of the various Sections in this Contract are for convenience and organization only, and are not intended to be any part of the body of this Contract, nor are they intended to be referred to in construing the provisions of this Contract.

h. Counterparts. This Contract may be executed in one or more counterparts, and all the counterparts shall constitute but one and the same agreement, notwithstanding that all parties hereto are not signatories to the same or original counterpart.

i. Attorneys' Fees. In the event of litigation involving this Contract, the prevailing party in any such action or proceeding shall be entitled to recover its costs and expenses incurred in such action from the other party including, without limitation, the cost of reasonable attorneys' fees.

j. Brokerage Fees. The parties expressly acknowledge that Optimal Water, Inc. has performed certain services in relation to the negotiation, execution and delivery of this Contract. However, Optimal Water, Inc. is not owed any compensation or remuneration from either SMWD or CCWD in connection with the services thus provided. Furthermore, CCWD warrants that it has not dealt with any other broker in connection with this transaction, and SMWD warrants that it has not dealt with any other broker in connection with this transaction. If any person or entity shall assert a claim to a finder's fee, brokerage commission or other compensation on account of alleged employment as a finder or broker or performance of services as a finder or broker in connection with this transaction, the party under whom the finder or broker is claiming shall indemnify and hold the other party harmless for, from and against any such claim and all costs, expenses and liabilities incurred in connection with such claim or any action or proceeding brought on such claim, including, but not limited to, counsel

and witness fees and court costs in defending against such claim. This indemnity shall survive the expiration or earlier termination of this Contract.

k. Public Announcement. All press releases and public announcements, if any, relating to this Contract and the transaction contemplated hereby shall be agreed to and prepared jointly by the parties.

l. Time. Time is of the essence with respect to this Agreement and the rights, obligations, conditions and entitlements set forth herein.

IN WITNESS WHEREOF, the parties have entered into this Contract as of the Effective Date hereof.

"CCWD"

CUCAMONGA COUNTY WATER DISTRICT

By: _____

Its: _____

"SMWD"

SANTA MARGARITA WATER DISTRICT

By: _____

Its: _____

APPENDIX G

AGREEMENT NO 04/902/00

WATER SALE AND PURCHASE AGREEMENT BY AND BETWEEN SOUTHERN CALIFORNIA WATER COMPANY AND SANTA MARGARITA WATER DISTRICT

WATER SALE AND PURCHASE AGREEMENT

This Water Sale and Purchase Agreement ("Agreement"), entered into as of the latest date shown opposite the signatures of the Parties to this Agreement (the "Effective Date"), is made by and between Southern California Water Company ("SCWC"), a Corporation, and Santa Margarita Water District (the "District"), a California Water District, (SCWC and the District sometimes hereinafter are referred to collectively as the "Parties" and individually as a "Party"), with respect to the following.

RECITALS

A. The District is located in South Orange County and is virtually completely dependent on The Metropolitan Water District of Southern California ("MWD") through MWD's member agency, Municipal Water District of Orange County ("MWDOC"), for importing potable water supplies to serve customers and lands within the District.

B. The District desires to diversify its potable water supply for purposes of ensuring sufficient water is available during dry-years to augment imported water provided by MWD/MWDOC as may be necessary or advisable with respect to the recent enactment of land use/water supply legislation requiring, among other things, sufficient water supplies in connection with the approval of new development.

C. The District desires to purchase groundwater in storage owned by SCWC located in the Chino Groundwater Basin (the "Chino Basin"), to which SCWC is an Appropriator and the holder of certain rights pursuant to the Judgment in Chino Basin Municipal Water District v. City of Chino, et al.

D. SCWC owns non-native water in storage in the Chino Basin which it has the right to sell to the District for use within the District's service area.

OPERATIVE PROVISIONS

1. **Sale and Purchase**. Subject to the terms hereof, SCWC shall sell, without covenant or warranty except as expressly stated herein, two-thousand (2,000) acre feet of non-native water, and the District shall purchase and accept delivery of such water.

2. **Price and Payment**. On the Effective Date of this Agreement, the District shall pay to SCWC the amount of $220/acre foot, or a total of $440,000, via wire transfer or other suitable means as may be agreed upon by the Parties.

3. **Delivery**. Upon payment as provided in Section 2, herein, the District shall take ownership of, together with all the rights and responsibilities appertaining thereto, and thereafter

may take delivery at any time determined by the District of all or a portion of the 2,000 acre feet of water. Delivery and all associated costs shall be the complete and sole responsibility of the District. It is understood by the Parties, however, that, upon mutual agreement of the Parties and on a case-by-case basis, delivery or deliveries may be accomplished by SCWC producing the water in storage which is the subject of this Agreement in-lieu of receiving, directly or indirectly, water from another source either within or outside of the Chino Basin, with the District paying the actual cost of producing such water at the time of production along with any and all other costs, including, without limitation, transportation/access charges which may be imposed by MWD, MWDOC and/or any other entities/agencies in connection with the delivery of such water. In this case, actual cost of producing such water shall be limited to the cost of energy required to produce the water for delivery to SCWC's water distribution system and any related costs of treating such water.

4. **MWD Cooperation**. The delivery of water to the District pursuant to this Agreement contemplates the use of MWD's water system. The Parties shall cooperate and exercise best-efforts, without offset or reimbursement of internal administrative costs, with respect to developing agreements, understandings or other means with MWD and/or other necessary entities or persons as required in order to enable the delivery of water to the District. The District shall be responsible for any and all out-of-pocket costs of the Parties associated with obtaining such agreements.

5. The Parties shall conform with any Chino Basin Watermaster requirements, which may include but is not necessarily limited to: filing forms, making notices or any other Chino Basin Watermaster procedures in connection with this Agreement.

6. **Right of Reimbursement**. In the event SCWC is barred from selling the water subject to this Agreement to the District for reasons limited to a meritorious challenge(s) by suit of SCWC's i) ownership of and/or ii) right to sell the water for purposes of this Agreement, the District shall be entitled to full reimbursement of the payment provided for in Section 2 herein one (1) year from the date of service of such suit; provided, however, that such suit must be served upon SCWC within one (1) year of the Effective Date of this Agreement.

7. **Representations and Warranties of District**. The District makes the following representations, warranties and covenants to SCWC, as of the date this Agreement is fully executed:

A. **Organization**. The District is a California Water District organized and operating under the provisions of Division 13 of the California Water Code.

B. **Power and Authority to Execute and Perform this Agreement**. The District has the right, power and authority to enter into this Agreement and to perform its obligations hereunder, and the person(s) executing this Agreement on behalf of District has (have) the right, power and authority to do so.

C. **Enforceability**. This Agreement constitutes the legal, valid and binding obligation of the District enforceable against the District in accordance with its terms.

D. **No Litigation**. There is no suit, action or arbitration or legal, administrative or other proceeding, formal or informal, pending or threatened, which adversely affects District's ability to purchase water from SCWC and accept delivery thereof, or to make full payment thereof, or to make full payment therefore, all as contemplated by this Agreement.

E. **No Conflict**. The execution and performance of this Agreement by the District does not breach or constitute a default by the District under any law, regulation, ruling, court order, agreement, indenture, or undertaking or other instrument to which District is a party or by which District is a party or by which District or any of its property may be bound or affected.

8. **Representations and Warranties of SCWC**. SCWC makes the following representations, warranties and covenants to the District, as of the date this Agreement is fully executed.

A. **Organization**. SCWC is a corporation duly organized, validly existing and in good standing under the laws of the State of California, and is qualified to do and is doing business in the State of California.

B. **Power and Authority to Execute and Perform this Agreement**. SCWC has the right, power and authority under this Agreement to perform its obligations hereunder, and the person(s) executing this Agreement on behalf of SCWC has (have) the right, power and authority to do so.

C. **Enforceability**. This Agreement constitutes a legal, valid and binding obligation of SCWC, enforceable against SCWC in accordance with its terms.

D. **No Litigation**. There is no suit, action or arbitration or legal, administrative or other proceeding, formal or informal, pending or threatened, which adversely affects the ability of SCWC to sell and deliver water to the District as contemplated by this Agreement.

E. **Ownership**. SCWC is the owner of the water that is the subject of this Agreement and has the right to sell the water for delivery to the District as provided for herein.

9. **Litigation and Attorneys' Fees**. In the event of litigation arising out of or related to this Agreement by one Party against the other Party, the prevailing Party shall be entitled to an award of reasonable attorneys' fees incurred in connection therewith. In the event either or both Parties are sued or otherwise challenged in connection with this Agreement, each shall pay its own attorneys' fees and costs, except in the case of a meritorious suit challenging SCWC's i) ownership of and/or ii) right to sell the water for purposes of this Agreement, served pursuant to

the provisions of Section 6 herein, in which event SCWC shall also pay any reasonable actual attorneys' fees incurred by the District in defending such suit or challenge and hold harmless and indemnify the District from any other reasonable costs which may be incurred in connection therewith.

10. **Indemnification**. Except as specifically provided elsewhere in this Agreement, SCWC agrees to indemnify, defend and hold harmless the District, its directors, officers, agents and employees, and the District agrees to indemnify, defend and hold harmless SCWC, its directors, officers, agents and employees, from and against any and all claims, losses, expenses, litigation, liability, damages, recoveries and deficiencies of any nature whatsoever that the District or SCWC may incur or suffer that arises out of, results from or relates to SCWC's or the District's breach of any term, provision, covenant, condition, representation or warranty contained in this Agreement.

11. **Amendment**. This Agreement may be amended only in writing signed by duly authorized representatives of the Parties hereto.

12. **Entire Agreement**. This Agreement constitutes the entire agreement between the Parties concerning the subject matter of this Agreement and, upon its effectiveness, supersedes any prior representations, agreements and understandings in connection herewith.

13. **Notices**. All notices, demands and other communications under this Agreement shall be in writing and be deemed to have been duly given on the date of service if served personally on the party to whom notice is to be given, or on the second day after mailing, if mailed to the Party to whom notice is given, by first-class mail, registered or certified, return receipt requested, postage prepaid and properly address as follows:

SCWC: James B. Gallagher, Vice President
Customer Service, Region III
Southern California Water Company
2143 Convention Center Way, Suite 110
Ontario, CA 91764

District: John J. Schatz, General Manager
Santa Margarita Water District
26111 Antonio Parkway, Suite A
Las Flores, CA 92688

Any party may change their address for purposes of this section by giving the other Party written notice of their new address in the manner set forth above.

14. **Severability**. If any term, provision, covenant or condition of this Agreement shall become illegal, null, void or against public policy, or is determined by a court of competent

jurisdiction to be invalid, void, or unenforceable, the provision shall be deemed to be severable from the remainder of this Agreement, and the remainder of the provisions hereof shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby. The term, provision, covenant or condition that is so invalidated, voided or held to be unenforceable, shall be modified or changed by the Parties to the extent possible to carry out the intentions and directives contained in this Agreement.

15. **Applicable Law.** This Agreement shall be governed by, and construed in accordance with, the laws of the State of California.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the latest date shown opposite the signatures below.

SOUTHERN CALIF

APPENDIX H

SANTA MARGARITA WATER DISTRICT WATER PROJECTIONS NORMAL, SINGLE DRY AND MULTIPLE DRY YEARS

Appendix H
Santa Margarita Water District Water Projections
Normal, Single Dry and Multiple Dry Years

Year		2005			
	Normal	Single Dry Year 1961	Multiple Dry Year 1959	Multiple Dry Year 1960	Multiple Dry Year 1961
Percentage Increase in Demand		105.5%	106.7%	103.7%	105.5%
Water Demands					
Domestic Water Demands	28,613	30,407	30,530	29,672	30,187
Recycled/Non-Potable Demands	5,430	5,729	5,794	5,631	5,729
Total Water Demand	34,043	36,135	36,324	35,303	35,915
Imported Domestic Supplies					
Existing Development	28,497	30,284	30,643	29,746	30,284
Approved New Development	-	-	-	-	-
The Ranch Plan Development	-	-	-	-	-
Imported Domestic Water Subtotal	28,497	30,284	30,643	29,746	30,284
Local Domestic Water					
Nichols Institute (Contract Operations)	116	122	124	120	122
Total Domestic Water Supplies	28,613	30,407	30,767	29,866	30,407
Recycled/Non-Potable Supplies					
Nichols Institute (Contract Operations)	40	42	43	41	42
Oso Creek WRP Demand	1,495	1,577	1,595	1,550	1,577
IRWD Los Alisos WRP	100	106	107	104	106
Existing Chiquita WRP Demand	2,377	2,508	2,536	2,465	2,508
Approved New Development	-	-	-	-	-
The Ranch Plan Development	-	-	-	-	-
Recycled Subtotal	4,012	4,233	4,281	4,160	4,233
Oso Creek Barrier Demand	1,418	1,276	1,276	1,276	1,276
Dove Canyon Urban Run-off	-	-	-	-	-
Gobernadora Multipurpose Basin	-	-	-	-	-
Horno Creek Basin	-	-	-	-	-
Urban Return Flow Projects Subtotal	1,418	1,276	1,276	1,276	1,276
Total Local Water Supplies	5,546	5,631	5,681	5,557	5,631
Total Imported Supplies	28,497	30,284	30,643	29,746	30,284
Total Water Supplies	34,043	35,915	36,324	35,303	35,915
Percentage increase in imported water		106.3%	107.5%	104.4%	106.3%
Percentage increase in local water		101.5%	102.4%	100.2%	101.5%

Appendix H
Santa Margarita Water District Water Projections
Normal, Single Dry and Multiple Dry Years

Year		2010			
	Normal	Single Dry Year 1961	Multiple Dry Year 1959	Multiple Dry Year 1960	Multiple Dry Year 1961
Percentage Increase in Demand		105.5%	106.7%	103.7%	105.5%
Water Demands					
Domestic Water Demands	27,664	29,186	29,517	28,688	29,186
Recycled/Non-Potable Demands	8,641	9,116	9,220	8,961	9,116
Total Water Demand	36,305	38,302	38,737	37,648	38,302
Imported Domestic Supplies					
Existing Development	26,409	28,255	28,603	27,734	28,255
Approved New Development	352	371	376	365	371
The Ranch Plan Development	787	830	840	816	830
Imported Domestic Water Subtotal	27,548	29,457	29,818	28,915	29,457
Local Domestic Water					
Nichols Institute (Contract Operations)	116	122	124	120	122
Total Domestic Water Supplies	27,664	29,579	29,942	29,036	29,579
Recycled/Non-Potable Supplies					
Nichols Institute (Contract Operations)	40	42	43	41	42
Oso Creek WRP Demand	2,240	2,363	2,390	2,323	2,363
IRWD Los Alisos WRP	321	339	343	333	339
Existing Chiquita WRP Demand	2,377	2,508	2,536	2,465	2,508
Approved New Development	338	357	361	351	357
The Ranch Plan Development	785	828	838	814	828
Recycled Subtotal	6,101	6,437	6,510	6,327	6,437
Oso Creek Barrier Demand	1,500	1,350	1,350	1,350	1,350
Dove Canyon Urban Run-off	100	90	90	90	90
Gobernadora Multipurpose Basin	725	653	653	653	653
Horno Creek Basin	215	194	194	194	194
Urban Return Flow Projects Subtotal	2,540	2,286	2,286	2,286	2,286
Total Local Water Supplies	8,757	8,845	8,920	8,733	8,845
Total Imported Supplies	27,548	29,457	29,818	28,915	29,457
Total Water Supplies	36,305	38,302	38,737	37,648	38,302
Percentage increase in imported water		106.9%	108.2%	105.0%	106.9%
Percentage increase in local water		101.0%	101.9%	99.7%	101.0%

Appendix H
Santa Margarita Water District Water Projections
Normal, Single Dry and Multiple Dry Years

Year		2015			
	Normal	Single Dry Year 1961	Multiple Dry Year 1959	Multiple Dry Year 1960	Multiple Dry Year 1961
Percentage Increase in Demand		105.5%	106.7%	103.7%	105.5%
Water Demands					
Domestic Water Demands	29,590	31,217	31,573	30,685	31,217
Recycled/Non-Potable Demands	10,571	11,152	11,279	10,962	11,152
Total Water Demand	40,161	42,370	42,852	41,647	42,370
Imported Domestic Supplies					
Existing Development	26,409	28,255	28,603	27,734	28,255
Approved New Development	352	371	376	365	371
The Ranch Plan Development	2,713	2,862	2,895	2,813	2,862
Imported Domestic Water Subtotal	29,474	31,489	31,873	30,913	31,489
Local Domestic Water					
Nichols Institute (Contract Operations)	116	122	124	120	122
Total Domestic Water Supplies	29,590	31,611	31,997	31,033	31,611
Recycled/Non-Potable Supplies					
Nichols Institute (Contract Operations)	40	42	43	41	42
Oso Creek WRP Demand	2,240	2,363	2,390	2,323	2,363
IRWD Los Alisos WRP	321	339	343	333	339
Existing Chiquita WRP Demand	2,377	2,508	2,536	2,465	2,508
Approved New Development	338	357	361	351	357
The Ranch Plan Development	2,715	2,864	2,897	2,815	2,864
Recycled Subtotal	8,031	8,473	8,569	8,328	8,473
Oso Creek Barrier Demand	1,500	1,350	1,350	1,350	1,350
Dove Canyon Urban Run-off	100	90	90	90	90
Gobernadora Multipurpose Basin	725	653	653	653	653
Horno Creek Basin	215	194	194	194	194
Urban Return Flow Projects Subtotal	2,540	2,286	2,286	2,286	2,286
Total Local Water Supplies	10,687	10,881	10,979	10,734	10,881
Total Imported Supplies	29,474	31,489	31,873	30,913	31,489
Total Water Supplies	40,161	42,370	42,852	41,647	42,370
Percentage increase in imported water		106.8%	108.1%	104.9%	106.8%
Percentage increase in local water		101.8%	102.7%	100.4%	101.8%

Appendix H
Santa Margarita Water District Water Projections
Normal, Single Dry and Multiple Dry Years

Year	2020				
	Normal	Single Dry Year 1961	Multiple Dry Year 1959	Multiple Dry Year 1960	Multiple Dry Year 1961
Percentage Increase in Demand		105.5%	106.7%	103.7%	105.5%
Water Demands					
Domestic Water Demands	31,442	33,171	33,549	32,605	33,171
Recycled/Non-Potable Demands	12,370	13,050	13,199	12,828	13,050
Total Water Demand	43,812	46,222	46,747	45,433	46,222
Imported Domestic Supplies					
Existing Development	26,409	28,255	28,603	27,734	28,255
Approved New Development	352	371	376	365	371
The Ranch Plan Development	4,565	4,816	4,871	4,734	4,816
Imported Domestic Water Subtotal	31,326	33,443	33,849	32,833	33,443
Local Domestic Water					
Nichols Institute (Contract Operations)	116	122	124	120	122
Total Domestic Water Supplies	31,442	33,565	33,973	32,953	33,565
Recycled/Non-Potable Supplies					
Nichols Institute (Contract Operations)	40	42	43	41	42
Oso Creek WRP Demand	2,240	2,363	2,390	2,323	2,363
IRWD Los Alisos WRP	321	339	343	333	339
Existing Chiquita WRP Demand	2,377	2,508	2,536	2,465	2,508
Approved New Development	338	357	361	351	357
The Ranch Plan Development	4,514	4,762	4,816	4,681	4,762
Recycled Subtotal	9,830	10,371	10,489	10,194	10,371
Oso Creek Barrier Demand	1,500	1,350	1,350	1,350	1,350
Dove Canyon Urban Run-off	100	90	90	90	90
Gobernadora Multipurpose Basin	725	653	653	653	653
Horno Creek Basin	215	194	194	194	194
Urban Return Flow Projects Subtotal	2,540	2,286	2,286	2,286	2,286
Total Local Water Supplies	12,486	12,779	12,898	12,600	12,779
Total Imported Supplies	31,326	33,443	33,849	32,833	33,443
Total Water Supplies	43,812	46,222	46,747	45,433	46,222
Percentage increase in imported water		106.8%	108.1%	104.8%	106.8%
Percentage increase in local water		102.3%	103.3%	100.9%	102.3%

Appendix H
Santa Margarita Water District Water Projections
Normal, Single Dry and Multiple Dry Years

Year	2025				
	Normal	Single Dry Year 1961	Multiple Dry Year 1959	Multiple Dry Year 1960	Multiple Dry Year 1961
Percentage Increase in Demand		105.5%	106.7%	103.7%	105.5%
Water Demands					
Domestic Water Demands	33,234	35,062	35,461	34,464	35,062
Recycled/Non-Potable Demands	14,523	15,322	15,496	15,060	15,322
Total Water Demand	47,757	50,384	50,957	49,524	50,384
Imported Domestic Supplies					
Existing Development	26,409	28,255	28,603	27,734	28,255
Approved New Development	352	371	376	365	371
The Ranch Plan Development	6,357	6,707	6,783	6,592	6,707
Imported Domestic Water Subtotal	33,118	35,333	35,761	34,691	35,333
Local Domestic Water					
Nichols Institute (Contract Operations)	116	122	124	120	122
Total Domestic Water Supplies	33,234	35,456	35,885	34,812	35,456
Recycled/Non-Potable Supplies					
Nichols Institute (Contract Operations)	40	42	43	41	42
Oso Creek WRP Demand	2,240	2,363	2,390	2,323	2,363
IRWD Los Alisos WRP	321	339	343	333	339
Existing Chiquita WRP Demand	2,377	2,508	2,536	2,465	2,508
Approved New Development	338	357	361	351	357
The Ranch Plan Development	6,667	7,034	7,114	6,914	7,034
Recycled Subtotal	11,983	12,642	12,786	12,426	12,642
Oso Creek Barrier Demand	1,500	1,350	1,350	1,350	1,350
Dove Canyon Urban Run-off	100	90	90	90	90
Gobernadora Multipurpose Basin	725	653	653	653	653
Horno Creek Basin	215	194	194	194	194
Urban Return Flow Projects Subtotal	2,540	2,286	2,286	2,286	2,286
Total Local Water Supplies	14,639	15,050	15,196	14,833	15,050
Total Imported Supplies	33,118	35,333	35,761	34,691	35,333
Total Water Supplies	47,757	50,384	50,957	49,524	50,384
Percentage increase in imported water		106.7%	108.0%	104.8%	106.7%
Percentage increase in local water		102.8%	103.8%	101.3%	102.8%

Appendix H
Santa Margarita Water District Water Projections
Normal, Single Dry and Multiple Dry Years

Year		2030			
	Normal	Single Dry Year 1961	Multiple Dry Year 1959	Multiple Dry Year 1960	Multiple Dry Year 1961
Percentage Increase in Demand		105.5%	106.7%	103.7%	105.5%
Water Demands					
Domestic Water Demands	33,477	35,318	35,720	34,716	35,318
Recycled/Non-Potable Demands	14,523	15,322	15,496	15,060	15,322
Total Water Demand	48,000	50,640	51,216	49,776	50,640
Imported Domestic Supplies					
Existing Development	26,409	28,255	28,603	27,734	28,255
Approved New Development	352	371	376	365	371
The Ranch Plan Development	6,600	6,963	7,042	6,844	6,963
Imported Domestic Water Subtotal	33,361	35,590	36,020	34,943	35,590
Local Domestic Water					
Nichols Institute (Contract Operations)	116	122	124	120	122
Total Domestic Water Supplies	33,477	35,712	36,144	35,064	35,712
Recycled/Non-Potable Supplies					
Nichols Institute (Contract Operations)	40	42	43	41	42
Oso Creek WRP Demand	2,240	2,363	2,390	2,323	2,363
IRWD Los Alisos WRP	321	339	343	333	339
Existing Chiquita WRP Demand	2,377	2,508	2,536	2,465	2,508
Approved New Development	338	357	361	351	357
The Ranch Plan Development	6,667	7,034	7,114	6,914	7,034
Recycled Subtotal	11,983	12,642	12,786	12,426	12,642
Oso Creek Barrier Demand	1,500	1,350	1,350	1,350	1,350
Dove Canyon Urban Run-off	100	90	90	90	90
Gobernadora Multipurpose Basin	725	653	653	653	653
Horno Creek Basin	215	194	194	194	194
Urban Return Flow Projects Subtotal	2,540	2,286	2,286	2,286	2,286
Total Local Water Supplies	14,639	15,050	15,196	14,833	15,050
Total Imported Supplies	33,361	35,590	36,020	34,943	35,590
Total Water Supplies	48,000	50,640	51,216	49,776	50,640
Percentage increase in imported water		106.7%	108.0%	104.7%	106.7%
Percentage increase in local water		102.8%	103.8%	101.3%	102.8%

APPENDIX I

SANTA MARGARITA WATER DISTRICT RATE TABLES

SANTA MARGARITA WATER DISTRICT
RATE TABLES

FISCAL YEAR 2003-04

RATES ESTABLISHED JULY 1, 2000

WATER

CHART A — WATER BASE CHARGES

METER SIZE	MONTHLY SERVICE CHARGE
3/4"	$ 5.74
1"	$ 7.77
1 1/2"	$ 12.84
2"	$ 18.93
2 1/2"	$ 27.05
3"	$ 35.16
4"	$ 53.42
6"	$ 104.14
8"	$ 165.00
10"	$ 246.15

POWER SURCHARGE *
ZONE 1 = $.00
ZONE 2 = $.00
ZONE 3 = $.10
ZONE 4 = $.20
ZONE 5 = $.25

*POWER SURCHARGE IS PER CCF

USER	USER DEFINITION	BASE CHARGE	TIER RANGE	CCF RATE
R	LIFELINE	BY METER SIZE - REFER TO CHART A	0 - 6	$ 1.38
	RESIDENTIAL SINGLE FAMILY		7 - 35	$ 1.56
			36 - 70	$ 2.05
			70+	$ 2.46
RS	LIFELINE	$5.74 **	0 - 6	$ 1.38
	RESIDENTIAL MULTI-FAMILY SINGLE METER		7 - 12	$ 1.56
			13 - 24	$ 2.05
			25+	$ 2.46
RC	LIFELINE	BY METER SIZE - REFER TO CHART A	0 - 6	$ 1.38
	RESIDENTIAL MULTI-FAMILY COMMON METER		7 - 12	$ 1.56
			13 - 24	$ 2.05
			25+	$ 2.46

** REGARDLESS OF METER SIZE

*** MULTIPLIED BY THE NUMBER OF EDU'S

SEWER

CHART B — SEWER BASE CHARGES

METER SIZE	MONTHLY SERVICE CHARGE
3/4"	$ 8.25
1"	$ 13.26
1 1/2"	$ 25.69
2"	$ 40.66
2 1/2"	$ 60.64
3"	$ 82.13
4"	$ 125.54
6"	$ 250.24
8"	$ 399.95
10"	$ 599.58

BASE CHARGE	CCF RATE	CEILING FORMULA	MTR SIZE	MAXIMUM CHARGE
$8.25 **	$ 0.88	14 CCF + BASE CHARGE	N/A	$ 20.57
$8.25 **	$ 0.88	9 CCF + BASE CHARGE	N/A	$ 16.17
BY METER SIZE - REFER TO CHART B	$ 0.88	9 CCF X # OF EDU'S PLUS BASE CHARGE	N/A	REFER TO FORMULA

WATER

CHART A

WATER BASE CHARGES

METER SIZE	MONTHLY SERVICE CHARGE
3/4"	$ 5.74
1"	$ 7.77
1 1/2"	$ 12.84
2"	$ 18.93
2 1/2"	$ 27.05
3"	$ 35.16
4"	$ 53.42
6"	$ 104.14
8"	$ 165.00
10"	$ 246.15

POWER SURCHARGE *
ZONE 1 = $.00
ZONE 2 = $.00
ZONE 3 = $.10
ZONE 4 = $.20
ZONE 5 = $.25

* POWER SURCHARGE IS PER CCF

SEWER

CHART B

SEWER BASE CHARGE

METER SIZE	MONTHLY SERVICE CHARGE
3/4"	$ 8.25
1"	$ 13.26
1 1/2"	$ 25.69
2"	$ 40.66
2 1/2"	$ 60.64
3"	$ 82.13
4"	$ 125.54
6"	$ 250.24
8"	$ 399.95
10"	$ 599.58

USER	USER DEFINITION	BASE CHARGE	TIER RANGE	CCF RATE	BASE CHARGE	CCF RATE *	USAGE FORMULA	MTR SIZE	MINIMUM CHARGE
C1	COMMERCIAL GENERAL & INSTITUTIONAL	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	BY METER SIZE - REFER TO CHART B	$ 0.88	SEWER CCF IS = 90% OF WD CCF USAGE	NO LIMIT	$ 20.57
C2	COMMERCIAL MEDIUM - LOW STRENGTH	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	BY METER SIZE - REFER TO CHART B	$ 1.08	SEWER CCF IS = 90% OF WD CCF USAGE	NO LIMIT	$ 20.57
C3	COMMERCIAL MEDIUM-HIGH STRENGTH	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	BY METER SIZE - REFER TO CHART B	$ 1.45	SEWER CCF IS = 90% OF WD CCF USAGE	NO LIMIT	$ 20.57
C4	COMMERCIAL HIGH STRENGTH	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	BY METER SIZE - REFER TO CHART B	$ 2.59	SEWER CCF IS = 90% OF WD CCF USAGE	NO LIMIT	$ 20.57
USER	**USER DEFINITION**	**BASE CHARGE**	**TIER RANGE**	**CCF RATE**	**BASE CHARGE**	**CCF RATE ***	**USAGE FORMULA**	**MTR SIZE**	**MAXIMUM CHARGE**
CR	COMMERCIAL RECREATIONAL	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	BY METER SIZE - REFER TO CHART B	$ 0.88	14 CCFS X # OF EDU'S PLUS BASE CHARGE	N/A	REFER TO FORMULA
FS	FIRE SERVICE (RES. & COMM.)	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED				
CN *	CONSTRUCTION	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	ALL ACCOUNTS BILLED AT ZONE 5 POWER SURCHARGE			
N	NURSERY IRRIGATION DOMESTIC	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED				
N3 **	NURSERY IRRIGATION NON-DOMESTIC	BY METER SIZE - REFER TO CHART A	NONE	$ 1.60 EXPIRED 7/17/98	NO SEWER ATTACHED	NO POWER SURCHARGE			
N4 **	NURSERY IRRIGATION DOMESTIC	BY METER SIZE - REFER TO CHART A	NONE	$ 2.17 EXPIRED 7/17/98	$ 8.25	$ 0.88	14 CCF + BASE CHARGE	N/A	$ 20.57

** SPECIAL RATES EXCLUSIVELY FOR NORMAN'S NURSERY AT UPPER OSO - EXPIRED AS OF 7/17/98, SEE STANDARD IN & CR RATES

WATER

CHART A

WATER BASE CHARGES

METER SIZE	SERVICE CHARGE
3/4"	$ 5.74
1"	$ 7.77
1 1/2"	$ 12.84
2"	$ 18.93
2 1/2"	$ 27.05
3"	$ 35.16
4"	$ 53.42
6"	$ 104.14
8"	$ 165.00
10"	$ 246.15

POWER SURCHARGE *
ZONE 1 = $.00
ZONE 2 = $.00
ZONE 3 = $.10
ZONE 4 = $.20
ZONE 5 = $.25

* POWER SURCHARGE IS PER CCF

SEWER

CHART B

SEWER BASE CHARGE

METER SIZE	MONTHLY SERVICE CHARGE
3/4"	$ 8.25
1"	$ 13.26
1 1/2"	$ 25.69
2"	$ 40.66
2 1/2"	$ 60.64
3"	$ 82.13
4"	$ 125.54
6"	$ 250.24
8"	$ 399.95
10"	$ 599.58

USER	USER DEFINITION	BASE CHARGE	TIER RANGE	CCF RATE	BASE CHARGE	COMMODITY RATE
CY	LAKEFILL	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	
ID	IRRIGATION DOMESTIC	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	
IN	IRRIGATION NON-DOMESTIC	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	**NO POWER SURCHARGE**
IR	IRRIGATION RECLAIMED	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	**NO POWER SURCHARGE**
DF	DISTRICT FACILITY	NO CHARGE	NONE	NO CHARGE	NO CHARGE	
GB	GREENBELT DOMESTIC - NON-DOMESTIC	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	DOMESTIC - POWER SURCHARGE ELIGIBLE NON-DOMESTIC - NO POWER SURCHARGE
GR	GREENBELT - REBATE ELIGIBLE	BY METER SIZE - REFER TO CHART A	NONE	$ 1.74	NO SEWER ATTACHED	**NO POWER SURCHARGE**
GM	GREENBELT - NON-DOMESTIC	NO MINIMUM CHARGE	NONE	$ 1.74	NO SEWER ATTACHED	**NO POWER SURCHARGE**

ALL NONDOMESTIC SERVICES ARE POWER SURCHARGE EXEMPT

APPENDIX J

ORDINANCE NO. 0-91-4-01

ORDINANCE OF THE SANTA MARGARITA WATER DISTRICT

ORANGE COUNTY, CALIFORNIA

ADOPTING A COMPREHENSIVE WATER CONSERVATION PROGRAM

ORDINANCE NO. O-91-4-01

ORDINANCE OF THE SANTA MARGARITA WATER DISTRICT, ORANGE COUNTY, CALIFORNIA, ADOPTING A COMPREHENSIVE WATER CONSERVATION PROGRAM

BE IT ORDAINED BY THE Board of Directors of the Santa Margarita Water District (the "District") as follows:

SECTION 1. Declaration of Policy. California Water Code Sections 350 and 375 et seq. provide public water purveyers with the authority to adopt and enforce a water conservation program to (1) protect the health, safety and welfare of the customers of the District, (2) assume the maximum beneficial use of the water supplies of the District, and (3) ensure that there will be sufficient water supply to meet the basic needs of human consumption, sanitation and fire protection. The Board of Directors of the District ("Board") hereby establishes this District Comprehensive Water Conservation Program pursuant to California Water Code Sections 350 and 375 et seq., based upon the need to conserve water supplies and to avoid or minimize the effects of any future shortage.

SECTION 2. Findings. Based upon information submitted and testimony received at the public hearing held on April 15, 1991, this Board of Directors finds that a drought emergency and water shortage exists which requires the enactment of this Ordinance. The Metropolitan Water District of Southern California ("MET") together with the Municipal Water District of Orange County ("MWDOC") have established a water rationing program which will reduce the District's imported water supply and have further established financial charges for water retailers failing to meet specifically imposed water consumption requirements. This comprehensive water conservation program is established by the Board in response to the reduction in the District's allocation of water from MET and MWDOC. The Board recognizes that ongoing adjustments made by MET and MWDOC relating to the amount and cost of water supply to Southern California water retailers, including the District, will result in ongoing changes in the policies of all of the Southern California water agencies. Therefore, this Ordinance contains provisions for staged water conservation adjustments which may be necessary from time to time during the continuation of the drought in order to meet the needs and concerns of the District's residents and water users.

SECTION 3. Application. The provisions of this Ordinance shall apply to all persons, entities, customers, and properties served by the District (hereinafter collectively referred to as "customers").

SECTION 4. Authorization. The District's General Manager or his designated representative, is hereby authorized and directed to implement the provisions of this Ordinance.

SECTION 5. Conservation Based Tiered Rate Structure. On January 21, 1991, the Board adopted a conservation based tierred rate structure for District customers. On February 25, 1991, the Board adopted guidelines for exceptions to the specific consumption allotments pertaining to residential water customers. Exceptions can only be granted upon application by the residential water customer accompanied with some evidence to prove or substantiate the variance condition (i.e., medical necessity, number of persons in household, hardship, business use of residence). The rate structure includes three tiers, with specific consumption allotments and rates applicable to each tier. Tiered rates for District customers specifically reflect costs relating to user types and property locations. One such specific use is landscape irrigation. As soon as water use audits of customers with irrigation meters are completed and a baseline efficiency landscape irrigation standard is set for water delivered per acre, the acreage served by each meter will function as the multiplier for calculation of each landscape irrigation customer's consumption allotment.

SECTION 6. Revision of Tiered Rate Structure. The current ascending tiered rate structure was developed and has been implemented to promote water conservation in the District and shall apply in conservation stages 1 and 2 (as hereinafter defined) unless this Ordinance or the current rate structures are amended by the Board of Directors. At such time as conservation stage 3 or 4 is implemented (in accordance with Section 8 of this Ordinance) the General Manager of the District shall also propose specific allotments and rates as necessary to ensure that the required level of water conservation is met in the District. When the Board implements conservation stage 3 or 4, the Board shall, at the same meeting, adopt or modify and adopt such proposed allotments and rates.

SECTION 7. Water Conservation Stages. In accordance with the District's Drought Contingency Plan Proposal, adopted on June 18, 1990 in response to announcements by the agencies supplying water to Southern California to reduce the demand for water, this District Comprehensive Water Conservation Program consists of four stages. The voluntary conservation stage (stage 1) shall remain in effect at all times until or unless a mandatory conservation stage is implemented in accordance with the provisions of this Ordinance. The mandatory conservation stages (stages 2, 3 and 4) shall take effect upon implementation by the Board in accordance with Section 8.

A. Stage 1 - Voluntary Conservation. District customers are encouraged to voluntarily conserve water during stage 1. District customers are specifically requested to voluntarily implement the mandatory water use restrictions set forth in stages 2, 3 and 4 to the extent feasible.

B. Stage 2 - Mandatory Conservation -- Drought Conditions. The following water conservation measures shall apply during stage 2:

1. Washing of autos, trucks, trailers, boats, airplanes and other types of mobile equipment shall be prohibited unless done with a hand-held bucket and a hand-held hose equipped with a positive shut-off nozzle for quick rinses or on the immediate premises of a commercial car wash.

2. Water shall not be used to wash down sidewalks, driveways, parking areas, tennis courts, patios or other paved areas, except to alleviate immediate fire or sanitation hazards.

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

4. Non-potable water shall be used wherever possible.

5. Construction water customers shall be required to use non-domestic District water as prescribed by a Board approved list of construction water uses. Construction water customers shall be prohibited from using any type of water for dust control in improved areas, street cleaning, rain clean-up or flushing of storm drains.

C. Stage 3 - Mandatory Conservation - Serious Drought Conditions. In addition to the mandatory water conservation measures for stage 2, the following water conservation measures shall apply during stage 3:

1. All outdoor irrigation, including residential lawn watering, shall be permitted only between the hours of 6:00 p.m. and 6:00 a.m. the following morning.

2. Agricultural users and commercial nurseries as defined in the Metropolitan Water District Code shall use water only between the hours of 6:00 p.m. and 6:00 a.m. the following morning. The watering of livestock and irrigation of propagation beds are permitted at any time.

3. Washing of autos, trucks, trailers, boats, airplanes or other types of mobile equipment is prohibited. Washing is permitted at any time on the immediate premises of a commercial car wash. The use of water by all types of commercial car washes not using partially reclaimed or recycled water shall be reduced in volume by 20%. Further, such washings are exempted from these regulations where the health, safety and welfare of the public is contingent upon frequent vehicle cleaning such as garbage trucks and vehicles used to transport food and perishables.

4. Filling or refilling of artificial lakes shall only be permitted by, and in accordance with the provisions of, an artificial lake filling permit obtained from the District General Manager or his designee.

5. The operation of any ornamental fountain or similar structure, unless the water is recycled or the water is non-potable, is prohibited.

6. The use of domestic water for construction purposes shall only be permitted by, and in accordance with the provisions of, a construction water use permit obtained from the District General Manager or his designee.

D. Stage 4 - Mandatory Conservation - Severe Drought Conditions. In addition to the mandatory water conservation measures for stages 2 and 3, the following water conservation measures shall apply during stage 4:

1. All outdoor irrigation is prohibited.

2. Use of water for agricultural or commercial nursery purposes is prohibited, except for livestock watering.

3. Washing of autos, trucks, trailers, boats, airplanes or other types of mobile equipment is prohibited. Washing is permitted at any time upon the immediate premises of a commercial car wash. The use of water by all types of commercial car washes shall be reduced in volume by 50%. Further, such washings are exempted from these

regulations where the health, safety and welfare of the public is contingent upon frequent vehicle cleaning such as garbage trucks and vehicles used to transport food and perishables.

4. Filling, refilling or adding of water to swimming pools, spas, ponds or artificial lakes is prohibited.

5. Use of domestic water for construction purposes is prohibited.

SECTION 8. Mandatory Conservation Stage Implementation. The District shall monitor the projected supply and demand for water by its customers on daily basis. The Board shall determine the extent of the conservation required through implementation or termination of particular conservation stages in order for the District to prudently plan for and supply water to its customers. The Board may order that the appropriate stage of water conservation be implemented or terminated by resolution adopted in accordance with this Ordinance. Adoption of a resolution implementing any stage beyond stage 1 shall be made at a public meeting of the Board after notice published at least once in a newspaper of general circulation. Adoption of a resolution terminating any stage shall be made at a public meeting of the Board. Implementation or termination of the designated conservation stage shall become effective immediately upon adoption of either such resolution.

SECTION 9. Exemptions. Customers may be exempted from application of this Ordinance for a certain type of use if the General Manager of the District issues a permit allowing such use and if such permit issuance is based on a finding that enforcement of the applicable restriction would either (1) cause an unnecessary and undue hardship to the customer applying for such permit or the public, or (2) cause or threaten an emergency condition affecting the health, sanitation, fire protection, or safety of the customer or the public. The General Manager of the District may require the installation and use of such water conservation devices or practices as he deems appropriate as a condition of the exemption permit.

SECTION 10. Enforcement. No customer of the District shall knowingly make, cause, use or permit the use of water supplied by the District for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Ordinance, in an amount in excess of the amounts authorized by this Ordinance, or during any period of time other than the period of time specified in this Ordinance. At no time shall water be wasted or used

unreasonably. Any violation of this Ordinance is a misdemeanor. Upon conviction thereof such person may be punished by imprisonment in the county jail for not more than 30 days, or by fine not exceeding one thousand dollars ($1,000), or by both. During any mandatory conservation stage, any customer who violates the provisions of this Ordinance by either excess use of water or by specific violation of one or more of the applicable water use restrictions for a particular mandatory conservation stage may also be cited by a District representative in accordance with the provisions of subsection A or B of this Section, as applicable.

A. Excess Use of Water.

(1) First Violation. Any customer using more than the maximum first tier consumption allotment for the applicable mandatory conservation stage (stage 2, 3 or 4) during any billing period in which a mandatory conservation stage is implemented shall receive a written warning that such use is considered waste of water and that a reduction in use is required to avoid being subject to the enforcement provisions of this Ordinance.

(2) Second Violation. Any customer using more than the maximum first tier consumption allotment for the applicable mandatory conservation stage during any two billing periods in which a mandatory conservation stage is implemented shall receive a written warning that such use is considered a waste of water and that a reduction of use is required to avoid installation of a flow restriction device in such customer's meter.

(3) Third Violation. Any customer using more than the maximum first tier consumption allotment for the applicable mandatory conservation stage during any three billing periods in which a mandatory conservation stage is implemented shall have a flow restriction device installed for a period of not more than 15 days. However, the Board shall have discretion to require that the device remain in the customer's meter for not more than an additional 15 days. At the end of such period and upon payment of all fees and charges then due, the District shall

remove the flow restriction device. In no event shall any customer have a flow restriction device installed for longer than 30 days.

B. Violation of Water Use Restrictions.

(1) First Violation. Any customer found by the District to be violating one or more of the restrictions on water use set forth in Section 7 of this Ordinance during any mandatory conservation stage shall receive a written warning that such use is considered a waste of water and that such use must be discontinued to avoid being subject to the enforcement provisions of this Ordinance.

(2) Second Violation. In the event that a second violation is found by the District during any mandatory conservation stage, the customer shall receive a written warning which describes the penalty for subsequent violations.

(3) Third Violation. In the event that a third violation is found by the District during any mandatory conservation stage, the District shall add a charge not to exceed $100 (or not to exceed $500 for a violation of 7-B(5) of Section 7) to the next water bill of the premises for which or upon which the violation has occurred. The charge shall double for each successive violation during any mandatory conservation stage.

SECTION 11. Rules and Regulations for Water Service. The provisions of this Ordinance are in addition to all other District Rules and Regulations for Water Service, and in the event of a conflict between this Ordinance and other rules and regulations relating to the same subject matter, the conflict shall, insofar as practical, be resolved to implement the purposes of this Ordinance.

SECTION 12. Severability. If any section, subsection, sentence, clause or phrase of this Ordinance is for any reason held to be unconstitutional or invalid by a court of competent jurisdiction, such decision shall not affect the remaining portions of his Ordinance and those shall remain in full force and effect.

SECTION 13. CEQA Exemption. The District finds that this Ordinance and actions taken hereafter pursuant to this Ordinance are exempt from the California Environmental Quality Act pursuant of Public Resources Code Section 21080(b)(4) and California Code of Regulations, Title 14, Section 15301. The General Manager of the District is hereby authorized and directed to file a Notice of Exemption as soon as possible following adoption of this Ordinance.

SECTION 14. Effective Date and Publication. This Ordinance shall become effective as of the date of adoption and shall be published within ten days of adoption, pursuant to the California Water Code Section 376.

ADOPTED, SIGNED AND APPROVED this 15th day of April, 1991.

President of the Board of
Directors of the Santa Margarita
Water District

(SEAL)

ATTEST:

Secretary of the Board of
Directors of the Santa Margarita
Water District

STATE OF CALIFORNIA)
) ss.
COUNTY OF ORANGE)

I, FRITZ R. STRADLING, Secretary of the Board of Directors of the Santa Margarita Water District, do hereby certify that the foregoing ordinance was duly adopted by the Board of Directors of said District at a regular meeting held on the 15th day of April, 1991, and that it was so adopted by the following vote:

AYES: DIRECTORS: SCHONE, BOULTINGHOUSE, VAN DAM, MOORE, KRASHO

NOES: DIRECTORS: NONE

ABSENT: DIRECTORS: NONE

ABSTAIN: DIRECTORS: NONE

Secretary of the Board of Directors
of Santa Margarita Water District

(SEAL)

STATE OF CALIFORNIA)
) ss.
COUNTY OF ORANGE)

I, FRITZ R. STRADLING, Secretary of the Board of Directors of the Santa Margarita Water District, do hereby certify that the above and foregoing is a full, true and correct copy of ORDINANCE NO. O-91-4-01, of said Board, and that the same has not been amended or repealed.

DATED: April 15, 1991

Secretary of the Board of Directors
of Santa Margarita Water District

(SEAL)